

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT FL1421A-CM-N

St. Johns River, Jacksonville to Florence, Florida

Introduction

NOAA Coastal Mapping Program (CMP) Project FL1421A-CM-N, St. Johns River, Jacksonville to Florence is a subproject of FL1421-CM-N that provides a highly accurate database of new digital shoreline data for St. Johns River, from Jacksonville upriver to Seven Sisters Islands, in 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 FL1421-CM-N was designed by the Requirements Branch (RB) of the Remote Sensing Division (RSD). RB 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, scope and priority, image requirements, flight line priority, Global Positioning System (GPS) data collection procedures and guidelines, instructions for data recording and handling, and contact and communication information. RB created a Project Layout Diagram, flight maps and input files for the aircraft flight management system.

Field Operations

The field operations for FL1421-CM-N consisted of the collection of static and kinematic GPS data and Inertial Measurement Unit (IMU) data, the acquisition of digital aerial imagery, and ground surveys performed by Fugro's subcontractor, TerraSurv, Inc.

Aerial survey operations included the acquisition of 39 strips of natural color and NIR imagery. The images were acquired using both the DSS 539 and DSS 580 dual camera systems. All aerial imagery acquisition was accomplished with NOAA's King Air aircraft (N68RF) flying at a nominal altitude of 10,500 feet. Please refer to the Data Acquisition Summary for additional information and specific dates concerning the aerial survey operations.

Fugro was contracted by NGS to perform field operations limited to the surveying of ground control points (GCPs) and check points (CPs). The National Spatial Reference System (NSRS) was used to provide control for the network. As a subcontractor to Fugro, TerraSurv, Inc. established 33 photo identifiable control points. Of these control points, 29 were successfully located and used as ground control in the final block adjustments, and 4 were successfully located and used as check points. Refer to Fugro's Survey Report, Florida Coastal NOAA Project FL1421(A-B) for more information on ground survey operations.

GPS Data Reduction

All GPS/IMU data processing tasks were completed by NGS and the final processed data was supplied to Fugro, Inc. GPS and IMU data were collected and processed by RSD personnel to yield precise positions and orientations of camera centers as a means of rendering accurately georeferenced digital images. For further information refer to the multiple Airborne Positioning and Orientation Reports (APOR) that are on file within the RSD Electronic Data Library.

Aerotriangulation

Fugro, Inc. performed routine softcopy aerotriangulation methods that 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. The RGB and NIR images were measured and adjusted as two separate blocks. This work was completed in May 2018 using a softcopy photogrammetric workstation. The softcopy system hardware consisted of a high-end Dell Precision workstation with the Windows operating system, and stereo viewing capability. SOCET SET (ver. 5.6) was used for project setup and the mensuration phase.

Upon successful completion of the aerotriangulation process, the overall RMS data for all of the adjusted ground points' standard deviations (both x & y) were used to compute a predicted horizontal circular error (95% confidence level) of 0.3 meters for the RGB adjusted block solution and 0.4 meters for the NIR solution.

The project database consists of project parameters and options, camera calibration data, 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, (NAD83). An Aerotriangulation Report was completed and is on file with other project data within the RSD Electronic Data Library.

Compilation

The compilation for FL1421A-CM-N was done by Fugro, Inc., between September and November 2018. Digital mapping was performed using the Feature Extraction module of SOCET SET on stereo-capable softcopy workstations, with the SOCET for ArcGIS module and ArcGIS (ver. 10.3) desktop GIS software. Feature identification and attribution within the GC were based on image analysis of project photographs and information extracted from the appropriate NOAA nautical charts, US Coast Guard Light List 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 FL1421A-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet horizontal accuracies of 0.6 meters from the RGB images and 0.8 meters from the NIR images, at the 95% confidence level. The predicted accuracies of compiled, well-defined points are derived by doubling the circular error derived from aerotriangulation statistics.

