**DESCRIPTIVE REPORT**

<table>
<thead>
<tr>
<th>Type of Survey</th>
<th>Hydrographic</th>
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<tbody>
<tr>
<td>Field No.</td>
<td>M-J911-OPS</td>
</tr>
<tr>
<td>Registry No.</td>
<td>F00588</td>
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**LOCALITY**

<table>
<thead>
<tr>
<th>State</th>
<th>Alabama / Mississippi</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Locality</td>
<td>Mobile Bay</td>
</tr>
<tr>
<td>Sublocality</td>
<td>Grand Bay</td>
</tr>
</tbody>
</table>

**2010**

**CHIEF OF PARTY**

Paul Turner, PS, NOAA

**LIBRARY & ARCHIVES**

**DATE**

1/19/2011
# HYDROGRAPHIC TITLE SHEET

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

<table>
<thead>
<tr>
<th>State</th>
<th>Alabama / Mississippi</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Locality</td>
<td>Mobile Bay</td>
</tr>
<tr>
<td>Sub-Locality</td>
<td>Grand Bay</td>
</tr>
<tr>
<td>Scale</td>
<td>1:20,000</td>
</tr>
<tr>
<td>Date of Survey</td>
<td>November 10, 2010</td>
</tr>
<tr>
<td>Instructions dated</td>
<td>April 02, 2010</td>
</tr>
<tr>
<td>Vessel</td>
<td>R/V Grand Bay</td>
</tr>
<tr>
<td>Chief of party</td>
<td>Paul Turner</td>
</tr>
<tr>
<td>Surveyed by</td>
<td>Mark McMann, Corey Allen, Paul Turner</td>
</tr>
<tr>
<td>Soundings by echo sounder, hand lead, pole</td>
<td>Odom ECHOTRAC CVM Single Beam Sonar System</td>
</tr>
<tr>
<td>Graphic record scaled by</td>
<td>N/A</td>
</tr>
<tr>
<td>Graphic record checked by</td>
<td>N/A</td>
</tr>
<tr>
<td>Verification by</td>
<td>Atlantic Hydrographic Branch</td>
</tr>
<tr>
<td>Soundings in</td>
<td>fathoms feet at MLW MLLW</td>
</tr>
</tbody>
</table>

**REMARKS:**

*Bold, Italic, Red notes in Descriptive Report were made during office processing.*

---

**NOAA FORM 77-28 SUPERSEDES FORM C&GS-537**

U.S GOVERNMENT PRINTING OFFICE: 1976-665-661/1222 REGION NO.6
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Introduction

The Office of Coast Survey (OCS), National Geodetic Survey (NGS), and the Center for Operational Oceanographic Products and Services (CO-OPS) established a Coastal and Climate Team (CCT) to focus their capabilities beyond traditional user needs into non-navigationally based products. As a proof-of-concept, the CCT team planned a collaborative project in the Mobile Bay region of the Gulf of Mexico. Data collected from the tri-office integrated effort in Mobile Bay will set a foundation for a new circulation model, which will improve harmful algal bloom forecasts, provide input for prediction models of oil spills, and contribute to more accurate models of storm surge, inundation, and sea-level rise. Concur

As a component of this project, the Office of Coast Survey conducted single beam bathymetric survey operations in Weeks Bay, AL and Grand Bay, AL/MS in an effort to provide contemporary hydrographic data for application to the coastal inundation model. Data from this project will be further utilized by the Office of Coast Survey to update the nautical products within Weeks Bay, AL and Grand Bay, AL/MS. All supporting data from this project was acquired aboard the Vessel of Opportunity R/V Grand Bay utilizing a Teledyne Odom ECHOTRAC CVM Single Beam Sonar system with a Trimble DSM 232 Modular GPS receiver and antenna. The acquisition system utilized a Panasonic ToughBook laptop outfitted with Hypack data acquisition software. Concur

This survey was conducted in the two main Bays that make up the Grand Bay National Estuarine Research Reserve (NERR) - Pt aux Chenes Bay and Grand Bay. The Grand Bay NERR is a marine protected area located in southeastern Mississippi almost entirely within Pt aux Chenes Bay and the surrounding marsh lands. Concur

The National Estuarine Research Reserve (NERR’s) – Grand Bay provided project support by facilitating the field team with a shallow water survey launch and docking/launching facilities for the duration of the project. Concur
A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Project Instructions M-J911-OPS-10 dated April 2, 2010 and all other applicable direction, with the exception of Deviation’s noted in this report. Concur

The survey area was located in Point aux Chenes and Grand Bay, AL/MS to the West of Mobile Bay, AL. This survey corresponds to Sheet B in the sheet layout provided with the Project Instructions, as shown in the figure 1 below. Sheet B was expanded to include Pt aux Chenes Bay (indicated in red on the following graphic) after survey operations began and is not included in the originally assigned Project Instructions. Concur

Data acquisition was conducted from April 19th – May 4th, 2010 and November 2nd - November 10th, 2010. Concur

---

1 NOS Hydrographic Surveys Specifications and Deliverables (April, 2009), OCS Field Procedures Manual for Hydrographic Surveying (April 2009), and all Hydrographic Surveys Technical Directives issued through the dates of data acquisition.
### Table 1: F00588 Statistics

