

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT FL1501D-CM-N

Intracoastal Waterway, Daytona Beach to Ponce de Leon Inlet, Florida

Introduction

NOAA Coastal Mapping Program (CMP) Project FL1501D-CM-N provides highly accurate digital shoreline data for a portion of the Intracoastal Waterway (ICW) from Daytona Beach to Ponce de Leon Inlet, Florida. Project FL1501D-CM-N is a subproject of a larger acquisition project, FL1501-CM-N, designed to provide coverage of the ICW from Jacksonville Beach, Florida, southward to Mosquito Lagoon and Indian River. 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

Photographic mission instructions for FL1501-CM-N were formulated 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

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 (N68RF), consisted of the acquisition of 25 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 FL1501D-CM-N, color imagery from three flight lines (114 images) collected with the DSS-439 camera 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.

GPS Data Reduction

GPS/IMU data was collected and processed by RSD personnel to yield precise positions and orientations of camera centers for application as photogrammetric control in the aerotriangulation phase of project completion. 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 in November 2014 using POSPAC ver. 6.2. 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.

Aerotriangulation

Routine softcopy aerotriangulation methods were applied to establish the network of precise camera positions and other control for mapping, and to provide model parameters and orientation elements required for digital compilation. This work was completed by RSD personnel in April 2017 utilizing a softcopy photogrammetric workstation. The color images were measured and adjusted as a single block using BAE Systems' SOCET SET (ver. 5.6) photogrammetric software in conjunction with the Multi-Sensor Triangulation (MST) module (ver. 5.6). Upon successful completion of the aerotriangulation process, the RMS of the standard deviations of the residuals for each aerotriangulated ground point which were used to compute a predicted horizontal circular error of 0.5 meters based on a 95% confidence level. An Aerotriangulation Report was completed and is on file with other project data within the RSD Electronic Data Library.

The project database consists of project parameters and options, interior orientation parameters, ground control parameters, adjusted exterior orientation parameters, and positional listing of all measured points. Positional data is referenced to the North American Datum of 1983 (NAD 83).

Compilation

The data compilation phase of this project was accomplished by RSD Applications Branch (AB) personnel in July 2017. 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 FL1501D-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.0 meters at the 95% confidence level. This predicted accuracy of well-defined points is based on a doubling of the circular error derived from aerotriangulation statistics.

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

Date	Time (UTC)	Roll	Strip / Images	Tide Level*
10/22/2014	17:19 – 17:25	14NC98	53-013 / 22489 – 22526	0.4 m
10/22/2014	17:29 – 17:34	14NC98	53-014 / 22527 – 22563	0.3 m

10/22/2014	17:41 – 17:47	14NC98	53-015 / 22576 – 22613	0.3 m
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* 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 in the project area varies between 1.2 – 1.3 meters above MLLW along the outer coast and 0.2 – 0.6 meters in 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 August 2017. The review process included analysis of the aerotriangulation 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 10.5 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:

- 11484, Ponce de Leon Inlet to Cape Canaveral, 1:80,000, 24th Ed., Jul. 2011
- 11485, ICW – Tolomato River to Palm Shores, 1:40,000, 38th Ed., Jan. 2017
(Including 1:10,000 scale inset of Daytona Beach Municipal Yacht Basin)
- 11486, St Augustine Light to Ponce de Leon Inlet, 1:80,000, 16th 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

- Project database
- Airborne Positioning and Orientation Report (APOR)
- Aerotriangulation Report (AT)
- GC11291 in shapefile format
- Project Completion Report (PCR)
- CEF in shapefile format

