NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

<table>
<thead>
<tr>
<th>Type of Survey:</th>
<th>Navigable Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registry Number:</td>
<td>H10957</td>
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LOCALITY

<table>
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<tr>
<td>General Locality:</td>
<td>Dry Tortugas, Florida</td>
</tr>
<tr>
<td>Sub-locality:</td>
<td>Tortugas Bank Vicinity</td>
</tr>
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2004

CHIEF OF PARTY
LCDR Donald W. Haines, NOAA

LIBRARY & ARCHIVES
DATE
Florida

Dry Tortugas, Florida

Tortugas Bank Vicinity

1:40,000

5/18/00 to 6/27/00

5/28/04 to 6/4/04

05/24/04

S-H903-TJ-04

NOAA Ship THOMAS JEFFERSON, S-222

LCDR Donald W. Haines, NOAA

THOMAS JEFFERSON Personnel

Kongsberg Simrad EM1002 Multibeam Echosounder

Reson 8101 Multibeam Echosounder (MBES)

Odom Echotrak MKII Vertical Beam Echosounder (VBES)

N/A

N/A

N/A

Atlantic Hydrographic Branch Personnel

Feet Meters at MLLW

Red, bold, italic notes in descriptive report were made during office processing

1) All Times are UTC.
2) This is a Navigable Area Hydrographic Survey.
3) Projection is UTM Zone 17.
TABLE OF CONTENTS

A. AREA SURVEYED .............................................................................................................. 1

B. DATA ACQUISITION AND PROCESSING .................................................................... 3
   EQUIPMENT ..................................................................................................................... 3
   QUALITY CONTROL ..................................................................................................... 3
      Side Scan Sonar Quality Control .......................................................... 3
      Multibeam Echosounder Quality Control ........................................... 3
      Crosslines ................................................................................................................. 4
      Junctions .................................................................................................................... 5
   CORRECTIONS TO ECHO SOUNDING ................................................................. 6

C. VERTICAL AND HORIZONTAL CONTROL ............................................................ 6
   VERTICAL CONTROL .......................................................................................... 6
   HORIZONTAL CONTROL .................................................................................... 6

D. RESULTS AND RECOMMENDATIONS ..................................................................... 7
   CHART COMPARISON ............................................................................................ 7
      General Agreement with Charted Soundings, Features, and Notes .................. 7
   ADDITIONAL RESULTS .......................................................................................... 7
      Aids to Navigation and Other Detached Positions .......................................... 7
      Bridges and Overhead Cables ........................................................................... 7
      Ferry Routes .......................................................................................................... 8
      Submarine Cables and Pipelines ..................................................................... 8
      Tidal Conditions .................................................................................................. 8

E. APPROVAL SHEET ..................................................................................................... 9

APPENDICES

APPENDIX I – ITEM INVESTIGATION REPORTS *
APPENDIX II – LIST OF GEOGRAPHIC NAMES *
APPENDIX III – PROGRESS SKETCH *
APPENDIX IV – TIDE AND WATER LEVELS *
APPENDIX V – SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCES *

*Data filed with original field records.
DESCRIPTIVE REPORT
to accompany
HYDROGRAPHIC SURVEY H10957

Scale of Survey: 1:40,000
Year of Survey: 2004
NOAA Ship THOMAS JEFFERSON
LCDR Donald W. Haines, Commanding

A. AREA SURVEYED

This hydrographic survey was conducted in accordance with Hydrographic Survey Letter Instructions* for project S-H903-TJ-04, Tortugas Bank Vicinity, Dry Tortugas, Florida. The original instructions are dated April 29, 2004.

This Descriptive Report pertains to sheet "A" of project S-H903_TJ-04. The assigned registry number for this sheet is H10957, as prescribed in the Letter Instructions.

This special project responds to a request from the National Marine Sanctuaries of the National Ocean Service (NOS). The results of this project will provide various types of hydrographic survey data sets to assist in the monitoring of a “no-take” ecological reserve in the Tortugas region which took effect July 1, 2001. This reserve protects some of the richest coral reef habitat found within the Florida Keys National Marine Sanctuary (FKNMS). Much of this habitat remains unmapped in detail with modern survey technology due to its remote location.

For complete survey limits, see the chartlet on the following page.

*Data filed with original field records.
B. DATA ACQUISITION AND PROCESSING

EQUIPMENT  See also the Evaluation Report

Data were acquired by NOAA Ship THOMAS JEFFERSON. NOAA Ship THOMAS JEFFERSON is a 63.4-meter hydrographic survey vessel with an average transducer draft of 4.6 meters.

NOAA Ship THOMAS JEFFERSON acquired multibeam echosounder (MBES) data with a SIMRAD 1002. Single beam echo sounder data was acquired with an Odom Echotrac DF3200 MK II echosounder, although this data were not processed.

