

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT FL1601C-CM-N

Little Hickory Island to Doctors Pass, Florida

Introduction

NOAA Coastal Mapping Program (CMP) Project FL1601C-CM-N provides highly accurate shoreline data for a portion of the Florida Gulf Coast and Intracoastal Waterway, from Little Hickory Island to Doctors Pass. Project FL1601C-CM-N is a subset of a larger project, FL1601-CU-N, covering a portion of the Gulf of Mexico coastline from South Venice to Marco Island. 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) originally designed Project FL1601-CU-N to support the Continually Updated Shoreline Product (CUSP), a seamless database of high resolution shoreline data. RB formulated the photographic mission instructions for this project following the guidelines of the Photo Mission Standard Operating Procedures, discussing the project's purpose, 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. Created a Project Layout Diagram, flight maps and input files for the aircraft flight management system.

Field Operations

The field operations for Project FL1601-CU-N consisted of the collection of static and kinematic GPS data, Inertial Measurement Unit (IMU) data, and the acquisition of aerial imagery. The tide coordinated photographic mission operations were conducted on February 11-13, 2016 for Mean High Water (MHW) imagery with the NOAA King Air (N68RF) aircraft. Project imagery for subproject FL1601C-CM-N included one flight line of natural color imagery acquired using an Applanix DSS-580/560 dual camera system at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.33 meters. Near-Infrared (NIR) imagery was also collected concurrently with the color imagery but was not used for this project.

Direct Georeferencing Data Processing

GPS/IMU data were 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 (ver. 7.1) software from May-June 2016. For further information refer to the Airborne Positioning and Orientation Reports (APORs) on file with

other project data in 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 the Exterior Orientation Total Propagated Uncertainty (EO-TPU) tool developed by NGS. Using this tool, the predicted horizontal uncertainty at the 95% confidence level for imagery used in this subproject was calculated to be 1.0 meter. NGS third order geodetic control points 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. Positional data is referenced to the North American Datum of 1983 (NAD 83).

Compilation

The data compilation phase of this project was accomplished by a member of RSD's Applications Branch (AB) in February 2018. Digital feature data was compiled using the Feature Extraction module within BAE's SOCET SET (ver. 5.6) software. Feature identification and attribution within the GC were based on image analysis of the digital images and information extracted from the appropriate NOAA nautical charts 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 FL1601C-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 2.0 meters at the 95% confidence level, a predicted accuracy derived by doubling the horizontal uncertainty calculated from the EO-TPU tool.

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

Date	Time (UTC)	Roll #	Strip / Photo #s	Tide Level*
02-11-2016	19:24 – 19:28	16VC15	64-001 / 4129 – 4150	0.6 – 0.8 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 0.67 – 0.78 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of AB. The final review of the project was completed in February 2018, and included analysis of the georeferencing results and assessment of the identification and attribution of 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 10.5 software. All project data was evaluated for compliance to CMP requirements.

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

- 11427, ICW, Fort Myers to Charlotte Harbor, 37th Ed., Sep. 2017
- 11430, Lostmans River to Wiggins Pass, 28th Ed., Nov. 2015

End Products and Deliverables

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

Remote Sensing Division Electronic Data Library

- Airborne Positioning and Orientation Report (APOR)
- Project Completion Report (PCR)
- Project database
- GC11395 in shapefile format
- CEF in shapefile format