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear Nautical Miles of Mainscheme Singlebeam</td>
<td>164.4</td>
</tr>
<tr>
<td>Linear Nautical Miles of Cross-lines</td>
<td>13.6</td>
</tr>
<tr>
<td>Total Square Nautical Miles</td>
<td>17.6</td>
</tr>
</tbody>
</table>

**Figure 2 – SB Coverage**
A. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition and processing systems, the R/V Grand Bay, quality control procedures, and data processing methods are described in the M-J911-OPS-10 Data Acquisition and Processing Report (DAPR), submitted under separate cover. Items specific to this survey and any deviations from the aforementioned report are discussed in the following sections. Concur

The survey sheet limits were expanded from the originally assigned area outlined in the project instructions to include the neighboring Bay to the west, Pt aux Chenes Bay. The sheet was expended in order to cover an greater area of coverage to incorporate into the model as well as to incorporate the main bays and waterways of the Reserve. Concur

Survey line spacing was adjusted from the “25 m-spaced VBES” as outlined in the Project Instructions to 200 m line spacing for the majority of the project. Aside from the entrance to the Bay, which proved to be the most dynamic area of the survey, the project area only varied from roughly half a meter in depth to roughly 3 meters and as a result, bumping the spacing out to 200 meters saved survey time while providing an adequately dense data set that will satisfy the requirements of all stake holders. (See Figure – 3 below) Concur

Final approved water levels were applied to this survey December 13th, 2010. See section C for additional information. Concur
B.1 Equipment

R/V Grand Bay was the only vessel used during survey F00588. Specifications for the R/V Grand Bay are listed below in Table 2. *Concur*

<table>
<thead>
<tr>
<th>R/V Grand Bay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hull Registration Number</td>
</tr>
<tr>
<td>Builder</td>
</tr>
<tr>
<td>Length Overall</td>
</tr>
<tr>
<td>Beam</td>
</tr>
<tr>
<td>Draft, Maximum</td>
</tr>
<tr>
<td>Cruising Speed</td>
</tr>
<tr>
<td>Max. Survey Speed</td>
</tr>
<tr>
<td>Primary Echosounder</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Sound Velocity Equipment</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Positioning Equipment</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Type of Operations</td>
</tr>
</tbody>
</table>

Table 2: R/V Grand Bay Specifications

No vessel configurations used during data acquisition deviated from the DAPR. *Concur*

B2. Quality Control

Data quality for survey F00588 was evaluated through examination of the processed single beam data and internal consistency and integrity of the data were manually examined by the hydrographer in CARIS single beam editor mode. Soundings and surfaces were reviewed for systematic errors and excessive noise. The data were found consistent in comparisons between day to day and line to line coverage. *Concur*

Cross-lines

Single Beam cross lines totaled 13.6 linear nautical miles (lnm), comprising 8.3% of the 164.4 lnm of total SB hydrography. The main scheme bathymetry was compared to the XL data in CARIS Single Beam Editor and agreed well with differences of 0.3 meters or less.*Concur*

Cross-line agreement with main scheme data meets the vertical accuracy requirements as stated
in the *NOS Hydrographic Surveys Specifications and Deliverables Manual* (HSSDM). Concur

Junctions

<table>
<thead>
<tr>
<th>Registry Number</th>
<th>Scale</th>
<th>Date</th>
<th>Field Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>H11621</td>
<td>1:20,000</td>
<td>2006</td>
<td>Fugro</td>
</tr>
<tr>
<td>H11620</td>
<td>1:20,000</td>
<td>2006</td>
<td>C&amp;C</td>
</tr>
</tbody>
</table>

F00588 junctions with hydrographic survey’s H11620 and H11621 from S-J977-KR, surveyed in 2006 by C&C Technologies and Fugro. The surveys are located between Round Island and Grand Bay, along the coast of Mississippi in Mississippi Sound. Both surveys were conducted with side scan sonar and concurrent single beam. The two surveys overlap F00588 along the Southern extents’ of Pt aux Chenes Bay and Grand Bay. The processed XYZ data from the junctioning surveys were analyzed and were found to be in agreement with one another +/- 1 foot and with no reconcilable differences. Concur

Coverage Assessment

Coverage assessment was determined using a four meter resolution Base surface. Concur

True Heave

True Heave data was not logged for F00588. Concur

Sound Velocity

An ODOM Digibar Velocity Probe served as the main sound velocity profiler (s/n 98527-020610) and was used to acquire all sound velocity data during this project. Sound velocity profiles from the DIGIBAR Probe were downloaded using Velocwin software which was used to create a .csv file. The sound velocity profiles were applied to the singlebeam data during CARIS post processing. Concur

6 sound velocity cast was conducted during this project. Concur

B3. Corrections to Echo Soundings

Data reduction procedures for survey F00588 conform to those detailed in the DAPR, M-J911-OPS-10 F00588 December, 2010. Concur

B4. Data Processing

Data processing procedures for survey F00588 conform to those detailed in the DAPR. A single field sheet was created to encompass survey F00588 and contains a single uncertainty generated four meter Base surface, F00588_4M_Final. The field sheet area of coverage is shown
in Figure 4 below. Concur