NOAA Ship THOMAS JEFFERSON positioning and attitude data were determined with a TSS POS/MV 320 Version 3 DGPS-aided inertial navigation system.

This survey is the completion of what NOAA Ship WHITING started in 2000. WHITING acquired side scan data with a Klein 5000. Vertical beam data were acquired using an Odom Echotrac DF3200 MKII echosounder. WHITING’s positioning system was a Trimble DSM212L and the attitude data was acquired using a TSS DMS-05 Dynamic Motion Sensor. Launch 1005 used a Reson SeaBat 8101 MBES with a TSS POS/MV (version 2) for position and attitude data. See Appendix V for Supplemental Data Acquisition and Processing Report.

Launch data in 2004 could not be acquired due to structural integrity issues with the launch davit pick-points. See email in Appendix V*.

No unusual vessel configurations or problems were encountered. Refer to the THOMAS JEFFERSON Spring 2004 Data Acquisition and Processing Report (DAPR*) for detailed equipment and vessel configuration information.

*Data filed with original field records.

QUALITY CONTROL

Side Scan Sonar Quality Control

No side scan data was acquired by THOMAS JEFFERSON for this project. Side scan data used in the feature report were acquired by WHITING in 2000. See Appendix V.

Multibeam Echosounder (MBES) Quality Control

There were no faults with the MBES system which affected data integrity. Daily confidence checks examining the internal consistency of the MBES were made by
Some differences (0.3-0.8m) were noted between the VBES data acquired by WHITING in 2000 and the MBES data acquired by THOMAS JEFFERSON in 2004. These depth differences are likely the result of a number of different sources. The beam footprint uncertainties associated with the VBES system (8 degrees for the ODOM VBES versus 2 degrees for the em1002 MBES) and irregular bottom (coral) could contribute to this depth difference. Furthermore, the significant amount of time that elapsed between acquisitions (4 years) could have resulted in bottom change in the survey area. Although these errors exceed the NOS accuracy requirements for depth soundings (0.5m for 20 meters depth), the hydrographer recommends using all available bathymetric data for this survey to update the relevant nautical charts. 

Concur.

Crosslines

Seventy-two nm of crosslines (4.9% of the 1444 nm of mainscheme MBES and VBES data) were acquired. No traditional crossline comparison was performed on the multibeam data because quality control procedures have been incorporated into the depth and uncertainty models produced by CARIS 5.4. Concur.

BASE Surface and Total Propagated Error

CARIS HIPS BASE (Bathymetry with Associated Statistical Error) surfaces for this survey were created at 2-meter resolution for depths greater than 30 meters, 1-meter for depths between 15 and 30 meters, and 0.5m-resolution for depths less than 15 meters

1. Density: The MBES data acquired by THOMAS JEFFERSON in 2004 was used to complete the survey done by WHITING in 2000. During acquisition, daily coverage BASE grids were created and holiday line plans derived from these grids. This survey was designed to meet specs and deliverables. Concur.

2. Uncertainty: An examination of the uncertainty grid was performed and the high uncertainty areas were examined in CARIS subset editor.

3. Standard Deviation: Areas of high standard deviation were investigated and resolved. High standard deviation areas were investigated in CARIS subset editor. True fliers were examined and rejected. High standard deviation areas caused by natural geologic features or submerged anthropogenic objects were also investigated by the Hydrographer. Concur.
Twenty-six coverage BASE Surfaces and two combined BASE Surfaces were created for this project. Some field sheets had to have separate BASE surfaces created for the 2000 and 2004 data to avoid CARIS crashing during finalization. The combined BASE surfaces were created at 4-meter resolution to facilitate easier insertion into Pydro. See tables on next two pages.

**BASE Surfaces used in the combined surface H10957_combine_north**

<table>
<thead>
<tr>
<th>NAME</th>
<th>PURPOSE</th>
<th>RESOLUTION (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H10957_1A_2m_Final</td>
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</tr>
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<tr>
<td>H10957_1e_1m_Final</td>
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</tr>
<tr>
<td>H10957_1F_2000_2m_Final</td>
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<td>H10957_1F_2004_2m_Final</td>
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<tr>
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<td>H10957_combine_north</td>
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**BASE Surfaces used in the combined surface H10957_south_combined**

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<td>H10957_south_a_2m_Final</td>
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<td>H10957_south_b_1m_Final</td>
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<tr>
<td>H10957_south_e_2m_Final</td>
<td>Coverage</td>
<td>2</td>
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</tbody>
</table>

**Junctions**

There are no contemporary surveys with which to junction. *Concur.*
CORRECTIONS TO ECHO SOUNDING

No SVP data was available for days 176-179 in 2000, so the 2000 master SVP file was recreated with SVP correction applied based on distance only. This did not adversely affect data quality. The 2004 data used SVP correction based on nearest in time. *Concur.*

Besides the above SVP issue, all methods or instruments used for 2004 acquisition were as described in the project DAPR. A table detailing all sound velocity casts is located in Separate III*. *Filed with original field records.*

C. VERTICAL AND HORIZONTAL CONTROL

VERTICAL CONTROL

The tidal datum for this project is Mean Lower Low Water (MLLW). Preliminary zones are based on the gauge at Key West, FL (872-4580). A tertiary tide gauge was installed on Loggerhead Key (872-4698) for this project.

