NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT FL0902B-CM-N

Choctawhatchee Bay East, Florida

Introduction

NOAA Coastal Mapping Program (CMP) Project FL0902B-CM-N provides a highly accurate database of new digital shoreline data for the eastern half of Choctawhatchee Bay, Florida, including coverage of the Intracoastal Waterway to West Bay. This project is a subproject of FL0902-CM-N which covers Choctawhatchee Bay in its entirety. 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

The Requirements Branch (RB) of the Remote Sensing Division (RSD) formulated the Project Instructions for this project following the guidelines of the "Scope of Work, Shoreline Mapping for the Coastal Mapping Program" (SOW), Version 13B, dated January 2008. The instructions discussed the project's purpose, geographic area of coverage, scope and priority; data acquisition, processing, accuracy, and compilation requirements; product delivery and reporting instructions; and contact and communication information.

Field Operations

The field operations consisted of the collection of static and kinematic GPS data and Inertial Measurement Unit (IMU) data, and the acquisition of digital aerial imagery. Aerial survey operations were conducted on November 12 & 13, 2009 with NOAA's Citation aircraft (N52RF) using the DSS 439 dual camera system (CAM0122 and CAM0116). Aerial survey operations were concluded on October 5, 2010 with NOAA's King Air aircraft (N68RF) using the DSS439 dual camera system (CAM0137). A total of 26 natural color (RGB) and 26 infra-red (NIR) flight lines were acquired at MLLW using the 60mm lens at a nominal altitude of 10,000 feet resulting in an approximate ground sample distance (GSD) of 0.35 meters.

Fugro EarthData, 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 EarthData, Inc., TerraSurv, Inc. established fourteen (14) photo identifiable control points, of which ten (10) were successfully located and used as ground control in the final block adjustments, and four (4) were successfully located and used as check points. See the Ground Control Report for more information on ground survey operations.

GPS Data Reduction

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 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 OPUS. The airborne kinematic data was processed in October 2010 using POSMMS 5.3.0. 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

The aerotriangulation (AT) for this project was completed in April 2016 by Fugro EarthData, Inc. personnel using a softcopy (digital) stereo photogrammetric system to establish the network of control required for the compilation phase. All photo measurements and ground control measurements were directly observed in a digital 'softcopy' environment. The softcopy system hardware consisted of a high-end Dell Precision™ Workstation with the Windows® 7 Professional operating system, and stereo viewing capability. SOCET SET (v 5.6.0) was used for project setup, point measurement and aerotriangulation using the ORIMA v. 11.01 module. A combination of the automatic point measurement feature of the SOCET SET software, and manual point measurement was used to measure the pass points and the tie points in this project.

The RMS of the standard deviations in both X and Y directions were calculated and used to determine the radius of the 95% confidence circle for each image block. The predicted horizontal accuracy is 0.6 m. for the RGB and NIR photos. This accuracy refers to each overall block. An Aerotriangulation Report was written and is on file with other project data within the RSD Electronic Data Library.

Select models from each strip of photography were examined in SOCET SET to ensure the horizontal and vertical integrity of the ORIMA solution, and to verify the suitability of the database for use in the compilation phase. The project database consists of project parameters and options, camera calibration data, ground control parameters, adjusted exterior orientation parameters, and positional listing of all measured points. Positional data is referenced to the North American Datum of 1983 (NAD 83), and is referenced to the Universal Transverse Mercator (UTM) coordinate system.

Compilation

The data compilation phase of this project was accomplished by Fugro EarthData, Inc. in June 2016. Digital mapping was performed using a combination of KLT Atlas v1.9.015 Stereo Softcopy workstations and SOCET SET v5.6 Stereo Softcopy workstations using the SOCET for ArcGIS module and ArcGIS 10.3. Feature identification and attribution within the Geographic Cell (GC) was based on information extracted from the appropriate NOAA nautical charts, US Coast Guard Light List 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 FL0902B-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. The cartographic features were compiled to meet a horizontal accuracy of 1.2 meters at the 95% confidence level. The predicted

accuracy of compiled, well defined points is derived by doubling the circular error derived from aerotriangulation statistics.

The following table provides information on the imagery used to complete this project:

Date	Time (UTC)	Color Imagery		Infrared Imagery		Tide Level*
		Roll	Images	Roll	Images	
11-12-2009	19:07 – 19:45	09NC24	6726 – 6862	09NR25	6570 – 6706	0.1 m
11-13-2009	15:17 – 17:20	09NC25	6977 – 7398	09NR26	6821 – 7242	0.1 m
10-05-2010	20:28 – 20:33	10NC27	11593 – 11623	10NR24	11711 – 11741	0.1 m
10-05-2010	20:33 – 20:41	10NC27	11624 – 11638	10NR24	11742 – 11756	0.0 m
10-05-2010	20:41 – 20:53	10NC27	11639 – 11679	10NR24	11757 – 11797	0.1 m

* 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 0.11 – 0.40 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of Fugro EarthData, Inc. The final QC review was completed in September 2016. The review process included analysis of aerotriangulation 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 10.3 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 chart was used in the comparison process:

