

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT FL1305A-CM-N

Indian Bay to Tarpon Springs, Florida

Introduction

NOAA Coastal Mapping Program (CMP) Project FL1305A-CM-N provides a highly accurate database of new digital shoreline data for the coast of Florida from Tarpon Springs to Indian Bay. Project FL1305A-CM-N is a subproject of a larger acquisition project, FL1305-CM-N, which extends from Tarpon Springs to Cedar Keys. 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 FL1305-CM-N was designed in response to a request for shoreline data from the Marine Chart Division of NOAA's Office of Coast Survey. 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 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 the FL1305-CM-N project consisted of the collection of static and kinematic GPS data and Inertial Measurement Unit (IMU) data, the acquisition of digital aerial imagery by NOAA, followed by ground surveys performed under contract with Fugro Geospatial, Inc. Aerial survey operations included the acquisition of 32 strips of natural color and NIR imagery at both the MLLW and MHW tidal stage. The images were acquired using either the DSS- 439/539 dual camera system in 2014 and the DSS 580/560 dual camera system in 2016. All aerial imagery acquisition was accomplished with NOAA's King Air aircraft (N68RF) flying at an altitude of 10,000 feet. Please refer to the FL1305 Acquisition Summary report 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 twenty-four (24) photo identifiable control points. Of the 24 collected control points, fourteen (14) were successfully located and used as ground control in the final block adjustments, and six (6) were successfully located and used as check points. Refer to Fugro's Florida Coastal FL1305 (A-F) Survey Report for more information on ground survey operations.

GPS Data Processing

All GPS/IMU data processing tasks were completed by NGS and the final processed data was supplied to Fugro Geospatial, Inc. GPS and IMU data was collected and processed by Remote Sensing Division (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 Geospatial, 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 December 2017 using a softcopy photogrammetric workstation. The softcopy system hardware consisted of a high-end Dell Precision™ Workstation with the Windows® 7 Professional operating system, and stereo viewing capability. SOCET SET v 5.6 was used for project setup and the mensuration phase. The adjustment solution phase was accomplished with the ORIMA v. 11.01 module.

Upon successful completion of the aerotriangulation process, the overall RMS data for all of the adjusted ground point standard deviations (both x & y) were used to compute a predicted horizontal circular error (95% confidence level) of 0.53 meters for the RGB adjusted block solution and 0.59 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 FL1305A-CM-N was done by Fugro Geospatial, Inc., between February and April of 2018. Digital mapping was performed using SOCET SET v5.6 Stereo Softcopy workstations with the SOCET for ArcGIS module and ArcGIS 10.3. Feature identification and attribution within the Geographic Cell (GC) were based on image analysis of 1:50,000 scale 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 FL1305A-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.1 meters from RGB imagery and 1.2 meters from the NIR

imagery, all at the 95% confidence level. The predicted accuracy of compiled, well defined points is derived by doubling the circular errors 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	
05-18-2014	17:57 – 18:00	14NC47	10756 – 10777	14NR40	7837 – 7958	0.9 – 1.0
05-18-2014	18:31 – 18:38	14NC47	10778 – 10830	14NR40	7859 – 7911	0.8 – 1.0
05-18-2014	18:43 – 18:50	14NC47	10831 – 10883	14NR40	7912 – 7964	1.0 – 0.8
10-18-2014	14:13 – 14:14	14NC95	21761 – 21767	14NR85	18291 – 18297	0.8
10-23-2014	17:44 – 17:53	14NC99	22848 – 22902	14NR89	19378 – 19432	0.9 – 0.8
01-29-2016	16:27 – 16:28	16VC12	3611 – 3617	16VR12	3610 – 3616	0.1
11-18-2016	14:22 – 14:25	16VC93	21303 – 21324	16VR86	19253 – 19274	0.1
11-18-2016	14:32 – 14:37	16VC93	21325 – 21356	16VR86	19275 – 19306	0.1
11-18-2016	14:44 – 14:48	16VC93	21360 – 21392	16VR86	19310 – 19342	0.1
11-18-2016	14:55 – 15:00	16VC93	21393 – 21425	16VR86	19343 – 19375	0.1
11-20-2016	14:56 – 14:59	16VC95	21495 – 21516	16VR88	19455 – 19466	0.0
11-20-2016	15:04 – 15:07	16VC95	21517 – 21537	16VR88	19467 – 19487	0.0
11-20-2016	15:13 – 15:16	16VC95	21538 – 21557	16VR88	19488 – 19507	0.0

* 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 0.85 – 0.92 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 May 2018. The review process included analysis of aerotriangulation results and assessment of the identification and attribution of digital feature data within the Geographic Cell (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 10.5.1 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 FL1305A-CM-N:

- 11411, Tampa Bay To Port Richey, FL, 20th Ed., Jan. 2017
- 11409, Anclote Keys to Crystal River, FL, 31st Ed., Jan. 2017