Verified tides from the tide station at Key West, FL (872-4580) were applied to all data using preliminary zoning.

See table below for preliminary zones and correctors used for this survey.

<table>
<thead>
<tr>
<th>ZONE NAME</th>
<th>CORRECTOR (min)</th>
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<tr>
<td>SEG502</td>
<td>+18</td>
<td>0.83</td>
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A Request for Approved Tides letter was sent to N/OPS1 on June 9, 2004 (Appendix IV. *Final tides were applied in the office using final tidal zoning.*

HORIZONTAL CONTROL

The horizontal datum used for this survey is the North American Datum of 1983 (NAD 83), projected using UTM zone 17. *Concur.*

Horizontal position was determined using the Global Positioning System (GPS) corrected by U.S. Coast Guard differential GPS (DGPS) beacon stations. The primary and only DGPS beacon used for this survey was Key West, FL. No horizontal control stations were established for this survey.
A Vertical and Horizontal Control report was submitted for this survey. This report, dated June 14, 2004, was submitted on June 15, 2004. *See also the Evaluation Report.*

**D. RESULTS AND RECOMMENDATIONS**

**CHART COMPARISON**

There are 3 charts affected by this survey:

<table>
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<th>Number</th>
<th>Version</th>
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<th>Scale</th>
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<td>11438</td>
<td>12&lt;sup&gt;th&lt;/sup&gt; Ed.</td>
<td>04/01/04</td>
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<tr>
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<tr>
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<td>03/01/03</td>
<td>1:470,940</td>
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</table>

**General Agreement with Charted Soundings, Features, and Notes**

Sounding data agreed well with charted depths. Discrete differences are addressed in the “AWOIS,” and “Significant Uncharted Features” sections in Appendix I. *Concur.*

**AWOIS Items and Significant Contacts**

There were 4 investigated AWOIS items and 4 significant uncharted items. No MBES data was acquired over AWOIS #12397, and is noted in Appendix I. No DTOV’s were submitted for this project in 2004. *Concur.*

**ADDITIONAL RESULTS**

**Aids to Navigation and Other Detached Positions**

There were no aids to navigation or detached positions on this survey. *Concur.*

**Bridges and Overhead Cables**

There were no bridges or overhead cables on this survey. *Concur.*
Ferry Routes

There were no ferry routes on this survey. *Concur.*

Submarine Cables and Pipelines

There were no submarine cables or pipelines on this survey. *Concur.*

Tidal Conditions

No unusual tidal conditions were encountered. *Concur.*
E. APPROVAL SHEET

S-H903-TJ-04
Dry Tortugas, Florida
Tortugas Bank Vicinity
Survey Registry No. H10957

Field operations for this basic hydrographic survey were conducted under my daily supervision with frequent checks of progress and adequacy. All bathymetry models, this Descriptive Report, and all accompanying records and data are approved.

This survey is adequate to supersede all prior surveys in common areas and for application to the relevant NOS nautical charts.

Also submitted in association with this descriptive report has been a series of reports and data:

- SEPARATES TO ACCOMPANY PROJECT S-H903-TJ-04, SHEET A, H10957
- DATA ACQUISITION AND PROCESSING REPORT (dated March-June, 2004; submitted 8/26/04)
- HORIZONTAL AND VERTICAL CONTROL REPORT (dated 06/14/04; submitted 06/15/04)

Respectfully Submitted:

[Signature]
ENS Andrew P. Seaman, NOAA
Junior Officer/Hydrographer

Approved and Forwarded:

[Signature]  [Signature]
LT Marc S. Moser, NOAA  LCDR Donald W. Haines, NOAA
Field Operations Officer  Commanding Officer
APPENDIX I

ITEM INVESTIGATION REPORTS

The following are item investigation reports detailing two groups of features:

1) AWOIS Items
2) Significant Uncharted Features
H10957 Descriptive Report Features

Registry Number: H10957
State: Florida
Locality: Dry Tortugas, FL
Sub-locality: Tortugas Bank Vicinity
Project Number: S-H903-TJ-04
Survey Dates: 05/21/2000 - 06/02/2004