Figure 4 – Fieldsheet F00588_4M_Final

C. HORIZONTAL AND VERTICAL CONTROL

Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Wide Area Augmentation System (WAAS) was the sole method of positioning. Concur

Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The primary tide station at Pascagoula, MS served as control for datum determination and as the primary source for water level correctors for survey F00588 during acquisition. Concur

A request for delivery of final approved water level data (smooth tides) for survey F00588 was forwarded via e-mail to N/OPS1 on November 16th, 2010. A copy of the request is included in Appendix II. Concur
The Tide Note for Hydrographic Survey F00588 was received on December 7\(^{th}\), 2010. Final approved water levels consist of verified water level data downloaded from the CO-OPS website for station Pascagoula in file 8741533.tid and the tide zoning information in file F00588_RevCORF.zdf. The Tide Note for Hydrographic Survey F00588 and ancillary correspondence are included in Appendix II. Concur

It will not be necessary for the Atlantic Hydrographic Branch to reapply the final approved water levels to the survey data during the survey acceptance review. Concur
D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

Survey F00588 was compared to Charts 11374 (35th Ed.; September 2009, 1:40,000) and 11373 (48th Ed.; November 2009, 1: 80,000). Concur

Depths from survey F00588 are predominately 1-3 feet deeper than what is currently charted on charts 11374 and 11373 and portions of the shoreline have drastically changed. Specific exceptions are described below. Concur

The following graphic’s display examples of the over-all deepening of the area along with examples of the severe shoreline erosion taking place in the region. Concur

Figure 5
Middle Bay is experiencing severe shoreline erosion

Charted island and marsh are now open water.
Figure 8

Deepening in the entrance to Grand Bay

Figure 9

Large charted island in Grand Bay - eroded into two small islets.
Comparison Recommendations

The Hydrographer has determined that bottom coverage requirements have been met and data accuracy meets requirements specified by the HSSDM. The surveyed soundings are adequate to supersede prior surveys in their common areas. Based on application of verified water level data, final chart comparisons are not required by the Atlantic Hydrographic Branch. Concur

Automated Wreck and Obstruction Information System (AWOIS) Investigations
No AWOIS items were assigned to M-J911-OPS-10, F00588. Concur

Dangers to Navigation (DTON’s)
No DTON’s were identified or reported during M-J911-OPS-10, F00588. Concur

D.2 Additional Results

Prior Survey Comparison
Survey F00588 was compared to the 1962 East Coast Field Party project OPR-410 survey H08648. Sounding data from HO8648 was overlapped with F00588 with the entire survey area. Depths from F00588 are in general agreement with these prior surveys within 1-2 feet and the over-all trends in bathymetry were in agreement as well.

Shoreline Verification and Processing
Shoreline verification was not required or performed for M-J911-OPS-10, F00588. Concur

Aids to Navigation
All aids to navigation were positioned accurately and found to serve their intended purpose Concur

Bottom Samples
Bottom samples were not required for M-J911-OPS-10, F00588. Concur

Submarine Cables and Pipelines

There were no submarine cables or pipelines within the survey limits for M-S911-OPS-10, F00588. Concur
E. APPROVAL

As team leader, field operations for hydrographic survey F00588 were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports. The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual (April 2009 edition), Field Procedures Manual (April 2009 edition), and all HSD Technical Directives issued through May 2010. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required. All data and reports are respectfully submitted to N/CS33, Atlantic Hydrographic Branch.

Listed below are supplemental reports that contain additional information relevant to this survey:

Title
F00588 Data Acquisition and Processing Report

Approved and Forwarded:

Paul Turner
I am the author of this document
2011.01.24 10:19:42 -05'00'

Paul Turner, Physical Scientist, NOAA

In addition, the following individuals were responsible for project support and assisting with data acquisition and processing of the survey:

Mark McMann, Physical Scientist Technician, NOAA

J. Corey Allen
2011.01.21 15:38:58
-05'00'

Corey Allen, Physical Scientist, NOAA
Appendix I

Danger to Navigation Report

*There were no Dangers to Navigation submitted from field unit.
Appendix II
Survey Feature Report

*No features included within PSS from field unit.
Appendix III
Final progress sketch and survey outline
Appendix IV
Tides and water levels
MEMORANDUM FOR: Chief, Requirements and Development Division, N/OPS1

FROM: Paul Turner, Hydrographic Surveys Division (N/CS3)

SUBJECT: Request for Approved Tides/Water Levels

Please provide the following data:

1. Tide Note
2. Final zoning in MapInfo and .MIX format
3. Six Minute Water Level data (Co-ops web site)

Transmit data to the following:

NOAA/NOS/Atlantic Hydrographic Branch
N/CS33, Building #2
439 West York Street
Norfolk, VA 23510
ATTN: Chief AHB

James.M.Crocker@noaa.gov
Corey.Allen@noaa.gov
Paul.Turner@noaa.gov

These data are required for the processing of the following hydrographic survey:

Project No.: M-J911-OPS-10
Registry No.: F00588
State: Mississippi
Locality: Mobile Bay
Sublocality: Grand Bay

Attachments containing:

