

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT FL1702A-CM-N

St. Johns River at Mile Point Turn, Florida

Introduction

NOAA Coastal Mapping Program (CMP) Project FL1702A-CM-N provides highly accurate digital shoreline data for a short stretch of St. Johns River at Mile Point Turn, in Florida. This is a subproject of a larger acquisition project, FL1702-CM-N, covering a slightly larger extent of St. Johns River and Pablo Creek beyond Mile Point Turn. 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 FL1702-CM-N was planned in response to a request from NOAA's Office of Coast Survey (OCS) to provide updated shorelines in navigationally critical areas in the vicinity of Mile Point Turn. 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 Procedure. The instructions discussed the project's purpose, geographic area of coverage, scope and priority; photographic requirements; flight line priority; Global Positioning System (GPS) data collection procedures and guidelines for both kinematic and static surveys; and data recording and handling instructions. RB created a Project Layout Diagram, flight maps and input files for the aircraft's flight management system.

Field Operations

The field operations consisted of the collection of static and kinematic GPS data and Inertial Measurement Unit (IMU) data, and the acquisition of digital aerial imagery. The photographic mission operations were conducted in November 2016 and February 2017 with the NOAA King Air (N68RF) aircraft. Project imagery included natural color (RGB) and near-infrared (NIR) imagery acquired concurrently using an Applanix DSS-580 dual head digital camera in coordination with both MLLW and MHW tide levels. All imagery was acquired at a nominal altitude of 7,500 feet, resulting in an approximate ground sample distance (GSD) of 0.24 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 in December 2016, and March 2017 using POSPac MMS GPS/IMU software (v. 7.1). 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 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 0.59 – 0.61 meters for the MHW imagery, and 0.65 – 0.67 meters for the MLLW imagery. 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.

Compilation

Feature data compilation for FL1702A-CM-N was initiated by a member of the RSD Applications Branch in February 2017. This work 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.

Spatial data accuracies were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy at the 95% confidence level of 1.2 meters for features compiled from the MHW imagery, and 1.3 meters for features compiled from the MLLW imagery. This predicted accuracy of compiled well-defined points is derived by doubling the horizontal uncertainty calculated using the EO-TPU tool.

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

Date	Time (UTC)	Strip	Color Imagery		Infrared Imagery		Tide Level*
			Roll	Images	Roll	Images	
11/16/2016	17:03-17:04	45-002	16VC92	21280 – 21284	16VR85	19230 – 19234	1.4 m
2/11/2017	18:17-18:18	45-002	17VC11	1867 – 1871	17VR09	1273 – 1277	0.0 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 1.31 – 1.36 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by senior members of the CMP. The final QC review was completed in April 2017. 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 10.3.1 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:

- 11491, St Johns River, Atlantic Ocean to Jacksonville, FL, 1:20,000 scale, 39th Ed., Feb 2015

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 Reports (APORs)
- Project database
- GC11302 in shapefile format
- Project Completion Report (PCR)
- CEF in shapefile format

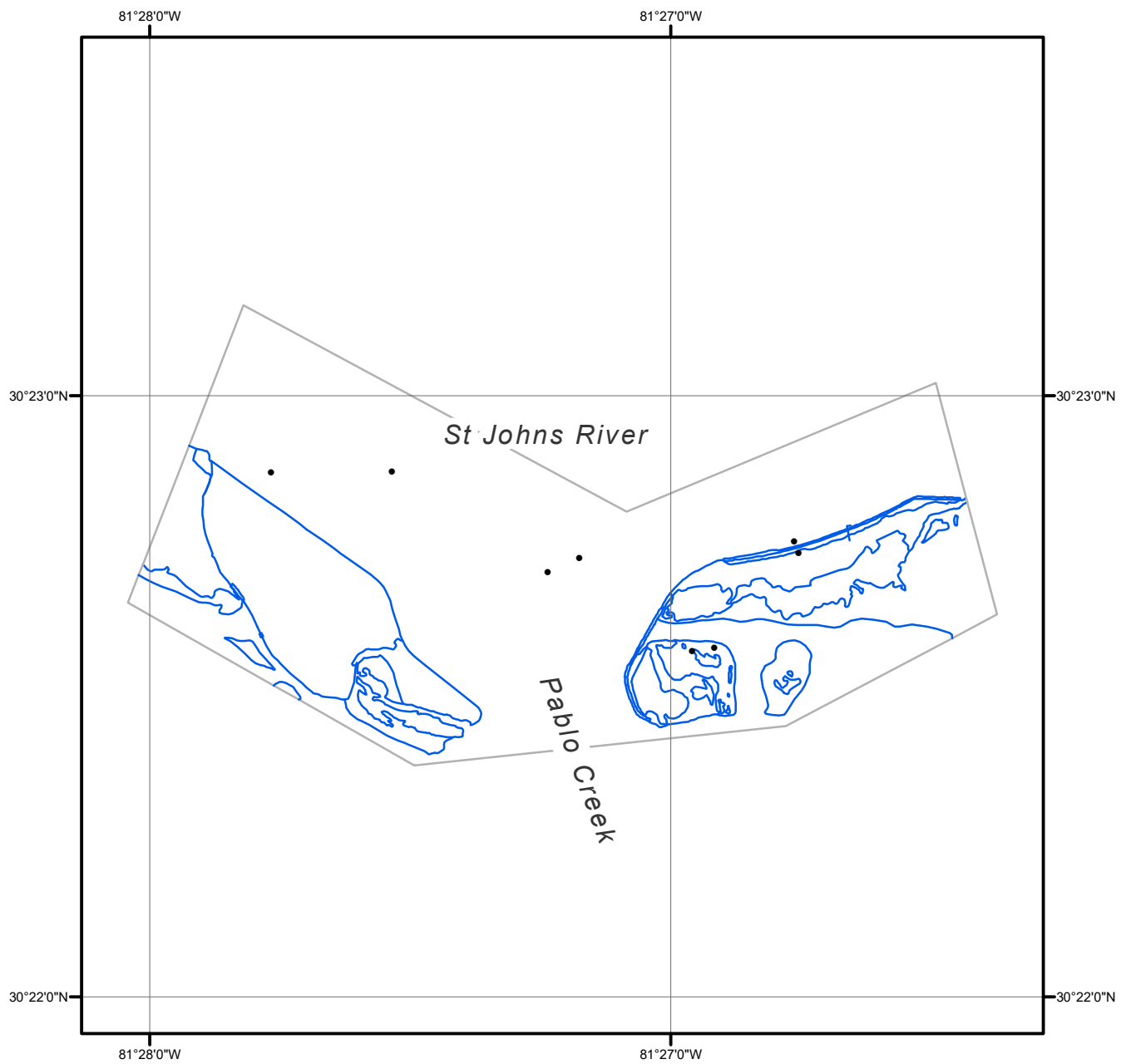
NOAA Shoreline Data Explorer

- GC11302 in shapefile format
- Metadata file for GC11302
- PCR in Adobe PDF format

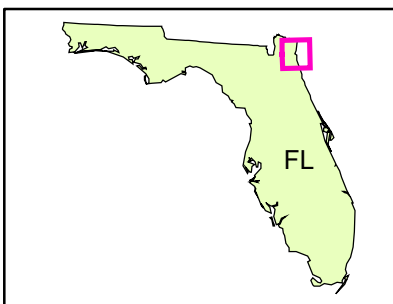
End of Report

ST. JOHNS RIVER AT MILE POINT TURN

FLORIDA



Overview



FL1702A-CM-N

GC11302