NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT MS1503B-CM-N

Mississippi Sound, Biloxi Bay to Pascagoula, Mississippi

Introduction

NOAA Coastal Mapping Program (CMP) Project MS1503B-CM-N provides a highly accurate database of new digital shoreline data for a portion of Mississippi Sound, from Biloxi Bay to Pascagoula, in Mississippi. Project MS1503B-CM-N is a subset of a larger project, MS1503-CM-N, which extends from St. Louis Bay to Pascagoula. The Geographic Cell (GC) may be used in support of the NOAA Nautical Charting Program (NCP) as well as geographic information systems (GIS) for a variety of coastal zone management applications.

Project Design

Project MS1503-CM-N was designed by the Requirements Branch (RB) of the Remote Sensing Division (RSD). RB formulated the photographic mission instructions for this project following the guidelines of the Photo Mission Standard Operating Procedures. The instructions discussed the project's purpose, geographic area of coverage, scope and priority, image requirements, Global Positioning System (GPS) data collection procedures and guidelines, instructions for data recording and handling, and mission communication protocols. RB created a Project Layout Diagram, flight maps and input files for the aircraft flight management system.

Field Operations

The field operations consisted of the collection of static and kinematic GPS data and Inertial Measurement Unit (IMU) data, the acquisition of digital aerial imagery and ground surveys performed by Fugro Inc.'s subcontractor TerraSurv, Inc. Aerial survey operations were conducted in January, 2018 with the NOAA King Air aircraft (N68RF). Project imagery included ten flight lines of natural color and near-infrared (NIR) imagery acquired concurrently using an Applanix DSS dual camera. All imagery was acquired at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.32 meters and flown in coordination with Mean Lower Low Water (MLLW). A Data Acquisition Summary is on file in the RSD Electronic Data Library containing additional information concerning the aerial survey operations for Project MS1503-CM-N.

Fugro, Inc. was contracted by NGS to perform field operations limited to the surveying of ground control points (GCPs) and check points (CPs). The National Spatial Reference System (NSRS) was used to provide control for the network. As a subcontractor to Fugro, TerraSurv Inc established fourteen photo identifiable control points. Of the 14 collected control points, eight were successfully located and used as ground control in the final block adjustments, and four were successfully located and used as check points. Refer to the Report of Survey, Coastal Mississippi, NOAA Project MS1503 (A-B) for more information on ground survey operations.

GPS Data Processing

GPS/IMU data was collected and processed by RSD personnel to yield precise positions and orientations of camera centers for application as photogrammetric control in the aerotriangulation (AT) phase of project completion. A local GPS base station was established for use as a reference station for kinematic GPS processing operations. The position of the base station was determined using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. The airborne kinematic data was processed in February 2018 using POSPAC MMS (ver. 8.2) software. NGS supplied all of the processed data to Fugro, Inc. For further information refer to the Airborne Positioning and Orientation Report (APOR) that is on file with other project data within the RSD Electronic Data Library.

Aerotriangulation

Fugro, Inc. performed routine softcopy AT methods that were applied to establish the network of precise camera positions and other control for mapping, and to provide model parameters and orientation elements required for digital compilation. This work was completed in July 2019 using a softcopy photogrammetric workstation. The color and NIR images were measured and adjusted as two separate blocks using BAE Systems SOCET SET (ver. 5.6) photogrammetric software in conjunction with the Multi-Sensor Triangulation (MST) module. Upon successful completion of the AT process, the overall RMS data for all of the measured image points were used to compute a predicted horizontal circular error of 0.36 meters for the color adjusted block solution and 0.41 meters for the NIR solution at the 95% confidence level. An AT Report was written and is on file with other project data within the RSD Electronic Data Library. Positional data is referenced to the North American Datum of 1983 (NAD 83).