1) an Abstract of Times of Hydrography,
2) digital MID MIF files of the track lines from Pydro

cc: N/CS33
<table>
<thead>
<tr>
<th>Year_DOY</th>
<th>Min Time</th>
<th>Max Time</th>
</tr>
</thead>
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<td>21:14:05</td>
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<td>20:22:14</td>
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<td>21:10:20</td>
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<td>19:28:21</td>
</tr>
<tr>
<td>2010_314</td>
<td>13:40:02</td>
<td>20:08:58</td>
</tr>
</tbody>
</table>
DATE: December 07, 2010

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: M-J911-OPS-2010
HYDROGRAPHIC SHEET: F00588 Rev

LOCALITY: Grand Bay, Mobile Bay, MS
TIME PERIOD: April 19 - November 10, 2010

TIDE STATION USED: 874-1533 Pascagoula NOAA LAB, MS
Lat. 30° 22.1'N Long. 88° 33.8' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.440 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: GB1, GB2 & GB3

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 1983-2001 National Tidal Datum Epoch (NTDE).
Final Tidal Zoning for
M-J911-OPS-2010, F00588_Rev
Weeks Bay and Grand Bay, AL & MS

GB1
Time Corrector +6 mins
Range Corrector x1.07
Reference 8741533

GB2
Time Corrector +6 mins
Range Corrector x1.07
Reference 8741533

GB3
Time Corrector -6 mins
Range Corrector x1.07
Reference 8741533

8741533 PASCAGOULA NOAA LAB
Appendix V
Supplemental survey records & correspondence
Paul.Turner@noaa.gov wrote:

Hi Sarah-

Here is the e-mail regarding the change in coverage. This is just a project update sent out to the main project stake holders. Since we were under such a short time frame (we only had one week to complete this survey) most of the communication regarding this expanded coverage took place over the phone while we were out surveying.

I hope this helps!

The second survey area for this project, Grand Bay F00588 was conducted in the same fashion so I will pull together any e-mail traffic I have for that area and send it in as well.

Paul

-------- Original Message --------
Subject: Re: Weeks Bay Survey Project Update
Date: Wed, 14 Apr 2010 16:07:25 -0400
From: Richard Patchen <Rich.Patchen@noaa.gov>
To: Paul.Turner@noaa.gov
CC: Gretchen Imahori <Gretchen.Imahori@noaa.gov>, Corey Allen <Corey.Allen@noaa.gov>, Mark McMann <Mark.Mcmann@noaa.gov>, James M Crocker <James.M.Crocker@noaa.gov>

Paul,

Great news. Interesting and important find at the entrance.

.. rich ..

Paul.Turner@noaa.gov wrote:
> Good morning Rich-
> > The survey in Weeks Bay has gone very well so far and we have covered roughly 60% of the project area as of Tuesday afternoon (April 13th). The facilities and survey launch here at the Weeks Bay Foundation have suited our needs very well and they are convenient to the working grounds.
> > I've attached three layouts displaying the coverage as of Tuesday afternoon. We ran the area right at the entrance at 25 Meter line spacing and we are running the remainder of the project area at 100 Meter line spacing. Aside from the entrance to the Bay, the project area only varies from about half a meter in depth to about 2 meters so bumping the spacing out to 100 meters will still provide an adequately dense data set that will satisfy the requirements for the model as well as for HSD.
> > The first layout is an overview displaying the soundings in feet and tenths of feet with the tracklines showing our survey lines.
> > The other two layouts are close-ups; one of the entrance and one of the line spacing change. There is a discrepancy in the entrance from what is charted and from what we found during our survey. The chart currently portrays a 12 and 14 foot sounding and we were finding a very steep dip down to 31 feet.
> > (The sounding display on the attached layouts are both display and zoom restricted in MapInfo so there is a far greater sounding density than what is portrayed on the layouts.)
> Please let me know if there is any additional information that I can provide you and I will submit a final cover plot either Saturday or Sunday.
> If you need to reach me by phone, my cell number is 301-802-1631.
> Thank you,
> Paul
Subject: Re: Request for GC  
From: Gene Parker <Castle.E.Parker@noaa.gov>  
Date: Wed, 30 Mar 2011 07:02:11 -0400  
To: Kyle.Ward@noaa.gov  
CC: Paul.Turner@noaa.gov, Corey.Allen@noaa.gov, Mike.Espey@noaa.gov, Matthew.Wilson@noaa.gov, Richard.T.Brennan@noaa.gov, Edward.Owens@noaa.gov, James.M.Crocker@noaa.gov

Good Morning Kyle,

Imagery would be great; recent or current imagery. The shoreline files would be an asset for F00588 Hcell compilation. Reference the images below. You decide the mode of action... AHB is requesting the shoreline for nautical chart update product; we're following protocol because no recent products are available from the NOS Data Explorer, or at least of what I find. We can compile the survey without using the shoreline, but yet again, the hydro crosses land areas and inter-tidal polygons which are charted as land areas and will present issues for MCD Raster Team. I've searched DREG for GC within the limits of chart 11374 and do not find any within the common area; I've found a GC for chart 11373 but not common with F588.

All we're asking is a data product to use that is more recent than 1954 or the current charted shoreline which is incorrect is certain common areas within the hydro survey; the latest GC or ortho-imagery would be great.

As per protocol, your assistance is requested.

