

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

## ***PROJECT FL1511-CM-N***

### ***Florida Beach to Mexico Beach, Florida***

#### **Introduction**

Coastal Mapping Program (CMP) Project FL1511-CM-N provides highly accurate digital shoreline data for a portion of the Gulf of Mexico coastline from Florida Beach to Mexico Beach, in Florida, and includes St. Andrew Sound and entrances to St. Andrew 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 coastal zone management applications.

#### **Project Design**

Project FL1511-CM-N was designed by the Requirements Branch (RB) of the Remote Sensing Division (RSD) following the guidelines of RSD's 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 Global Positioning System (GPS) data and Inertial Measurement Unit (IMU) data and the acquisition of aerial imagery. The photographic mission operations were conducted on October 19, 2015, with the NOAA King Air aircraft. Project imagery included four flight lines (183 individual exposures) of natural color imagery acquired using an Applanix DSS 580/560 dual camera system. The color images were acquired concurrently with near-infrared (NIR) imagery, which was not used for this project. All imagery was acquired at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.33 meters for the color imagery.

#### **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. The airborne kinematic data was processed using Applanix POSPAC (ver. 7.1) software on December 14, 2015. For further information refer to the Airborne Positioning and Orientation Report (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 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 0.8 meters for the imagery used to compile data for FL1511-CM-N.

Seven (7) published coordinates for NGS third order geodetic control points were used to test 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 initiated by RSD personnel in February 2016. Digital mapping was performed using the Feature Extraction software module within SOCET SET (ver. 5.6). 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 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 FL1511-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.6 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 # | Photo #s      | Tide Level* |
|------------|---------------|--------|---------------|-------------|
| 10/19/2015 | 19:28 – 19:33 | 15VC16 | 02224 – 02262 | 0.2 m       |
| 10/19/2015 | 19:44 – 19:51 | 15VC16 | 02263 – 02317 | 0.2 m       |
| 10/19/2015 | 19:58 – 20:07 | 15VC16 | 02318 – 02371 | 0.3 m       |
| 10/19/2015 | 20:13 – 20:19 | 15VC16 | 02372 – 02406 | 0.3 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 from the NOS station at Panama City, FL (ID: 8729108). The elevation of the MHW tidal datum in the project area varies between 0.2 - 0.3 meters above MLLW.

## Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by RSD personnel. The final QC review was completed in March 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 Esri's 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 charts were used in the comparison process:

- 11390, East Bay to West Bay, 1:40,000 scale, 26<sup>th</sup> Ed., Nov. 2015
- 11391, St Andrew Bay, 1:25,000 scale, 26<sup>th</sup> Ed., Sep. 2015
- 11393, Lake Wimico to East Bay, 1:40,000 scale, 22<sup>nd</sup> Ed., Nov. 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**

- Project database
- Airborne Positioning and Orientation Report (APOR)
- GC11193 in shapefile format
- Project Completion Report (PCR)
- Chart Evaluation File in shapefile format

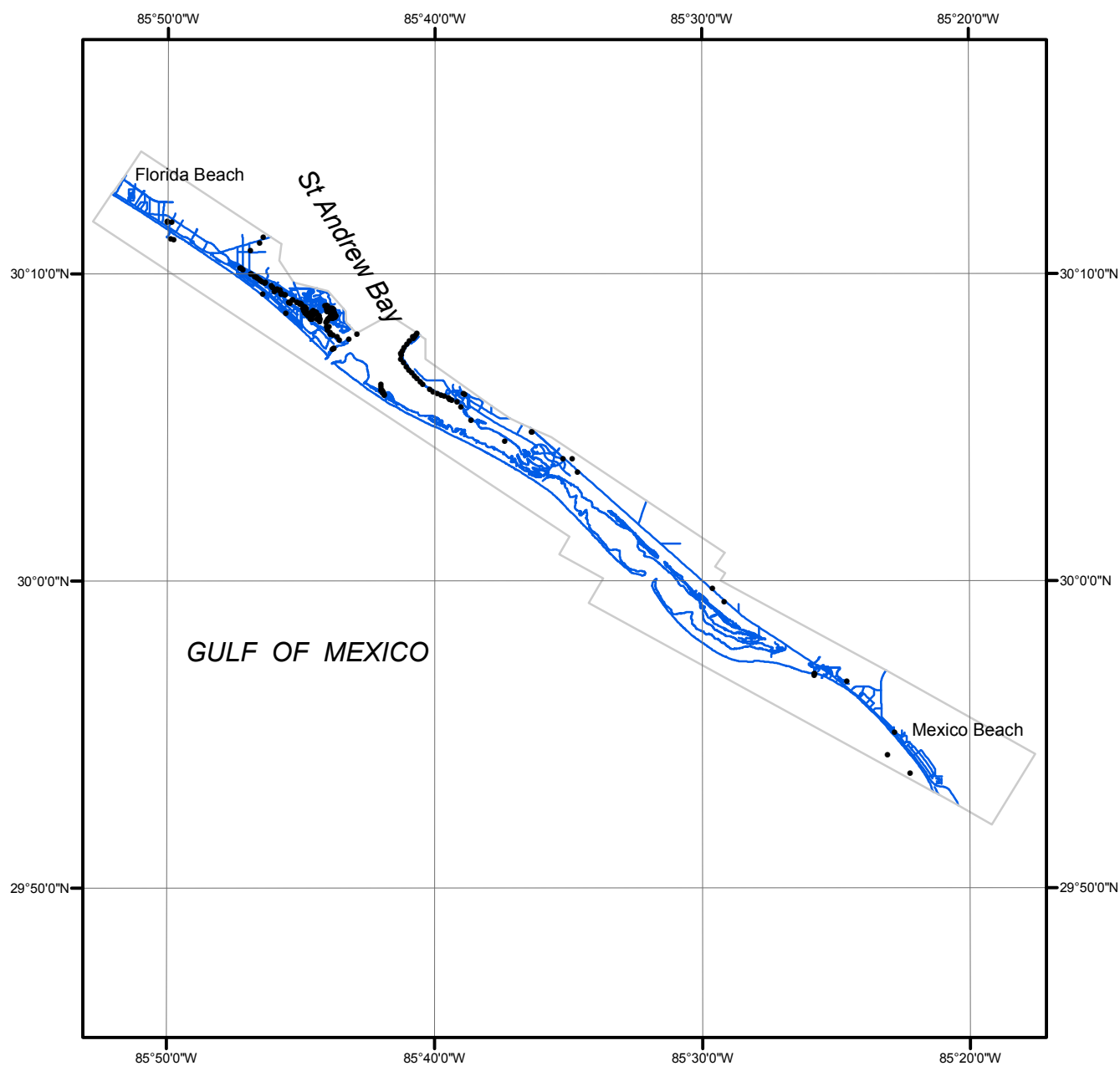
### **NOAA Shoreline Data Explorer**

- GC11193 in shapefile format
- Metadata file for GC11193
- Digital copy of the PCR in Adobe PDF format

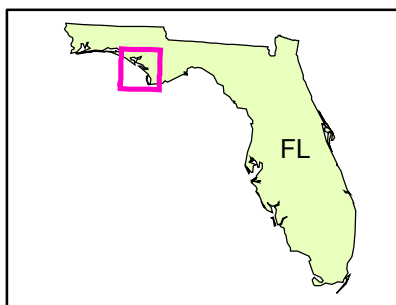
## **End of Report**

# FLORIDA BEACH TO MEXICO BEACH

## FLORIDA



Overview



FL1511-CM-N

GC11193