Charts Affected

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<td>27th Ed.</td>
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<td>1:470940</td>
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<td>31st Ed.</td>
<td>09/01/2003</td>
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<td>11013</td>
<td>45th Ed.</td>
<td>07/01/2003</td>
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<td>411</td>
<td>49th Ed.</td>
<td>03/01/2003</td>
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Features

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<th>Name</th>
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<th>Survey Latitude</th>
<th>Survey Longitude</th>
<th>AWOIS Item</th>
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</thead>
<tbody>
<tr>
<td>1.1</td>
<td>UNCHARTED 39-FT Sounding</td>
<td>Shoal</td>
<td>11.86 m</td>
<td>024° 38' 47.121&quot; N</td>
<td>83° 04' 39.250&quot; W</td>
<td>---</td>
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<tr>
<td>1.2</td>
<td>UNCHARTED 42-FT Sounding</td>
<td>Shoal</td>
<td>13.01 m</td>
<td>024° 40' 52.770&quot; N</td>
<td>83° 01' 54.792&quot; W</td>
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<tr>
<td>1.3</td>
<td>UNCHARTED 42-FT Sounding</td>
<td>Shoal</td>
<td>12.80 m</td>
<td>024° 40' 46.038&quot; N</td>
<td>83° 02' 16.716&quot; W</td>
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<td>1.4</td>
<td>UNCHARTED 47-FT Sounding</td>
<td>Shoal</td>
<td>14.46 m</td>
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<td>[no data]</td>
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1 - New Features
1.1) Profile/Beam - 98/59 from h10957 / s222_mb / 2004-154 / 0502_20040602_120138_raw

Survey Summary

Survey Position: 024° 38' 47.121" N, 83° 04' 39.250" W
Least Depth: 11.86 m
Profile/Beam: 98/59
Charts Affected: 11434_1, 1113A_1, 11420_1, 11006_1, 11013_1, 411_1

Remarks:
100% SSS and 100% MBES was acquired over the area and a sounding was found in this position.

Feature Correlation

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<th>Address</th>
<th>Feature</th>
<th>Range</th>
<th>Azimuth</th>
<th>Status</th>
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<td>648/31</td>
<td>8.63</td>
<td>205.9</td>
<td>Secondary</td>
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Hydrographer Recommendations

Chart as per digital data.

Cartographically-Rounded Depth (Affected Charts):
6 ½fm (11434_1, 1113A_1, 11420_1, 11006_1, 11013_1, 411_1)

S-57 Data

[None]

Office Notes

Concur with clarification. Coral head is present, annotate the seabed area with a coral head in Latitude 24°38'53.123"N, Longitude 83°04'37.883"W. Least depth of the coral mound is 11.844m (6.476 fathoms \ 38.856ft). Current charted depths in the immediate area are 8 fathoms. Recommend to chart a 6 1/2 fathoms sounding in Latitude 24°38'49.373"N, Longitude 83°04'35.379"W.
1.2) Profile/Beam - 1067/9 from h10957 / wh05 / 2000-142 / 113_1609

Survey Summary

Survey Position: 024° 40' 52.770" N, 83° 01' 54.792" W
Least Depth: 13.01 m
Timestamp: 2000-142.16:13:07.113 (05/21/2000)
Survey Line: h10957 / wh05 / 2000-142 / 113_1609
Profile/Beam: 1067/9
Charts Affected: 11434_1, 1113a_1, 11420_1, 11006_1, 11013_1, 411_1

Remarks:
100% MBES was acquired over the area and a sounding was found in this position.

Feature Correlation

<table>
<thead>
<tr>
<th>Address</th>
<th>Feature</th>
<th>Range</th>
<th>Azimuth</th>
<th>Status</th>
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<tbody>
<tr>
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<td>1067/9</td>
<td>0.00</td>
<td>000.0</td>
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Hydrographer Recommendations

Chart as per digital data.

Cartographically-Rounded Depth (Affected Charts):
7fm (11434_1, 1113A_1, 11420_1, 11006_1, 11013_1, 411_1)

S-57 Data

Geo object 1: Seabed area (SBDARE)
Attributes: NATSUR - 14:coral
WATLEV - 3:always under water/submerged
Geo object 2: Sounding (SOUNDG)
Attributes: INFORM - 100% MBES was acquired over the area and a sounding was found in this position.

