

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

## ***PROJECT FL1501B-CM-N***

### ***Intracoastal Waterway, Moultrie Creek to Pellicer Flats, Florida***

#### **Introduction**

NOAA Coastal Mapping Program (CMP) Project FL1501B-CM-N provides highly accurate digital shoreline data for a portion of the Intracoastal Waterway (ICW) and Matanzas River from Moultrie Creek to Pellicer Flats, in Florida. Project FL1501B-CM-N is a subproject of a larger acquisition project, FL1501-CM-N, designed to provide coverage of the ICW from Jacksonville Beach, southward to Mosquito Lagoon and Indian River, 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 FL1501-CM-N was designed by the Requirements Branch (RB) of the Remote Sensing Division (RSD) 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**

Field operations for FL1501-CM-N 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, conducted October 22-25, 2014 and October 30, 2015 with the NOAA King Air aircraft, consisted of the acquisition of twenty five flight lines of natural color and near-infrared (NIR) imagery using both Applanix DSS-439 and DSS-580 dual head digital camera systems. All imagery was acquired at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distances (GSD) of 0.36 meters (DSS-439) and 0.33 meters (DSS-580). For subproject FL1501B-CM-N, only the color imagery from five flight lines (93 images) were used. Imagery was not acquired in strict coordination with local tides, though the goal was to collect all imagery below the Mean High Water (MHW) tide stage.

#### **Direct Georeferencing Data Processing**

The GPS/IMU data were processed by RSD personnel to yield precise camera positions and orientations for direct geo-referencing (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. Airborne kinematic data was processed using Applanix POSPac (ver. 6.2) software in November 2014, and POSPac (ver. 7.1) in December 2015. 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 1.5 meters.

NGS third order geodetic control points were used to verify the horizontal integrity of the directly georeferenced (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 May 2018. Digital mapping was performed using the Feature Extraction software module within SOCET SET (ver. 5.6). Feature identification and attribution within the 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 FL1501B-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 3.0 meters at the 95% confidence level. This predicted accuracy of compiled well-defined points is 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 / Images	Tide Level*
10/22/2014	18:30 – 18:32	14NC98	53-008 / 22738 – 22753	0.4 – 0.3 m
10/22/2014	18:36 – 18:39	14NC98	53-009 / 22754 – 22770	0.3 – 0.4 m
10/30/2015	19:32 – 19:34	15VC20	53-007 / 03228 – 03243	0.4 m
10/30/2015	19:50 – 19:51	15VC20	53-007 / 03290 – 03295	0.3 – 0.9 m
10/30/2015	19:57 – 19:59	15VC20	53-005 / 03296 – 03311	0.9 – 0.6 m
10/30/2015	20:07 – 20:10	15VC20	53-006 / 03334 – 03355	0.4 – 0.8 m

\* Tide levels are given in meters above MLLW, and were calculated using the Pydro software tool with discrete tidal zoning for the outer coast area (lines 53-009 and 53-007), and with a TCARI grid for the back-bay areas. The elevation of the MHW tidal datum in the project area varies between 1.36 – 1.57 meters above MLLW for the outer coast, and 0.49 – 1.45 meters above MLLW for the back bays.

## **Quality Control / Final Review**

Quality control tasks were conducted during all phases of project completion by a senior member of RSD. The final QC review was completed in June 2018. 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 10.4 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:

- Chart 11485, 38<sup>th</sup> Ed., Jan 2017
- Chart 11486, 16<sup>th</sup> Ed., Nov 2010