Regards,
Gene

Current Edition of Chart 11374_2 and the F588 VBES bathy grid:

Kyle.Ward@noaa.gov wrote:
> Matt,
> We will take a look into this. How bad is the shoreline? Is it a "must have" to compile the Hcell or could you get by with imagery? The project overall is a low navigational priority. As this project was not intended to address the shoreline can you compile the survey without fixing the shoreline? We could then put in a request for new shoreline and not hold up your compilation.
> Mike,
> What is the status of shoreline work in this area?
> Regards,
> Kyle
> ----- Original Message ----- 
> From: Matthew Wilson <Matthew.Wilson@noaa.gov> 
> Date: Tuesday, March 29, 2011 4:39 pm 
> Subject: Request for GC 
> To: Kyle Ward <Kyle.Ward@noaa.gov>
Greetings from AHB. We're reviewing survey F00588 (project M-J911-OPS-10), conducted in 2010 by Paul Turner, Mark McMann, and Corey Allen of HSD, which falls under the bounds of Chart 11374_2. This area is just to the east of Pascagoula, MS, from Pt aux Chenes Bay to Grand Bay, and has undergone significant shoreline changes from what we see charted on 11374. Both myself and Gene Parker have navigated the NOAA Data Explorer searching for a recent GC of this area to aid in the review and H-Cell compilation process for F00588. Our efforts are thus far unsuccessful, in that the most recent data we can find is from the 1970s.

Could you help us in locating the recent GC for this area? We assume something is out there, as this is an area which was heavily affected by Katrina.

Thanks in advance for your assistance,

Matt
Subject: Re: Survey F00588; Shoreline GC request
From: Mike Espey <Mike.Espey@noaa.gov>
To: Rosemary Abbitt <Rosemary.Abbitt@noaa.gov>
CC: Ed <Edward.Owens@noaa.gov>, CDR Rick Brennan <Richard.T.Brennan@noaa.gov>, Gene Parker <Castle.E.Parker@noaa.gov>, Matthew.Wilson@noaa.gov, Kyle.Ward@noaa.gov, Tim Blackford <Tim.Blackford@noaa.gov>

Hello Rosemary,
Production on the referenced GC is underway! The GC project number is GC10879.

Regards,
Mike

On 5/25/2011 9:35 AM, Rosemary Abbitt wrote:
Good Morning Mike,

My name is Rosemary Abbitt. I am an ERT intern at the Atlantic Hydrographic Branch. I am currently in the final stages of compiling survey F00588 from project M-J911-OPS-10. I am writing to check the status of the requested GC in reference to the shoreline changes (Chart 11374, 35th Edition). If it is available, we would like to include the GC project number in our reports so it can be easily referenced for application by MCD. If you could please respond today or tomorrow so this information can be included in the HCell Report. It would be greatly appreciated.

Thank you for your time and assistance with this matter,

Rosemary Abbitt
ERT Hydrographic Intern

Mike Espey <mike.espey@noaa.gov>
Chief, Applications Branch
Remote Sensing Division
National Geodetic Survey
November 1<sup>st</sup> – November 11<sup>th</sup> Mark McMann, Corey Allen, and Paul Turner returned to the Gulf of Mexico to resume survey operations in the Grand Bay National Estuarine Research Reserve along the Mississippi and Alabama coast in support of the NOS Coastal & Climate Team’s creation of a nested Mobile Bay Forecast/Circulation Model. Survey operations were halted earlier this year due to the impact’s from the Deep Water Horizon oil spill off the coast of Louisiana. The field component of this collaborative project comprises a comprehensive suite of measurements of the physical setting, including highly accurate bathymetry, water levels and tidal datums, wetland elevations, three dimensional currents, salinity, and water temperatures for the region.

As a component of this project, OCS conducted single beam bathymetric survey operations in Grand Bay, AL/MS in an effort to provide contemporary hydrographic data for application to a coastal inundation model. Data from this project will be further utilized by the Office of Coast Survey to update the nautical products within the region. This report provides a brief summary of the daily field operations and data acquisition of the return trip to the region (November 2010) where the survey team resumed field operations from this past spring.
This survey was conducted in the two main Bays that make up the Grand Bay National Estuarine Research Reserve (NERR) - Pt aux Chenes Bay and Grand Bay. The Grand Bay NERR is a marine protected area located in southeastern Mississippi almost entirely within Pt aux Chenes Bay and the surrounding marsh lands.

The Reserve provided logistical support and a 16ft. aluminum skiff which served as our primary survey launch for the project. The facilities and survey launch suited our needs very well and were convenient to the working grounds. The launch was outfitted with an Odom “Fly-Away System” consisting of a single-beam sonar and GPS receiver which we pole mounted and affixed to the starboard side of the boat.

Hydrographic survey operations went very smooth beginning on Tuesday, November 2nd running through Wednesday, November 10th. This sheet was divided into two survey areas (Pt aux Chenes Bay and Grand Bay) as a result of the size of the area and the logistics involved in accessing the working grounds. The Grand Bay area was a challenging area to work in given the small skiff and exposure to the wind and seas. In addition, the working grounds were in a remote area and required about an hour to an hour and a half of transit time (including driving the car, trailer the boat, and vessel transit time) each day.