Office Notes

Concur with clarification. Coral head is present, annotate the seabed area with a coral head in Latitude 24°40'52.72"N, Longitude 83°01'50.46"W. Least depth of the coral mound is 13.00m (7.0 fathoms). Current charted
depths in the immediate area are 11 fathoms. Recommend to chart a 7 fathoms sounding in Latitude 24°40'52.760"N Longitude 83°01'54.800"W.
1.3) Profile/Beam - 565/84 from h10957 / wh05 / 2000-143 / 124_1558

Survey Summary

Survey Position: 024° 40' 46.038" N, 83° 02' 16.716" W
Least Depth: 12.80 m
Timestamp: 2000-143.15:59:46.524 (05/22/2000)
Survey Line: h10957 / wh05 / 2000-143 / 124_1558
Profile/Beam: 565/84
Charts Affected: 11434_1, 1113A_1, 11420_1, 11006_1, 11013_1, 411_1

Remarks:
100% MBES was acquired over the area and a sounding was found in this position.

Feature Correlation

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Hydrographer Recommendations

Chart as per digital data.

Cartographically-Rounded Depth (Affected Charts):
7fm (11434_1, 1113A_1, 11420_1, 11006_1, 11013_1, 411_1)

S-57 Data

Geo object 1: Seabed area (SBDARE)
Attributes: NATSUR - 14:coral
            WATLEV - 3:always under water/submerged
Geo object 2: Sounding (SOUNDG)
Attributes: INFORM - 100% MBES was acquired over the area and a sounding was found in this position.

Office Notes

Concur with clarification. Coral head is present, annotate the seabed area with a coral head in Latitude 24°40'41.592"N, Longitude 83°02'16.572"W. Least depth of the coral mound is 12.80m (6.999 fathoms / 41.994-ft). Current
charted depths in the immediate area are 11 fathoms. Recommend to chart a 7 fathoms sounding in Latitude 24°40'46.028"N, Longitude 83°02'16.708"W.
1.4) Profile/Beam - 3619/87 from h10957 / wh05 / 2000-144 / 602_2308

Survey Summary

Survey Position: 024° 41' 08.587" N, 83° 03' 00.672" W
Least Depth: 14.46 m
Survey Line: h10957 / wh05 / 2000-144 / 602_2308
Profile/Beam: 3619/87
Charts Affected: 11434_1, 1113A_1, 11420_1, 11006_1, 11013_1, 411_1

Remarks:
100% MBES was acquired over the area and a sounding was found in this position.

Feature Correlation

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Hydrographer Recommendations

Chart as per digital data.

Cartographically-Rounded Depth (Affected Charts):
7 ¾fm (11434_1, 1113A_1, 11420_1, 11006_1, 11013_1, 411_1)

S-57 Data

Geo object 1: Seabed area (SBDARE)
Attributes: NATSUR - 14:coral
WATLEV - 3:always under water/submerged

Geo object 2: Sounding (SOUNDG)
Attributes: INFORM - 100% MBES was acquired over the area and a sounding was found in this position.

Office Notes

Concur with clarification. Coral head is present, annotate the seabed area with a coral head in Latitude 24°41’09.021”N, Longitude 83°02’53.333”W. Least depth of the coral mound is 14.46m (7.906 fathoms / 47.440-ft).
Current charted depths in the immediate area are 11 fathoms. Recommend to chart a 7 3/4 fathoms sounding in Latitude 24°41'08.602"N, Longitude 83°03'00.684"W.
2 - AWOIS Features
2.1) AWOIS #12396 - AWOIS 12396

No Primary Survey Feature for this AWOIS Item

Search Position: 024° 36' 00.730" N, 83° 03' 23.670" W
Historical Depth: 20.12 m
Search Radius: 10
Search Technique: ES, S2, MB, DI, SD
Technique Notes: [None]

History Notes:
NOAA SHIP WHITING IDENTIFIED THIS ITEM AS A DANGER TO NAVIGATION DURING SURVEY OPERATIONS IN DRY TORTUGAS FLORIDA IN FY2000. A DANGER TO NAVIGATION REPORT WAS COMPOSED BUT NOT SUBMITTED [ENTERED 4/5/2004 BY JCM]

Survey Summary

Charts Affected: 11434_1, 1113A_1, 11420_1, 11006_1, 11013_1, 411_1

Remarks:
100% SSS and 100% MBES was acquired over this position and a sounding was found.

Feature Correlation

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Hydrographer Recommendations

Chart as per digital data.