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
- GC11327 in shapefile format
- Project Completion Report (PCR)
- CEF in shapefile format

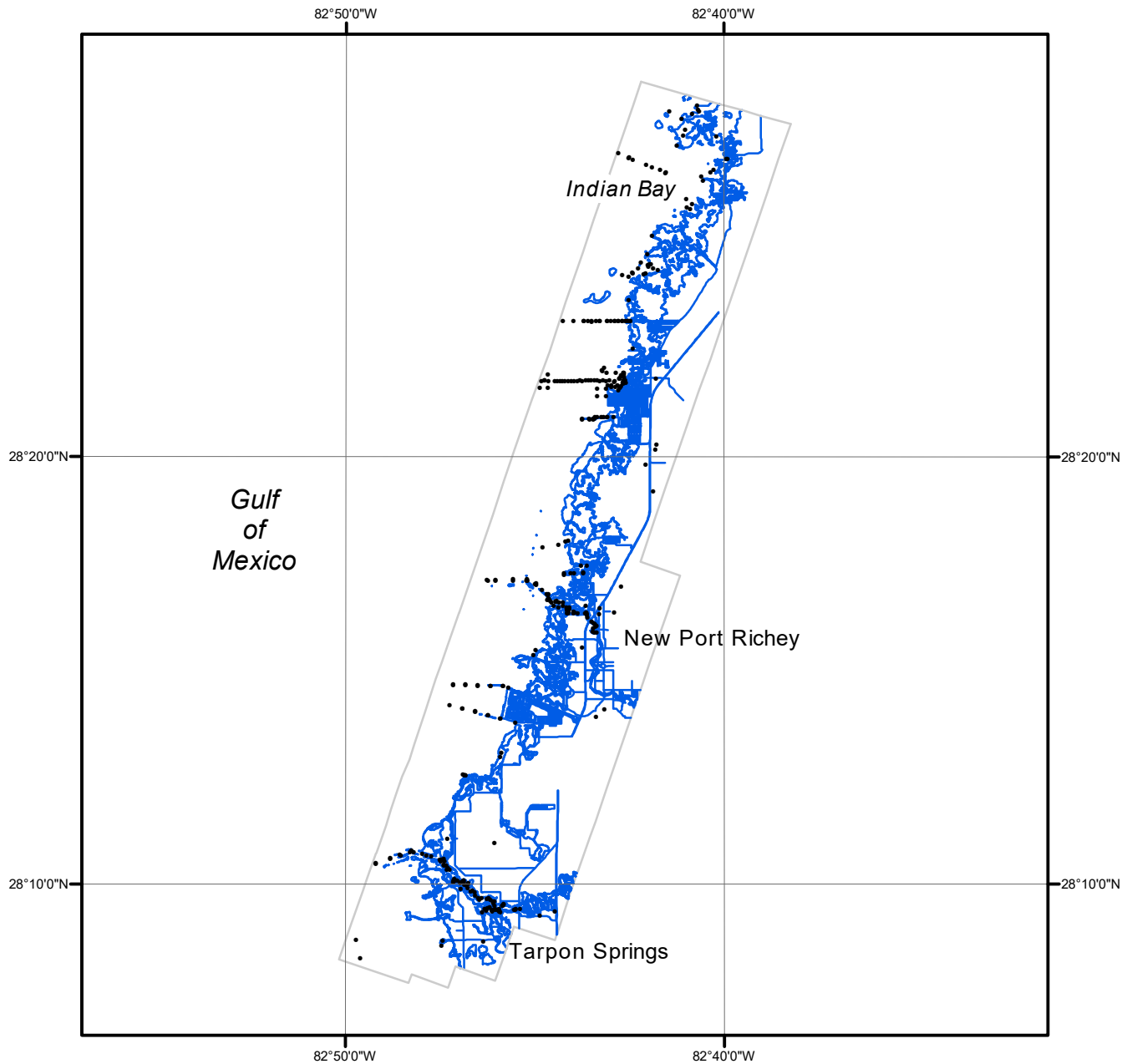
NOAA Shoreline Data Explorer

- GC11327 in shapefile format
- Metadata file for GC11327
- PCR in Adobe PDF format

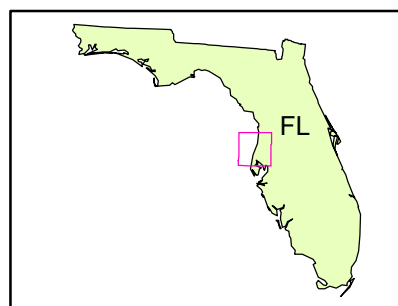
End of Report

INDIAN BAY TO TARPON SPRINGS

FLORIDA



Overview



FL1305A-CM-N

GC11327