Consistent and stiff north winds limited our ability to survey for the majority of the first week which we utilized to run calibration tests, scope-out a few neighboring launch sites, and get a jump start on some of the project documentation and reports. The winds finally laid down providing excellent conditions allowing us resume survey operations.
We began surveying where we broke-away last Spring in the northern portion of Pt aux Chenes Bay and worked our way East into Grand Bay. We ran 200 meter line spacing predominately in an East/West azimuth beginning at the most sea-ward extent and working shoreward. This proved to be the most advantageous method given the orientation of the Bays and the prevailing winds and seas. 10-12kts. proved to be about the limit that we were able to survey in and acquire useable data. Anything over that and the motion of the vessel was reflected in the data and spray from the waves/swell would brake over the bow and threaten the exposed equipment on deck.

In general, the project area was consistently deeper than what is currently charted and the portrayed shoreline is badly off in many of the areas. Middle Bay is experiencing severe shoreline erosion, L’ Isle Chaude Bay is no longer a Bay - it is basically just open water, and several small charted islands and marsh land(s) are no longer there. Extreme shoreline erosion is very noticeable throughout the entire region, especially in the northern portion of Grand Bay where a relatively large island has been eroded into two small inlets. Combined, this survey provided 178 Linear Nautical Miles (LNM), 18 Square Nautical Miles (NMS), and completed in 12 survey days. (See images below)
From April 9th- May 6th NOAA’s Coast Survey conducted a bathymetric survey in Weeks Bay, Pt aux Chenes Bay, and Grand Bay along the Mississippi and Alabama coast in support of the Tri-Office (OCS, NGS, & CO-OPS) creation of a nested Mobile Bay Foreast/Circulation Model. The bathymetric data collection is just one part of the Tri-Office Mobile Bay Project that will be done this and next year. The Mobile Bay Project is a proof-of-concept collaborative survey that will build on some existing navigationally focused projects to design a more robust, extensive project that will provide the backbone for numerous new and/or enhanced coastal and climate products for NOAA’s coastal stakeholders.

Mark McMann, Corey Allen, and Paul Turner conducted single beam survey operations in the Weeks Bay and Grand Bay National Estuarine Research Reserve’s (NERR’s) in an effort to provide contemporary hydrographic data for application to the coastal hydrodynamic inundation model. Data from this project will be further utilized by the Office of Coast Survey to update the nautical charts and products within the area.
The first segment of the project was conducted at the Weeks Bay National Estuarine Research Reserve in Alabama on the southeast side of Mobile Bay. Dr. Scott Phipps, the research coordinator of the reserve, was our main point of contact and provided us with lodging on the grounds of the reserve and an 18ft aluminum skiff which served as our survey launch for the week. The facilities and survey launch suited our needs very well and were convenient to the working grounds.

Hydrographic survey operations for this portion of the project went very smooth beginning on Monday April 12 and commencing on Saturday April 17th. The vessel was integrated with an Odom “Fly-Away System” consisting of a single-beam sonar and GPS receiver which we pole mounted and affixed to the starboard side of the boat.
The Weeks Bay survey provided 63 Linear Nautical Miles (LNM) and roughly 3 Square Nautical Miles (SNM) of coverage lasting six project days. The survey speed was limited to roughly 5 Kts. as a result of the pole and mounting apparatus that were used to secure the sonar to the vessel. Line spacing was run at 25 meter spacing at the entrance and mouth of the Bay and 100 meters for the remainder of the area.

Aside from the entrance to the Bay, the project area only varied from about half a meter in depth to about 2 meters so bumping the spacing out to 100 meters still provided an adequately dense data set that satisfies the requirements for the model as well as the coverage requirements for HSD.

There was a discrepancy in the entrance of the Bay from what is charted and from what we found during our survey. The chart currently portrays a 12 and 14 foot sounding and we were finding a very steep dip down to 31 feet.
On Sunday April 18th, we relocated over to the Grand Bay area and began survey operations on Monday, April 19th. The Grand Bay National Estuarine Research Reserve (NERR’s) provided logistical support and a 16ft. aluminum skiff, very similar to the boat that we used in Weeks Bay, which we outfitted and served as our survey launch. This area was divided into two survey areas (Pt aux Chenes Bay and Grand Bay) as a result of the size of the area and the logistics involved in accessing the working grounds. The Grand Bay area was far more challenging than Weeks Bay as that area was much more remote, very exposed to the wind and seas, and required about an hour to an hour and a half of transit time (including driving the car, trailering the boat, and vessel transit time) each day.
The waterways of the Grand Bay NERR’s lie almost entirely within Pt aux Chenes Bay and the surrounding marsh lands. We began survey operations on the Pt aux Chenes Bay survey sheet first as a curtesy to the Reserve. This would ensure that in the event that the project was cut short, we would at a minimum, have completed the area within the Reserve - which turned out to be a smart decision.