Compilation

The data compilation phase of this project was accomplished by Fugro, Inc. personnel in January 2020. Digital mapping was performed using the Feature Extraction software module within SOCET SET (ver. 5.6). Feature identification and attribution within the GC was based on image analysis of the aerial imagery and information extracted from the largest scale NOAA nautical chart and other ancillary sources. Feature attribution was assigned in compliance with the Coastal Cartographic Object Attribute Source Table (C-COAST), which provides the definition and attribution scheme for the full range of cartographic features pertinent to the CMP. Selected features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for project MS1503B-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.7 meters at the 95% confidence level for the color imagery and 0.8 meters at the 95% confidence level for the NIR imagery. This predicted accuracy of well-defined points is based on a doubling of the circular error derived from AT statistics. The table below provides information on the imagery used to complete this project:

Date	Time (UTC)	Color Imagery		Infrared Imagery		Tide Level*
		Roll	Strip/Images	Roll	Strip/Images	
1/25/2018	16:58 – 16:59	18VC08	64-005 / 1437 – 1441	18VR08	64-005 / 1437 – 1441	0.1

1/25/2018	17:16 – 17:20	18VC08	64-007 / 1472 – 1492	18VR08	64-007 / 1472 – 1492	0.1
1/25/2018	17:25 – 17:29	18VC08	64-008 / 1493 – 1514	18VR08	64-008 / 1493 – 1514	0.1
1/25/2018	17:34 – 17:39	18VC08	64-009 / 1515 – 1539	18VR08	64-009 / 1515 – 1539	0.1
1/25/2018	17:45 – 17:48	18VC08	64-010 / 1540 – 1554	18VR08	64-010 / 1540 – 1554	0.1

* Tide levels are given in meters above MLLW and were calculated using the Pydro software tool with a TCARI grid referenced to verified water level observations at the time of photography from various NOS gauges in the vicinity of the project. The elevation of the MHW tidal datum in the project area varies between 0.44 – 0.49 meters above MLLW.

Quality Control / Final Review

Quality Control tasks were conducted during all phases of project completion by a senior member of the Fugro compilation team. The final QC review was completed in January 2020. The review process included analysis of AT results and assessment of the identification and attribution of digital feature data within the Geographic Cell (GC) according to image analysis and criteria defined in C-COAST. The quality control process concluded with an inspection of topological connectivity within the GC using ArcGIS (ver. 10.7.1) software. All project data was evaluated for compliance to CMP requirements.

Comparisons of the largest scale NOAA nautical charts with natural color photographs and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical charts were used in the comparison process for MS1503B-CM-N:

- 11373, Dauphin Island to Cat Island, MS, 52nd Ed., May 2015
- 11374, Dauphin Island to Dog Keys Pass, MS, 38th Ed., May 2015
- 11375, Pascagoula Harbor, MS, 39th Ed., February 2016

End Products and Deliverables

The following specifies the location and identification of the products generated during the completion of this project:

Remote Sensing Division Electronic Data Library

- Data Acquisition Summary
- Ground Control Report
- Airborne Positioning and Orientation Reports (APOR)
- Aerotriangulation Report
- Project database
- GC11564 in shapefile format
- Project Completion Report (PCR)
- CEF in shapefile format