- 11385, West Bay to Santa Rosa Sound, FL, 1:40,000, 28th edition, May 2014
- 11388, Choctawhatchee Bay, FL, 1:80,000 scale, 18th edition, Jun. 2012

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

- Ground Control Report
- Airborne Positioning and Orientation Reports (APOR)
- Aerotriangulation Report
- Project database
- GC11202 in shapefile format
- Project Completion Report (PCR)
- CEF in shapefile format

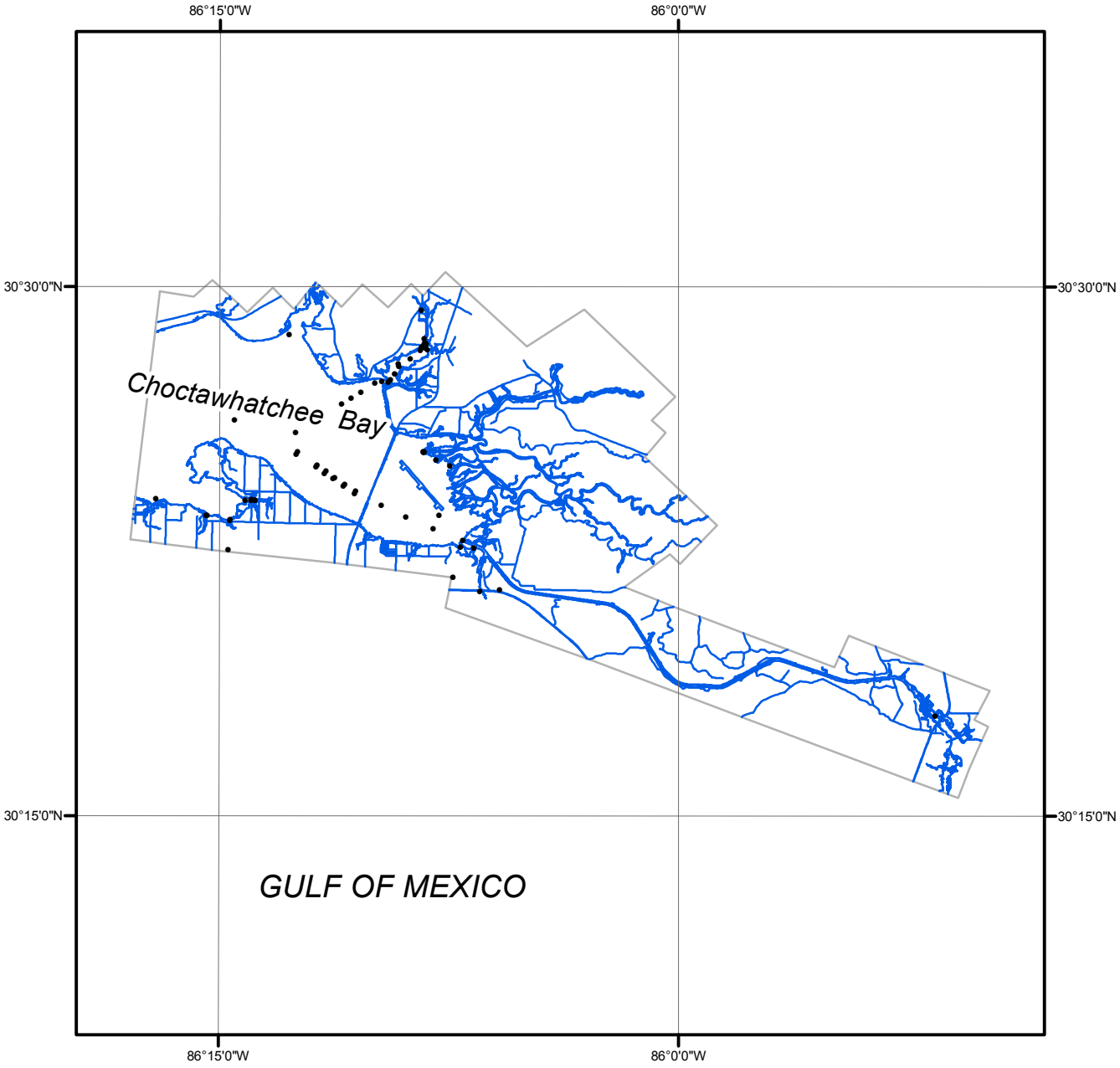
NOAA Shoreline Data Explorer

- GC11202 in shapefile format
- Metadata file for GC11202
- Copy of PCR

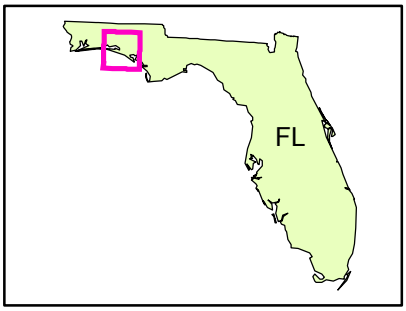
End of Report

CHOCTAWHATCHEE BAY EAST

FLORIDA



Overview



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GC11202