The Pt aux Chenes Bay survey provided 77 Linear Nautical Miles and roughly 9 Square Nautical Miles which includes Bangs Lake and Middle Bay. We ran 200 meter line spacing predominately in an East/West azimuth beginning at the most sea-ward extent and working shoreward. In general, the survey area was consistently deeper than what is currently charted and the portrayed shoreline is badly off in many of the areas. Middle Bay is experiencing severe shoreline erosion, L’ Isle Chaude Bay is no longer a Bay - it is basically just open water, and several small charted islands and marsh land(s) are no longer there. (See images below.)
The survey team was on site for 17 project days resulting in just seven survey days as a result of the consistent and strong SE winds, malfunctioning equipment, software issues, and the Gulf of Mexico oil spill. The prevailing winds where predominately out of the Southeast at roughly 15-25 kts. creating conditions to rough to work in. 10 kts. proved to be about the limit that we were able to survey in and acquire useable data. Anything over that and the motion of the vessel was reflected in the data and spray from the waves/swell would brake over the bow and threaten the exposed equipment on deck.

On Friday April 23rd, our GPS unit was failing to communicate with the ODOM system and/or our acquisition software (Hypack). After sending the majority of the day trouble shouting the problem, we determined that the GPS unit was not receiving power so we immediately contacted NSD in Silver Spring and had them FedEx a spare Odom Fly-Away system down to us. The spare system arrived Monday morning and we integrated the new GPS unit onto our mounting device and updated the HVF file to reflex the adjustment. Then we experienced software issues with the acquisition software – Hypack and spent the remainder of the day working through that with intermentant calls back to Silver Spring. By Tuesday the sonar system was operational but the weather picked up and we were unable to operate for the remainder of the week due to high winds and on/off heavy rains.
The conditions of the oil spill in the Gulf of Mexico continued to deteriorate and the concern over the preservation of the surrounding coastal communities was growing. Response teams were deployed in early May to position boom and oil absorbent material along the mouth and entrances to many of the Bays, Bayous, and rivers in the Grand Bay and Chenes Bay area in an effort to contain and prevent the oil from washing ashore. As a result, on Tuesday May 4th, we were basically “sealed” out of the working grounds as we were just about to complete the project area in Pt aux Chenes Bay. The project was put on hold due to the severity of the oil spill and the issue of accessing the working grounds with the intent to return and complete the project once it is safe to do so – hopefully this Fall.
Local Contacts:

**Weeks Bay NERR’s**

Scott Phipps, Ph.D.
Research Coordinator
Weeks Bay National Estuarine Research Reserve
11300 US Hwy 98
Fairhope, AL 36532
(251)928-9792
(251)928-1792 (fax)
Scott.Phipps@DCNR.Alabama.gov

Dr. Scott Phipps served as our main point of contact and facilitated us with lodging and the survey launch.

**Grand Bay NERR’s**

David Ruple, Reserve Manager
Grand Bay National Estuarine Research Reserve
6005 Bayou Heron Road
Moss Point, MS 39562
228-475-7047
228-475-8097 (fax)
David.ruple@dmr.ms.gov

David Ruple served as our main point of contact and provided us with a survey launch.

**Dauphin Island Sea Lab**

Dauphin Island Sea Lab
101 Bienville Blvd
Dauphin Island, AL 36528
251-861-2141

Denise Keaton
Administrative Assistant
dkeaton@disl.org
251-861-7511

John Dindo, Ph.D.
Senior Marine Scientist
Jdindo.org
AHB COMPILATION LOG

### General Survey Information
- **REGISTRY No.**: F00588
- **PROJECT No.**: M-J911-OPS-10
- **FIELD UNIT**: NOAA
- **DATE OF SURVEY**: 20100419 - 20101110
- **LARGEST SCALE CHART**: 11374_1, edition 35, 09/01/2009, 1:40,000
- **ADDITIONAL CHARTS**: N/A
- **SOUNDING UNITS**: FEET
- **COMPILER**: Rosemary P. Abbitt

### Source Grids

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This Document is for Office Process use only and is intended to supplement, not supersede or replace, information/recommendations in the Descriptive or H-Cell Reports.

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SORDAT | SORIND |

SPECIFICATIONS:

I. COMBINED SURFACE:
   a. Number of SAR Final Grids: 1
   b. Resolution of Combined Grid (m): 4m

II. SURVEY SCALE SOUNDINGS (SS):
   a. Attribute Name: Depth
   b. Selection criteria: Radius, Shoal bias
   c. Radius value is:
      i. Use single-defined radius: 0.9
      ii. And/Or use radius table file: N/A [40k = chart scale]
   d. Queried Depth of All Soundings
      i. Minimum: -0.3281 ft
      ii. Maximum: 14.7178 ft

III. INTERPOLATED TIN SURFACE:
   a. Resolution (m): 12 m
   b. Interpolation method: Natural Neighbor
   c. Shift value: -0.75 ft [only include applicable shift values] [-0.75 feet]

IV. CONTOURS:
   a. Attribute Name: Depth
   b. Use a Depth List: F00588_depth_contours_list.txt
   c. Output Options:
      i. Line Object: DEPCNT
      ii. Value Attribute: VALDCO

V. FEATURES:
   a. Number of Chart Features: 24 [all features included in H-Cell]
   b. Number of Non-Chart Features: N/A [all features submitted by field & not included in H-Cell]