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: INFORM - 100% SSS and 100% MBES was acquired over this position and a sounding was found.
Office Notes

Concur with clarification. No feature with the AWOIS listed depth was identified in the area, a natural rise in the seafloor is present. AWOIS Item 12396 is considered disproven, update the database. Chart present survey soundings in the common area.
2.2) AWOIS #12397 - AWOIS 12397

No Primary Survey Feature for this AWOIS Item

Search Position: 024° 38' 54.380" N, 83° 04' 05.910" W
Historical Depth: 10.06 m
Search Radius: 10
Search Technique: ES, S2, MB, DI, SD
Technique Notes: [None]

History Notes:
NOAA SHIP WHITING IDENTIFIED THIS ITEM AS A DANGER TO NAVIGATION DURING SURVEY OPERATIONS IN DRY TORTUGAS FLORIDA IN FY2000. A DANGER TO NAVIGATION REPORT WAS COMPOSED BUT NOT SUBMITTED [ENTERED 4/5/2004 BY JCM]

Survey Summary

Charts Affected: 11434_1, 1113A_1, 11420_1, 11006_1, 11013_1, 411_1

Remarks:
There was no MBES data acquired over this AWOIS. Historical bathymetry was determined from the VBES data acquired by WHITING in 2000, and a sounding was found in this position.

Feature Correlation

<table>
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<tr>
<th>Address</th>
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<th>Range</th>
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Hydrographer Recommendations

Chart as per digital data.

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: INFORM - There was no MBES data acquired over this AWOIS. Historical bathymetry was determined from the VBES data acquired by WHITING in 2000, and a sounding was found in this position.
Office Notes

Concur with clarification. No feature was identified in the area, AWOIS Item 12398 is considered disproven, update the database. Chart present survey soundings in the common area.
2.3) AWOIS #12398 - AWOIS 12398

No Primary Survey Feature for this AWOIS Item

Search Position: 024° 38' 19.420" N, 83° 04' 53.250" W
Historical Depth: 11.43 m
Search Radius: 10
Search Technique: ES, S2, MB, DI, SD
Technique Notes: [None]

History Notes:
NOAA SHIP WHITING IDENTIFIED THIS ITEM AS A DANGER TO NAVIGATION DURING SURVEY OPERATIONS IN DRY TORTUGAS FLORIDA IN FY2000. A DANGER TO NAVIGATION REPORT WAS COMPOSED BUT NOT SUBMITTED [ENTERED 4/5/2004 BY JCM]

Survey Summary

Charts Affected: 11434_1, 1113A_1, 11420_1, 11006_1, 11013_1, 411_1

Remarks:
100% SSS and 100% MBES was acquired over this position and a sounding was found.

Feature Correlation

<table>
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</table>

Hydrographer Recommendations

Chart as per digital data.

S-57 Data

Geo object 1: Seabed area (SBDARE)
Attributes:
- NATSUR - 14:coral
- WATLEV - 3:always under water/submerged

Geo object 2: Sounding (SOUNDG)
Attributes:
- INFORM - 100% SSS and 100% MBES was acquired over this position and a sounding was found.
Concur with clarification. AWOIS Item 12398 is a coral head. Least depth of the coral mound is 11.924m (6.52 fathoms). Current charted depths in the immediate area are 8 fathoms. Recommend to chart a 6 1/2 fathoms sounding in Latitude 24°38'18.972"N, Longitude 83°04'52.797"W. Chart a seabed classification of coral in Latitude 24°38'19.955"N, Longitude 83°04'44.283"W.
2.4) AWOIS #12399 - AWOIS 12399

No Primary Survey Feature for this AWOIS Item

Search Position: 024° 37' 12.160" N, 83° 05' 03.190" W
Historical Depth: 11.89 m
Search Radius: 10
Search Technique: ES, S2, MB, DI, SD
Technique Notes: [None]

History Notes:
NOAA SHIP WHITING IDENTIFIED THIS ITEM AS A DANGER TO NAVIGATION DURING SURVEY OPERATIONS IN DRY TORTUGAS FLORIDA IN FY2000. DANGER TO NAVIGATION REPORT WAS COMPOSED BUT NOT SUBMITTED [ENTERED 4/5/2004 BY JCM]

Survey Summary

Charts Affected: 11434_1, 1113A_1, 11420_1, 11006_1, 11013_1, 411_1

Remarks:
100% SSS and 100% MBES was acquired over this position and a sounding was found.

Feature Correlation

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Hydrographer Recommendations

Chart as per digital data.

S-57 Data

Geo object 1: Seabed area (SBDARE)
Attributes: NATSUR - 14:coral
WATLEV - 3:always under water/submerged
Geo object 2: Sounding (SOUNDG)
**Attributes:** INFORM - 100% SSS and 100% MBES was acquired over this position and a sounding was found.

