

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT FL1803-CM-N

Intracoastal Waterway, Wetappo Creek South Prong to Lake Wimico, Florida

Introduction

NOAA Coastal Mapping Program (CMP) Project FL1803-CM-N provides a highly accurate database of new digital shoreline data for the Intracoastal Waterway (ICW), from the South Prong of Wetappo Creek to Lake Wimico, in Florida. 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 FL1803-CM-N was designed in response to a request for shoreline data from the Marine Chart Division of NOAA's Office of Coast Survey. The Requirements Branch (RB) of the Remote Sensing Division (RSD) 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, and the acquisition of digital aerial imagery. Aerial survey operations were conducted in April, 2019 with the NOAA King Air aircraft (N68RF). Project imagery included five 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 for color imagery. The NIR imagery was not used for this project. Although imagery was not acquired in strict coordination with local tides, the goal was to collect all imagery below Mean High Water (MHW).

Direct Georeferencing Data Processing

GPS/IMU data was processed by RSD personnel to yield precise camera positions and orientations for direct georeferencing (DG) of the imagery. 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 using Applanix POSPac MMS (ver. 8.3) software in June, 2019. For further information refer to the Airborne Positioning and Orientation Reports (APOR) on file with other project data within the RSD Electronic Data Library.

The processed GPS/IMU data were used to derive precise exterior orientation (EO) values of the camera centers required for digital feature extraction. The predicted horizontal accuracy of the imagery was determined by propagating sensor EO and image measurement uncertainties through the photogrammetric collinearity equations using an Exterior Orientation Total Propagated Uncertainty (EO-TPU) tool developed by NGS. Using this tool, the predicted horizontal uncertainty at the 95% confidence level was calculated to be 0.95 meters.

Three NGS third order geodetic control points (“APALACHICOLA MUNICIPAL TANK”, “APALACHICOLA CHAN REAR RNG BCN” and “APALACHICOLA USAF MICROWAVE”) were used to verify the horizontal integrity of the DG data. All stereo-models were examined and found to have acceptable levels of parallax for mapping purposes.

Compilation

The data compilation phase of this project was accomplished by RSD Applications Branch (AB) personnel in August, 2019. 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 FL1803-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.9 meters at the 95% confidence level. This predicted accuracy of well-defined points measured during the compilation phase was derived by doubling the imagery accuracy computed from the EO-TPU tool.

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

Date	Time (UTC)	Roll#	Strip / Image #s	Tide Level*
4-21-2019	16:45 – 16:48	19VC20	64-002 / 3280 – 3299	0.4 – 0.2 m
4-21-2019	16:56 – 16:59	19VC20	64-001 / 3300 – 3316	0.2 m
4-21-2019	17:10 – 17:15	19VC20	64-003 / 3344 – 3366	0.2 m
4-21-2019	17:21 – 17:26	19VC20	64-005 / 3367 – 3392	0.2 m
4-21-2019	17:35 – 17:39	19VC20	64-004 / 3400 – 3419	0.2 – 0.4 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 0.29 – 0.46 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a member of the Applications Branch. The final QC review was completed in August, 2019. The review process included analysis of the DG results and assessment of the identification and attribution of digital

feature data within the 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) software. All project data was evaluated for compliance to CMP requirements.

Comparisons of the largest scale NOAA nautical charts with source imagery and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical charts were used in the comparison process:

11393, Lake Wimico to East Bay, 23rd Ed., Jan. 2017

11402, Apalachicola Bay to Lake Wimico, 23rd Ed., Jan. 2015

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

- Airborne Positioning and Orientation Reports (APOR)
- Project Completion Report (PCR)
- Project database
- GC11537 in shapefile format
- Chart Evaluation File in shapefile format