## **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
- GC11289 in shapefile format
- CEF in shapefile format

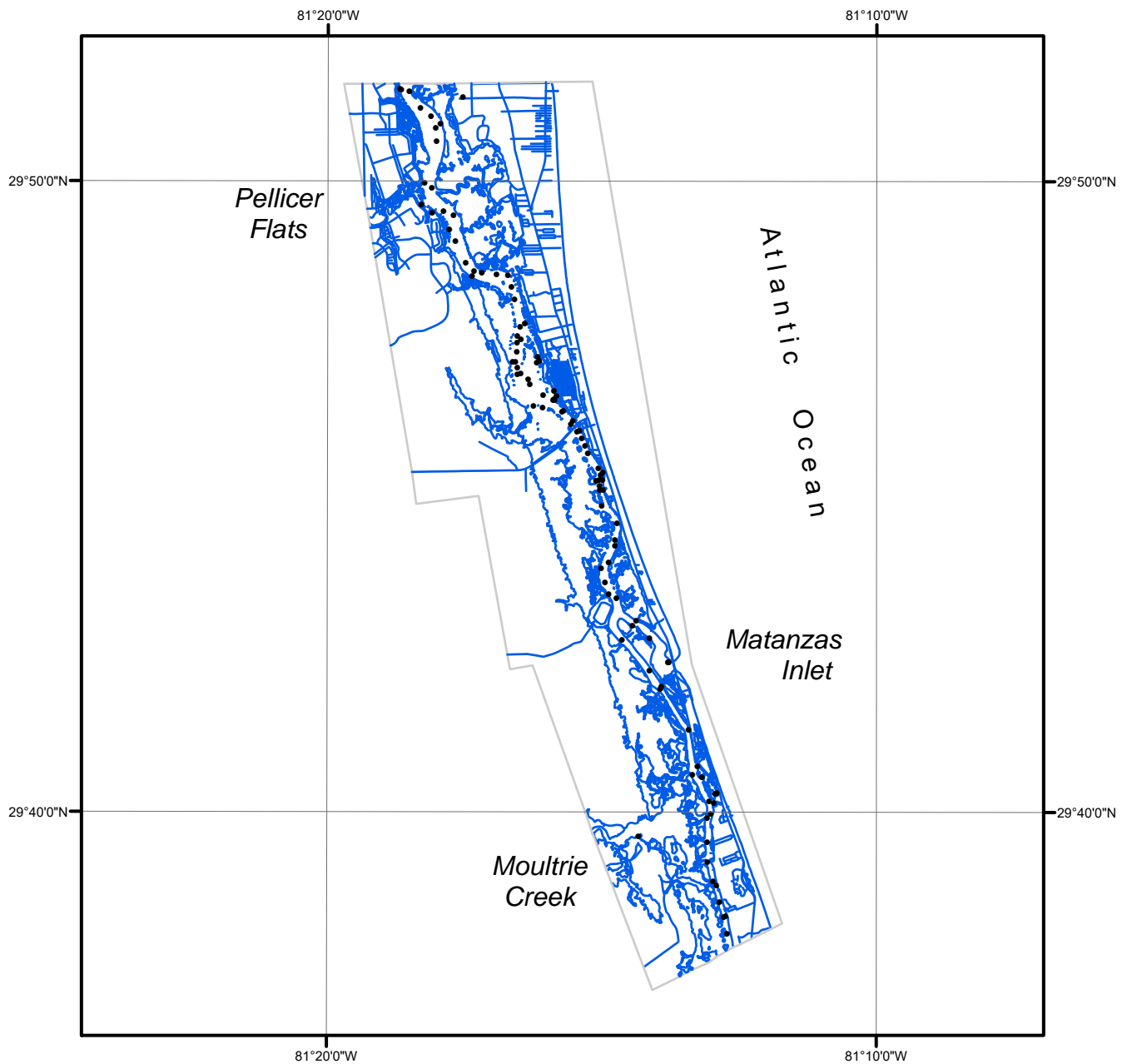
### **NOAA Shoreline Data Explorer**

- GC11289 in shapefile format
- Metadata file for GC11289
- PCR in Adobe PDF format

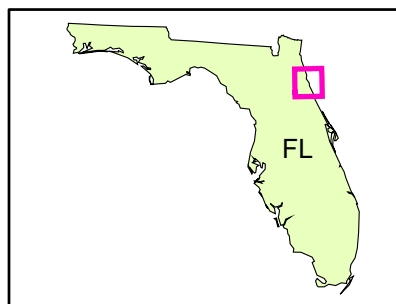
## **End of Report**

# ICW, MOULTRIE CREEK TO PELLICER FLATS

## FLORIDA



Overview



FL1501B-CM-N

GC11289