**Office Notes**

Concur with clarification AWOIS Item 12399 is a coral head. Least depth of the coral mound is 12.255m (6.701 fathoms / 40.207-ft). Current charted depths in the immediate area are 6 3/4 fathoms. Recommend to chart a 6.7 fathom sounding in 24°37'11.862"N Latitude, 83°05'02.743"W Longitude. and annotate a seabed classification of coral in 24°37'05.528"N Latitude, 83°05'00.612"W Longitude.
DATE: December 10, 2004

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: S-H903-TJ-2004
HYDROGRAPHIC SHEET: H10957

LOCALITY: Tortugas Bank Vicinity, Dry Tortugas, FL
TIME PERIOD: May 18 - June 26, 2000
May 28 - June 4, 2004

TIDE STATION USED: 872-4698 Loggerhead Key, FL
Lat. 24° 37.9'N Lon. 82° 55.2'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.423 meters

TIDE STATION USED: 872-4580 Key West, FL
Lat. 24° 33.2'N Lon. 81° 48.5'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.463 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: SEG501, SEG502, SEG503, SEG504 & SEG505

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the new 1983-2001 National Tidal Datum Epoch (NTDE).

Note 2: Use tide data from the appropriate station with applicable zoning correctors for each zone according to the order in which they are listed in the Tidezone corrector file (.ZDF). For example, tide station one (TS1) would be the first choice for an applicable zone followed by TS2, etc. when data are not available.

CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION
This Evaluation Report has been written to supplement and/or clarify the original Descriptive Report. Sections in this report refer to the corresponding sections of the Descriptive Report.

B. DATA ACQUISITION AND PROCESSING

B.1 Equipment

The following software was used to process and review data at the Atlantic Hydrographic Branch (AHB):

- CARIS HIPS/SIPS version 6.0 service pack 2
- CARIS BASE Editor 1.0
- CARIS HOM 3.3 service pack 3
- PYDRO, version 6.4.9 HF 11
- dKart Inspector 5.0 build 732

B.2 HOM Processing

Chart compilation was done by Atlantic Hydrographic Branch personnel in Norfolk, Virginia. Compilation data will be forwarded to Marine Chart Division, Silver Spring, Maryland.

H-Cells

The survey falls across three charts, one with depths listed in feet (chart 11438), and the other two with depths listed in fathoms (charts 11434 and 11420). As such, two separate H-cells were created. The first H-Cell covers the portion of the survey area falling on chart 11438, compiled at a 1:15,000 scale using soundings in feet (the scale of the chart was 1:30,000, thus the survey was compiled at half chart scale, even though the survey scale for the project was 1:40,000). The second H-Cell covers charts 11434 and 11420, was compiled at the survey scale of 1:40,000, using soundings in fathoms.

H-cell layers in CARIS HOM are organized as follows:

- Layer 100: Sounding Objects, survey scale
- Layer 200: Skin of the Earth
- Layer 300: Seabed area (coral heads and bottom samples from the charts)
- Layer 600: Metadata Objects
Attributes:
Inform: H10957, S-H903-TJ-04, NOAA Ship Thomas Jefferson, LCDR Donald W. Haines
SorDat: 20040604
SorInd: US,US,surve,H10957 (features), US,US,nsurf,H11076 (soundings), and
US,US,graph,chart # for seabed areas.

In the office, using CARIS HIPS, two finalized combined BASE surfaces were
created at a resolution of 5m. For chart 11438, a 1:15,000 survey scale surface was created, and
for charts 11434 and 11420 the surface was created at the project survey scale of 1:40000. The
survey scale sounding data set was extracted from the survey scale BASE surface at 5mm @
1:15,000 scale (for the H-Cell compiled in feet) and 1:40,000 scale (for the H-Cell compiled in
fathoms). Shoal biased chart scale sounding compilation was accomplished through the CARIS
HOM sounding suppression routine using the table (0,100, 80m). Soundings were then checked
for conflicts, corrected to remove conflicts, and edited to allow for proper sounding compilation
placement with respect to existing charted depths outside the survey area.

Office processing used CARIS BASE Editor to create the contours for this survey,
but upon review, due to rounding errors that could not be easily resolved, contours were
removed from the H-Cells.

In CARIS HIPS two finalized combined BASE surfaces were created. For chart
11438, a 1:15000 survey scale surface was created, and for charts 11434 and 11420 the surface
was created at the project survey scale of 1:40000. In BASE Editor, product surfaces were
generated at the scale of the charts (1:30,000 scale for chart 11438 and 1:180,000 scale for chart
11434) sourced from these survey scale surfaces. Survey scale sounding data set was extracted
from the multibeam and singlebeam data at 5mm @ 1:15,000 scale (for the H-Cell compiled in
feet) and 1:40,000 scale (for the H-Cell compiled in fathoms).