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

| Date | Time (UTC) | Color Imagery | | Infrared Imagery | | Tide Level* |
|------------|---------------|---------------|--------------------|------------------|-----------|-------------|
| | | Roll | Images | Roll | Images | |
| 10/17/2015 | 14:30 - 14:33 | 15VC15 | 53-018 / 1803-1818 | 15VR15 | 1807-1822 | 0.2 - 0.3 |
| 10/17/2015 | 15:11 - 15:12 | 15VC15 | 53-019 / 1893-1907 | 15VR15 | 1897-1911 | 0.2 - 0.3 |
| 10/17/2015 | 15:17 - 15:19 | 15VC15 | 53-022 / 1908-1924 | 15VR15 | 1912-1928 | 0.3 |
| 10/17/2015 | 15:22 - 15:24 | 15VC15 | 53-025 / 1925-1938 | 15VR15 | 1929-1942 | 0.2 |
| 10/17/2015 | 15:31 - 15:32 | 15VC15 | 53-013 / 1950-1960 | 15VR15 | 1954-1964 | 0.2 |
| 10/17/2015 | 15:40 - 15:42 | 15VC15 | 53-014 / 1961-1975 | 15VR15 | 1965-1979 | 0.3 |
| 10/17/2015 | 15:49 - 15:51 | 15VC15 | 53-028 / 1976-1990 | 15VR15 | 1980-1994 | 0.2 - 0.3 |
| 10/17/2015 | 15:56 - 15:59 | 15VC15 | 53-034 / 1991-2009 | 15VR15 | 1995-2013 | 0.2 - 0.3 |
| 10/17/2015 | 16:08 - 16:10 | 15VC15 | 53-027 / 2010-2024 | 15VR15 | 2014-2028 | 0.2 - 0.3 |
| 1/19/2016 | 17:31 - 17:32 | 16VC08 | 53-017 / 3062-3075 | 16VR08 | 3061-3074 | 0.0 - 0.1 |
| 1/19/2016 | 17:36 - 17:38 | 16VC08 | 53-016 / 3076-3089 | 16VR08 | 3075-3088 | 0.0 - 0.1 |
| 1/19/2016 | 17:43 - 17:47 | 16VC08 | 53-015 / 3090-3112 | 16VR08 | 3089-3111 | 0.0 - 0.1 |
| 1/20/2016 | 17:31 - 17:32 | 16VC09 | 53-021 / 3113-3123 | 16VR09 | 3112-3122 | 0.1 |
| 1/20/2016 | 17:42 - 17:44 | 16VC09 | 53-023 / 3131-3145 | 16VR09 | 3130-3144 | 0.1 |
| 1/20/2016 | 17:54 - 17:58 | 16VC09 | 53-024 / 3146-3171 | 16VR09 | 3145-3170 | 0.1 |
| 1/20/2016 | 18:48 - 18:51 | 16VC09 | 53-020 / 3172-3189 | 16VR09 | 3171-3188 | 0.1 |
| 1/20/2016 | 19:00 - 19:05 | 16VC09 | 53-026 / 3190-3217 | 16VR09 | 3189-3216 | 0.1 |

* 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 0.26 – 0.82 meters above MLLW.

Quality Control / Final Review

Quality Control tasks were conducted during all phases of project completion by a senior member of the Fugro compilation team. The final QC review was completed in December 2018. The review process included analysis of 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 (ver. 10.3) software. All project data was evaluated for compliance to CMP requirements.

Comparisons of the largest scale NOAA nautical charts with natural color photographs and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical charts were used in the comparison process for FL1421A-CM-N:

- 11491, St Johns River, Atlantic Ocean to Jacksonville, FL, 39th Ed., Feb. 2015
- 11492, St Johns River, Jacksonville to Racy Point, FL, 21st Ed., Jul. 2006

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

- Ground Control Report
- Airborne Positioning and Orientation Reports (APOR)
- Aerotriangulation Report
- Project database
- GC11333 in shapefile format
- Project Completion Report (PCR)
- CEF in shapefile format