VI. CHART SURVEY SOUNDINGS (CS):
   a. Number of ENC CS Soundings: 336
   b. Attribute Name: Depth
   c. Selection criteria: Radius, Shoal bias
   d. Radius value is:
      i. Use single-defined radius: 350.00 m
      ii. And/Or use radius table file: N/A [40k = chart scale]
   e. Enable Filter: Interpolated !=1
   f. Number Survey CS Soundings: 339

VII. NOTES:
This HCell 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.

A. AREA SURVEYED

B. DATA ACQUISITION AND PROCESSING

B.2 QUALITY CONTROL

The AHB source depth grid for the survey’s nautical chart update product was the shoal layer of a 4m resolution BASE surface (*.CSAR). The survey scale soundings were created from the surface at a single defined radius of .9mm at the largest scale chart covering the respective area of the survey (Chart 11374 - 1:40,000). A TIN was created from the survey scale soundings, from which an interpolated surface of 12m resolution was generated. The chart scale soundings were derived from only the non-interpolated nodes of this surface to preserve absolute continuity between the chart scale soundings, the survey scale soundings, and the original source grid. This also ensures that the chart scale soundings are a subset of the survey scale soundings. The chart scale soundings were selected using a single defined radius of 350m (on the ground). The surface model was referenced when selecting the chart scale soundings, to ensure that the selected soundings portray the bathymetry within the common area.

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 depth contours in feet (0,3,6,12 ft). 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 HCell product as per 2009 HCell Specifications.

The compilation products (Final *.HOB files) for this survey are detailed in the F00588 AHB Compilation Log contained within this document. The Final HOB files include depth areas (DEPARE), depth contours (DEPCNT), soundings (SOUNDG), meta-objects (M_COVR, and M_QUAL), cartographic Blue Notes ($CSYMB), and features (WRECKS, OBSTRN, BCNSPP, MARCUL, PILPNT, SBDARE).

As dictated by Hydrographic Technical Directive 2008-8, the Final HOB files were combined into two separate HCell files in S-57 format. Both S-57 files were exported from CARIS Bathy DataBASE in meters, and then converted from metric units into feet using CARIS S-57 Composer 2.2. Quality assurance and topology checks were conducted using CARIS S-57 Composer 2.2 and DKART Inspector 5.1 validation tests.

The final HCell products are two S-57 files, in Lat/Long NAD-83. The contents of these two HCell deliverables are listed in the table below:
B.2.4 Junctions and Prior Surveys

Survey F00588 (2010) junctions with both survey H11621 (2006) and survey H11620 (2006) to the south. Most present survey depths compare within 1-3 feet of junctioning survey depths to the south. Most present survey depths compare within 1-3 foot of the charted hydrography to the southwest.

B.4 DATA PROCESSING

The following software was used to process data at the Atlantic Hydrographic Branch:
- CARIS Bathy DataBASE version 3.0/HF10
- CARIS HIPS/SIPS version 7.0/SP2/HF6
- CARIS S-57 Composer version 2.2/HF5
- CARIS S-57 Composer version 2.1/HF4
- DKART Inspector version 5.1
- HSTP Pydro version 10.11 (r3191)

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

Intracoastal Waterway Dauphin Island to Dog Key Pass
Corrected through NM 05/21/2011
Corrected through LNM 05/10/2011
Scale 1:40,000

ENC COMPARISON

US5MS21M
Intracoastal Waterway Dauphin Island to Dog Key Pass
Edition 25
Application Date 2010/02/23
Issue Date 2010/02/23
Chart 11374

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 HCell files or the Blue Notes should be retained as charted. The following exceptions are noted:

a. Recommend to only apply the bathymetric data in AHB's HCell. Shoreline revisions should also be considered and dependent upon the source provided by NOAA's Remote Sensing Division. AHB has requested the most recent Ortho-imagery or Geographic Cell from RSD. The request was made through HSD-OPS on 03/29/2011. The project number for the latest GC is GC10879, but has not yet been applied.

b. This survey was intended to update the bathymetry only, not the disposition of charted features. Charted features were not addressed in this survey, as this was NOT a requirement in the Project Instructions. Hence, all charted features must be retained or revised (see features table and screen grabs below).

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a. Revise charted dangerous wreck (WRECKS). The wreck was observed at low tide and no structure was visible to the field surveyors. Revise charted dangerous visible wreck to a dangerous wreck, least depth unknown at the charted position.

b. Retain Submerged Piles (OBSTRN), Pipe PA (OBSTRN), and Submerged Stake (OBSTRN)
c. Retain Charted Stake (PILPNT)

d. Retain Charted Oyster Bar (MARCUL)
e. Retain Charted Submerged Pipe (OBSTRN), Marker (BCNSPP), and Fish Haven (OBSTRN)

f. Retain Charted Sea Bed Characteristics (SBDARE)
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 VBES survey is adequate to supersede the charted bathymetry within the common area coverage limits. Any features not specifically addressed either in the HCell 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.
**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 HCell 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 HCell 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.

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**Rosemary P. Abbitt**  
Hydrographic Survey Intern  
Atlantic Hydrographic Branch

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I have reviewed the HCell 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.

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**Richard T. Brennan**  
2011.05.27 04:01:45 -04'00'

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**Approved: __________________________**  
**CDR Richard T. Brennan, NOAA**  
Chief, Atlantic Hydrographic Branch