Seabed classified areas (seafloor characteristics) were transferred to the H-cell from
the raster chart (charts 11434 and 11420). Bottom samples that were classified as seabed area
with the acronym NATSUR (nature of surface, IE - sand, shell, coral) are visible in the H-cell as
an S-57 object. The NATQUA category is required for seabed areas and was filled with the Null
place holder to allow for H-cell completion

Contour and Depth Area Feature Objects

Contours and depth areas were initially created but later removed after discovering
problems with rounding of the contour values. Thus, no contours are in the H-Cells based on
HSD H-Cell Specifications v2.0. A single depth area was created covering the entirety of the
survey area ranging in depth from 0m to 999m.
Soundings during HOM processing were selected with the CARIS GIS Environmental Variable set to a metric scale (-1,-1,T) to accommodate millimeter precision of the sounding value. This environmental variable was reset to NOAA standard charting values (0,0,N for feet, 11,11,N for fathoms) to convert the metric sounding values to whole feet/fathoms.

The completed H-Cell was exported as a Base Cell File (ENC.000) in S-57 format with all values in metric units. The metric equivalent ENC.000 file was then converted to NOAA chart values (ENC_CU.000) with all values measured in feet or fathoms. Four .000 files were created for this survey containing different sounding values: the two (US510957_cu and US510957_ss) .000 files are in feet, the other two (US310957_cu and US310957_ss) .000 files are in fathoms.

**dKart Inspector**

The final ENC_CU.000 file was examined using dKart Inspector. Warnings received were all inconsequential. The DSPM.HUNI and DSPM.DUNI were reported to have illegal values, but these errors were expected as originating during ENC conversion to NOAA chart values, so they can be ignored.

**C. VERTICAL AND HORIZONTAL CONTROL**

Office processing of this survey as an ENC required translating the datum to meet S-57 ENC requirements. During CARIS HOM processing the horizontal geodetic datum was translated from the survey datum (NAD83, UTM Zone 17) to Latitude and Longitude (LLDG) World Geodetic System-84 (WGS-84) as per S-57 format specifications. The S-57 ENC format serves as the exchange file submitted to the Marine Chart Division.

Final tides were received at AHB in January, 2005 and reapplied to the survey during office processing.

**D. RESULTS AND RECOMMENDATIONS**

**D.1. CHART COMPARISONS**

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<td>26th</td>
<td>Apr. /05</td>
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<td>28th</td>
<td>Jul. /05</td>
<td>16/05</td>
<td>12/05</td>
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Hydrography

The charted hydrography originates with prior surveys and requires no further consideration. The hydrographer makes adequate chart comparisons in Section D. of the Descriptive Report. The following should be noted:

No crossline comparison was performed by the field as the quality control procedures were incorporated into CARIS processing at the time of survey acquisition. Office review found good agreement between all multibeam and singlebeam sonar mainscheme lines and crosslines.

Charted and Uncharted Features

1) AWOIS Item 10951, a charted submerged wreck in the vicinity of 24°38'12.50"N Latitude, 083°07'46.35"W Longitude, was not reviewed by the hydrographer. Upon office review the submerged wreck was not located within the AWOIS search radius. This feature is considered disproved. It is recommended this feature be removed from the chart.

2) The charted 11 fathom sounding in the vicinity of 24°41'00.19"N Latitude, 083°05'18.65"W Longitude is no longer present. Current surveyed depths are 25-29 fathoms. Chart present survey soundings in the common area.

3) The charted 12 fathom sounding in the vicinity of 24°37'27.93"N Latitude, 083°01'22.52"W Longitude is no longer present. Current surveyed depths are 15-16 fathoms. Chart present survey soundings in the common area.

4) Seabed area classifications - Coral, are recommended to be charted in the following locations - Latitude 24°37'50.22"N, Longitude 083°02'01.83"W, Latitude 24°37'55.99"N, Longitude 083°04'46.09"W, and Latitude 24°37'42.93"N, Longitude 083°03'17.78"W.

Comparison with Prior Surveys

A comparison with prior surveys was not done during office processing in accordance with section 4 of the memorandum titled "Changes to Hydrographic Survey Processing", dated May 24, 1995.

Junctions

There were no surveys to junction with H10957.
Adequacy of Survey

Except as noted above, the present survey is adequate to supersede the charted hydrography within the common area. This is an adequate hydrographic/multibeam/side scan sonar survey. No additional field work is recommended.
Bryan Chauveau
Physical Scientist
Verification of Data
Evaluation and Analysis Report
The completed survey has been inspected with regard to survey coverage, delineation of depth curves, development 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 NOS requirements except where noted in the Evaluation Report.

Bryan Chauveau  
Physical Scientist or Cartographer,  
Atlantic Hydrographic Branch

All final products have undergone a comprehensive review as per the Atlantic Hydrographic Branch Processing Manual and are verified to be accurate and complete except where noted in the Evaluation Report.

Helen Stewart  
Atlantic Hydrographic Branch, Norfolk, Virginia

I have reviewed the Base Cell files, accompanying data, and reports. This survey and accompanying Marine Chart Division deliverables meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.

Commander P. Tod Schattgen, NOAA  
Chief, Atlantic Hydrographic Branch