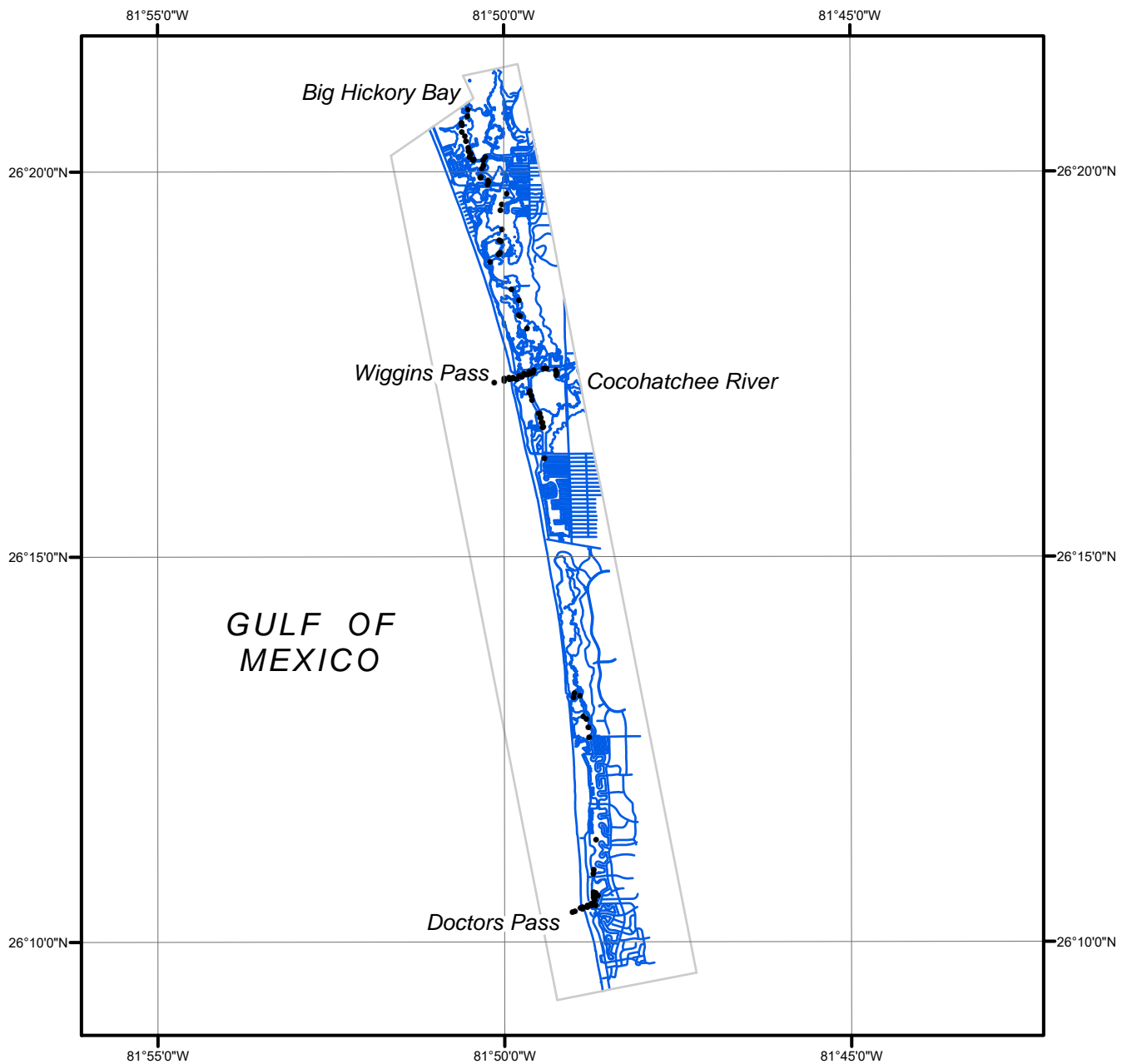
NOAA Shoreline Data Explorer

- GC11395 in shapefile format
- Metadata file for GC11395
- Digital copy of the PCR

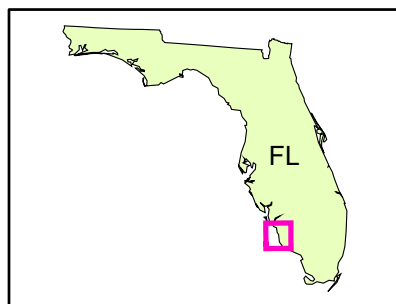
End of Report

LITTLE HICKORY ISLAND TO DOCTORS PASS

FLORIDA



Overview



FL1601C-CM-N

GC11395