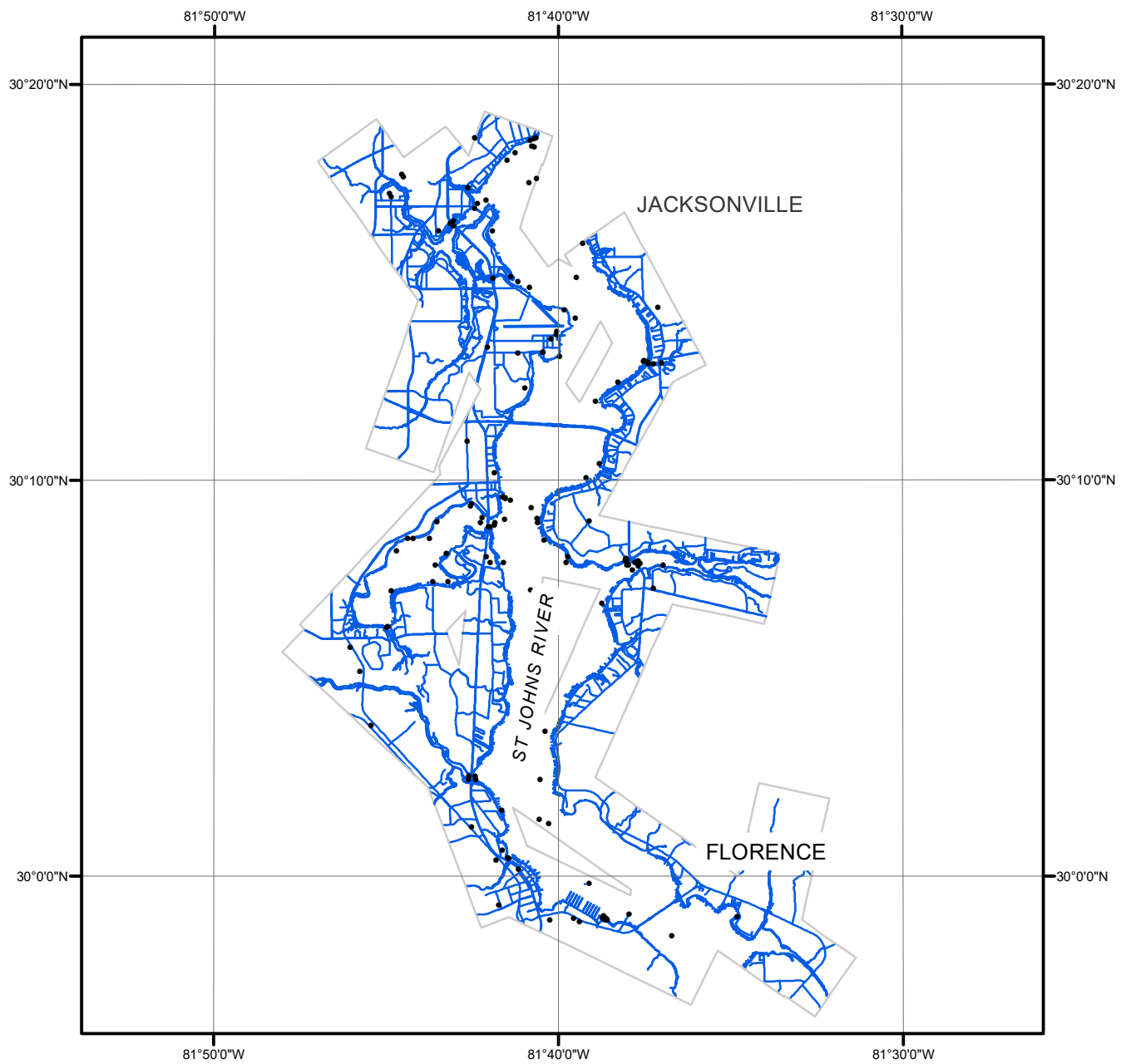
NOAA Shoreline Data Explorer

- GC11333 in shapefile format
- Metadata file for GC11333
- PCR in Adobe PDF format

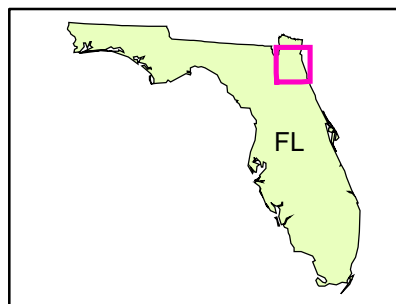
End of Report

ST JOHNS RIVER, JACKSONVILLE TO FLORENCE

FLORIDA



Overview



FL1421A-CM-N

GC11333