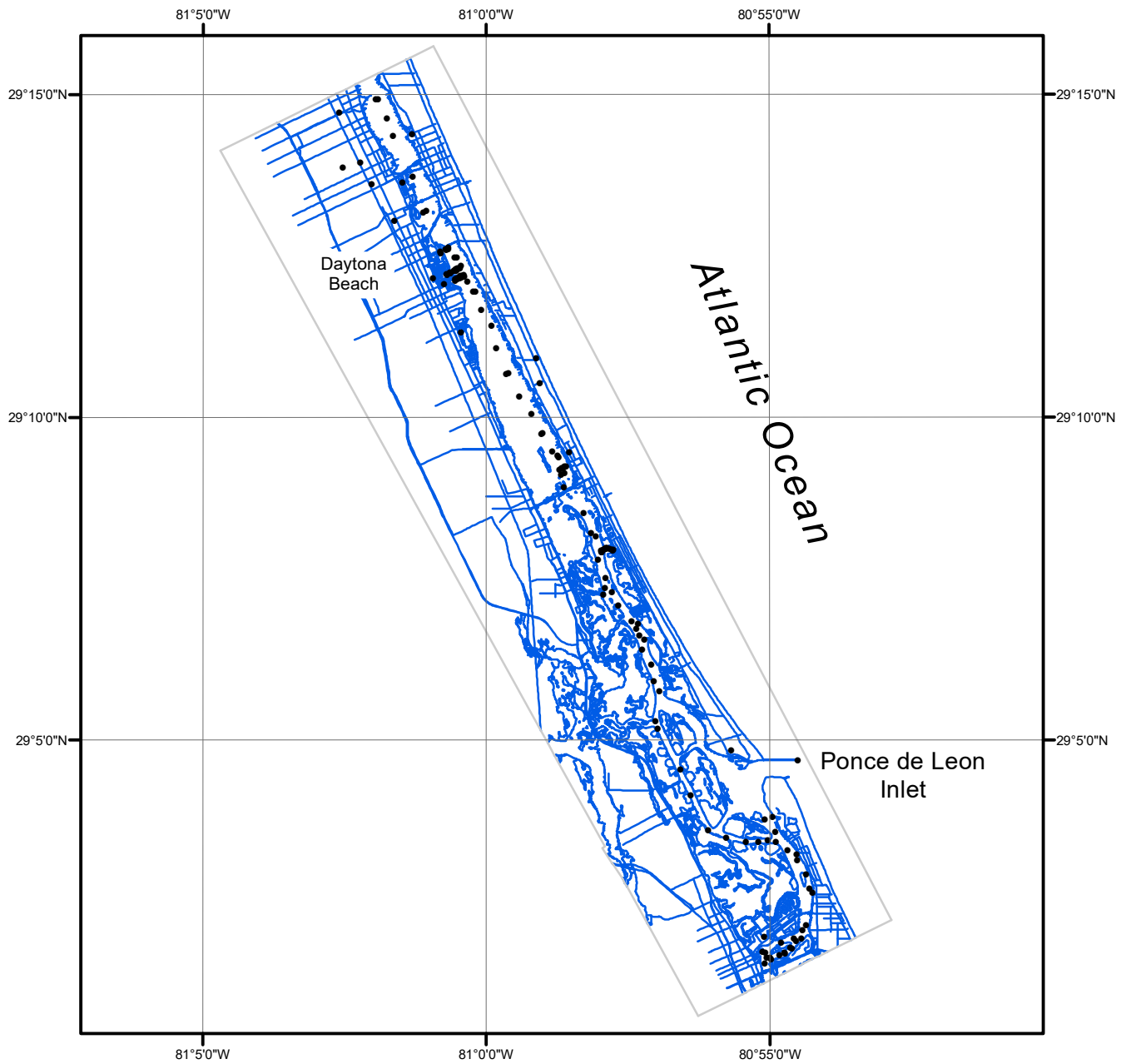
NOAA Shoreline Data Explorer

- GC11291 in shapefile format
- Metadata file for GC11291
- Digital copy of the PCR

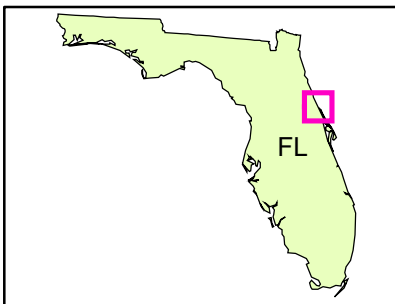
End of Report

ICW, DAYTONA BEACH TO PONCE DE LEON INLET

FLORIDA



Overview



FL1501D-CM-N

GC11291