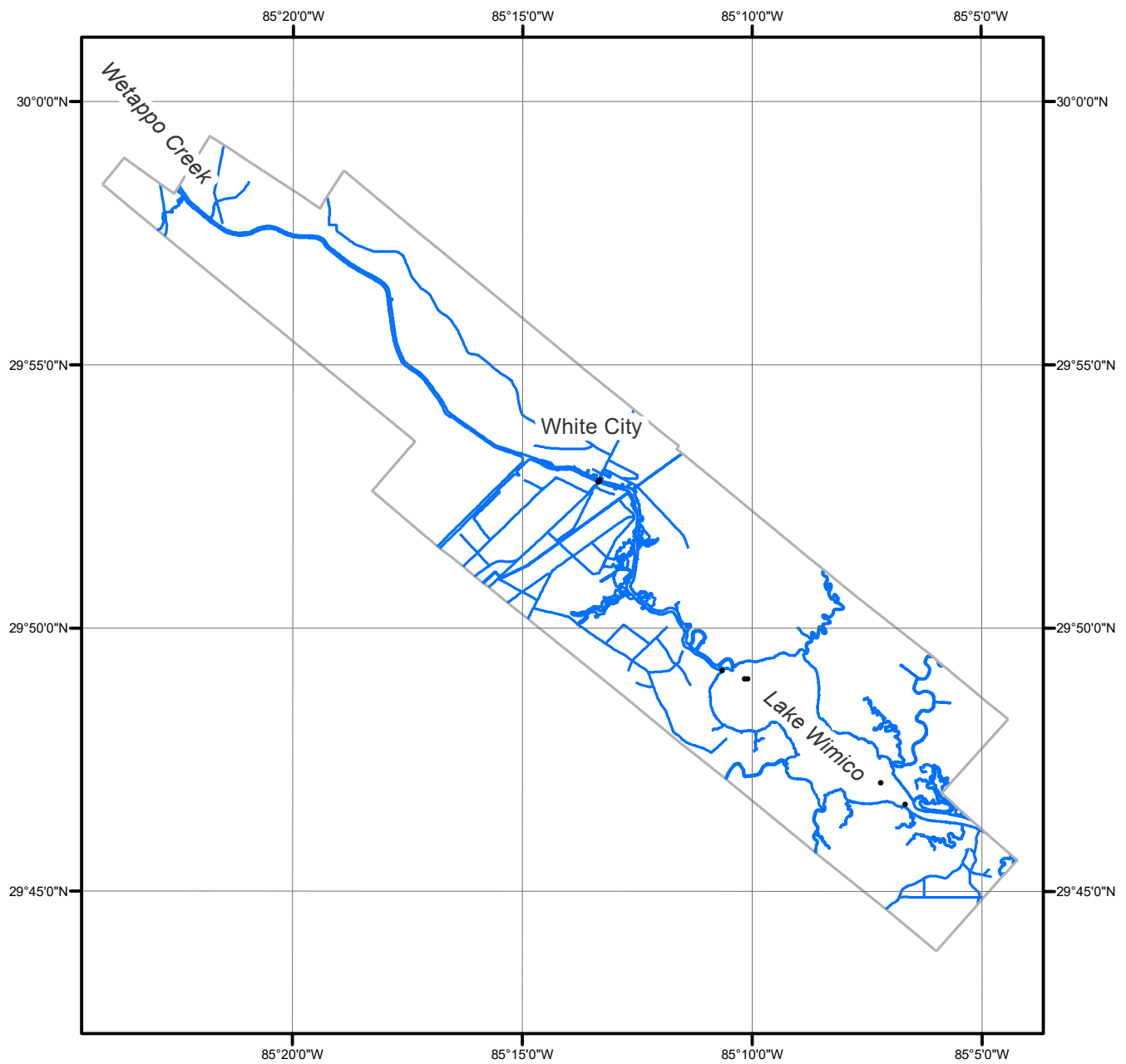
NOAA Shoreline Data Explorer

- GC11537 in shapefile format
- Metadata file for GC11537
- PCR in Adobe PDF format

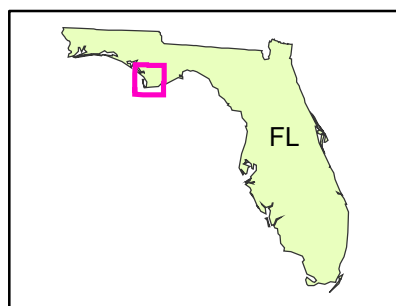
End of Report

ICW, WETAPPO CREEK SOUTH PRONG TO LAKE WIMICO

FLORIDA



Overview



FL1803-CM-N

GC11537