

# **NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT**

## ***PROJECT FL1510A-CM-N***

### ***Estero Island to Bonita Beach, Florida***

#### **Introduction**

NOAA Coastal Mapping Program (CMP) Project FL1510A-CM-N provides a highly accurate database of new digital shoreline data for a portion of the coastline from Estero Island to Bonita Beach, Florida, including Big Carlos Pass, Big Hickory Island, and several other smaller islands. FL1510A-CM-N is a subproject of a larger project, FL1510-CM-N, which extends from Hurricane Bay to Cocohatchee River, and includes all of Estero Bay. 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 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, flight and data acquisition requirements, and instructions for data recording and handling. 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 Global Positioning System (GPS) data and Inertial Measurement Unit (IMU) data, and the acquisition of digital aerial imagery. Aerial survey operations were conducted on February 12, 2016 with the NOAA King Air (N68RF) aircraft. Four flight lines of natural color and near-infrared (NIR) imagery were acquired concurrently using an Applanix DSS 580/560 dual camera system, with portions of two flight lines (76 individual exposures) used for subproject FL1510A-CM-N. All imagery was acquired at an approximate altitude of 10,700 feet, resulting in an average ground sample distance (GSD) of 0.37 meters.

#### **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 MMS 7.1 software on March 11, 2016. 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. Positional data is based on the North American Datum of 1983 (NAD 83).

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 Excel spreadsheet based 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 0.9 meters.

## Compilation

The data compilation phase of this project was accomplished by RSD Applications Branch personnel in July 2016. Digital mapping was performed using the Feature Extraction software module within SOCET GXP (ver. 4.1). Feature identification and attribution within the Geographic Cell (GC) were 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 FL1510A-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.7 meters. 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 table below provides information on the imagery used to complete this project:

Date	Time (UTC)	Color Imagery		NIR Imagery		Tide Level*
		Roll	Images	Roll	Images	
2-12-2016	15:09 – 15:12	16VC14	4008 – 4026	16VR14	4007 – 4025	0.1 – 0.2 m
2-12-2016	15:18 – 15:21	16VC14	4038 – 4056	16VR14	4037 – 4055	0.1 – 0.2 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 NOS gauges. The elevation of the MHW tidal datum above MLLW in the project area varies between 0.66 – 0.86 meters.

## 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 2016. 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 10.2.2 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 chart was used in the comparison process:

11427, Fort Myers to Charlotte Harbor and Wiggins Pass, 1:40,000, 35th Ed., Sep. 2011

## **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 Report (APOR)
- Project Completion Report (PCR)
- Project database
- GC11204 in shapefile format
- Chart Evaluation File in shapefile format

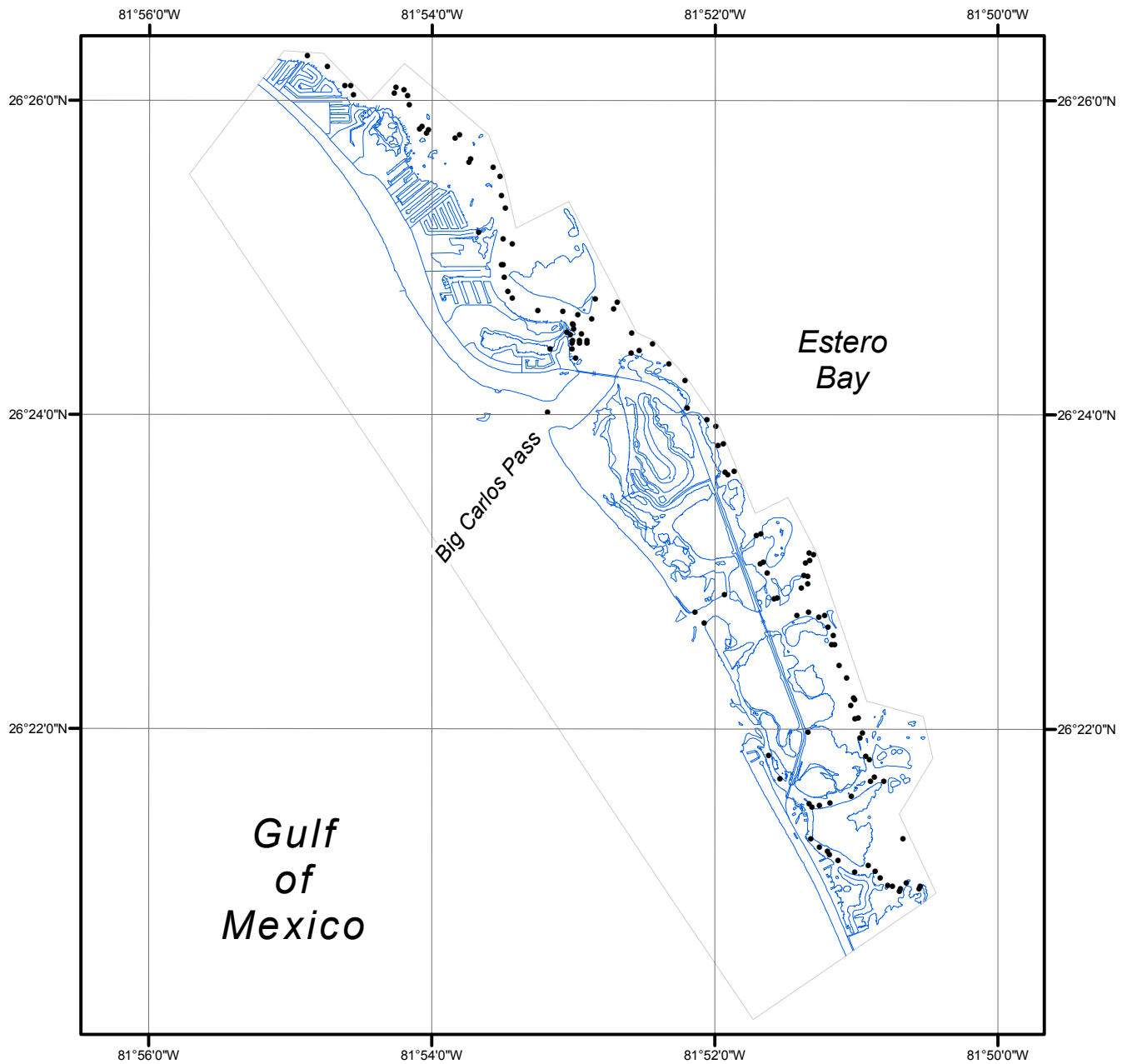
### **NOAA Shoreline Data Explorer**

- GC11204 in shapefile format
- Metadata file for GC11204
- Digital copy of the PCR

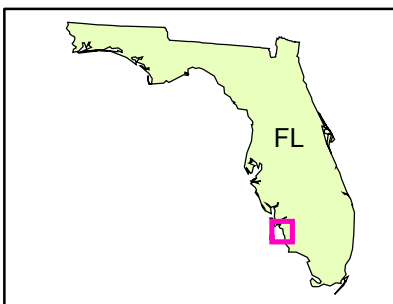
## **End of Report**

# ESTERO ISLAND TO BONITA BEACH

## FLORIDA



Overview



FL1510A-CM-N

GC11204