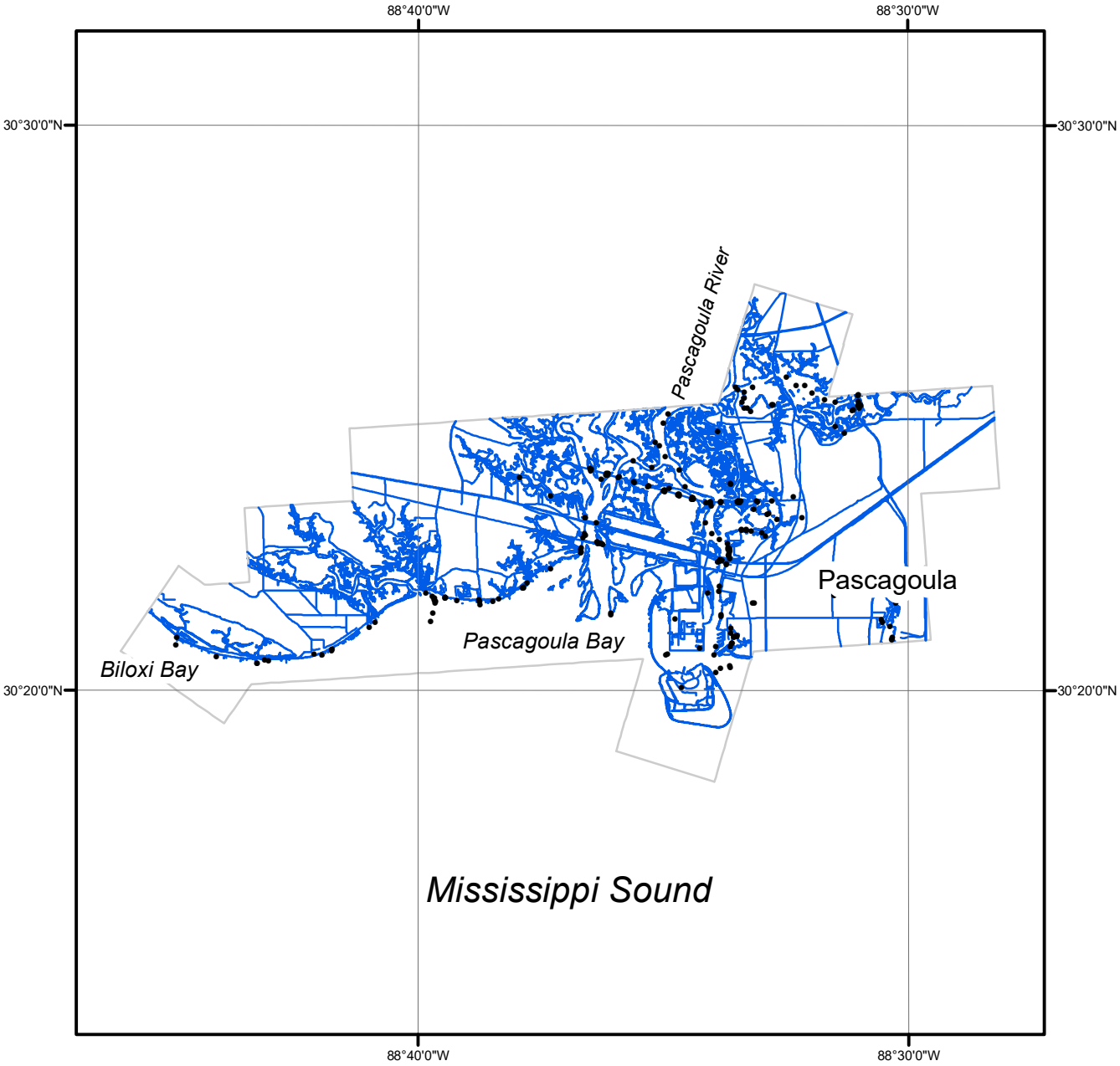
NOAA Shoreline Data Explorer

- GC11564 in shapefile format
- Metadata file for GC11564
- PCR in Adobe PDF format

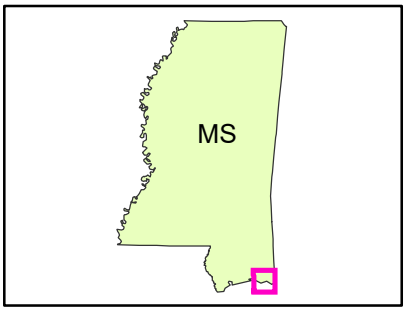
End of Report

MISSISSIPPI SOUND, BILOXI BAY TO PASCAGOULA

MISSISSIPPI



Overview



MS1503B-CM-N

GC11564