

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT FL1809B-CM-N

Back Canals, Yamato to Pompano Beach, Florida

Introduction

NOAA Coastal Mapping Program (CMP) Project FL1809B-CM-N provides a highly accurate database of new digital shoreline for several canals extending further inland of the Intracoastal Waterway from Yamato southwards to Pompano Beach, in Florida. This is a subproject of a larger imagery acquisition project, FL1809-CM-N, which was designed to provide coverage of the ICW and various other navigable canals in Florida from Boynton Beach to Little Lake Canal. 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 FL1809-CM-N were formulated by the Requirements Branch (RB) of the Remote Sensing Division (RSD) following the guidelines of the Photo Mission Standard Operating Procedures. The instructions detailed 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 for FL1809-CM-N consisted of the collection of static and kinematic GPS data and Inertial Measurement Unit (IMU) data, and the acquisition of non-tidally coordinated aerial imagery. A total of eight flight lines of imagery were acquired at a nominal altitude of 10,500 feet using Applanix Digital Sensor System (DSS) dual cameras with the NOAA King Air aircraft (N68RF). Both color (RGB) and near-infrared (NIR) imagery were flown concurrently, though only RGB imagery was used for this project. Two flight lines (62-007 and 62-008) were collected in April 2019 using a DSS 580/560 with a ground sample distance (GSD) of 0.32 meters, and the rest of the lines (62-001 through 62-006) were collected in September 2021 using a DSS 6150/6100 with a GSD of 0.23 meters. Portions of two lines of images (62-001 & 62-003) were used for FL1809B-CM-N.

Direct Georeferencing Data Processing

The GPS/IMU data were processed by RSD personnel to yield precise camera positions and orientations for direct georeferencing (DG) of the imagery. The Airborne kinematic data for project FL1809B-CM-N was processed in November 2021 using Applanix POSPac MMS (ver. 8.7) software, utilizing the IN-Fusion PP-RTX processing mode, which is an implementation of Trimble's *CenterPoint RTX* GNSS correction service. 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 calculated using an 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 0.65 meters. NGS third order control was 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

The data compilation phase of this project was completed by RSD Applications Branch (AB) personnel in November 2022. Digital mapping was performed using Esri's ArcGIS Pro stereo extraction software (ver. 2.9.3). 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 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 FL1809B-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled from the RGB images only, and were compiled to meet a horizontal accuracy of 1.3 meters, a predicted accuracy of well-defined points measured during the compilation phase, derived by doubling the imagery accuracy computed from the TPU tool.

The table below provides detailed information on the image sources used:

Date	Time (UTC)	Roll	Flight Line / Frame ID	Tide Level*
19-Sep-2021	14:17 – 14:20	21VC02	62-003 / 104 – 117	0.7 m
19-Sep-2021	14:26 – 14:28	21VC02	62-001 / 118 – 128	0.7 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 NOS gauges. The MHW tidal datum in the project area is between 0.64 – 0.65 meters above MLLW.

Quality Control / Final Review

Quality control (QC) tasks were conducted by a senior member of the RSD. The final QC review was completed in November 2022. The review process consisted of an assessment of image georeferencing and the identification and attribution of cartographic features 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. 10.8.1). 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 ENC's were used in the comparison process:

- US4FL31M, 52nd Ed., May 2022
- US5FL33M, 55th Ed., Nov. 2022

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 (APOR)
- Project database
- GC11757 in shapefile format
- Project Completion Report (PCR)
- CEF in shapefile format

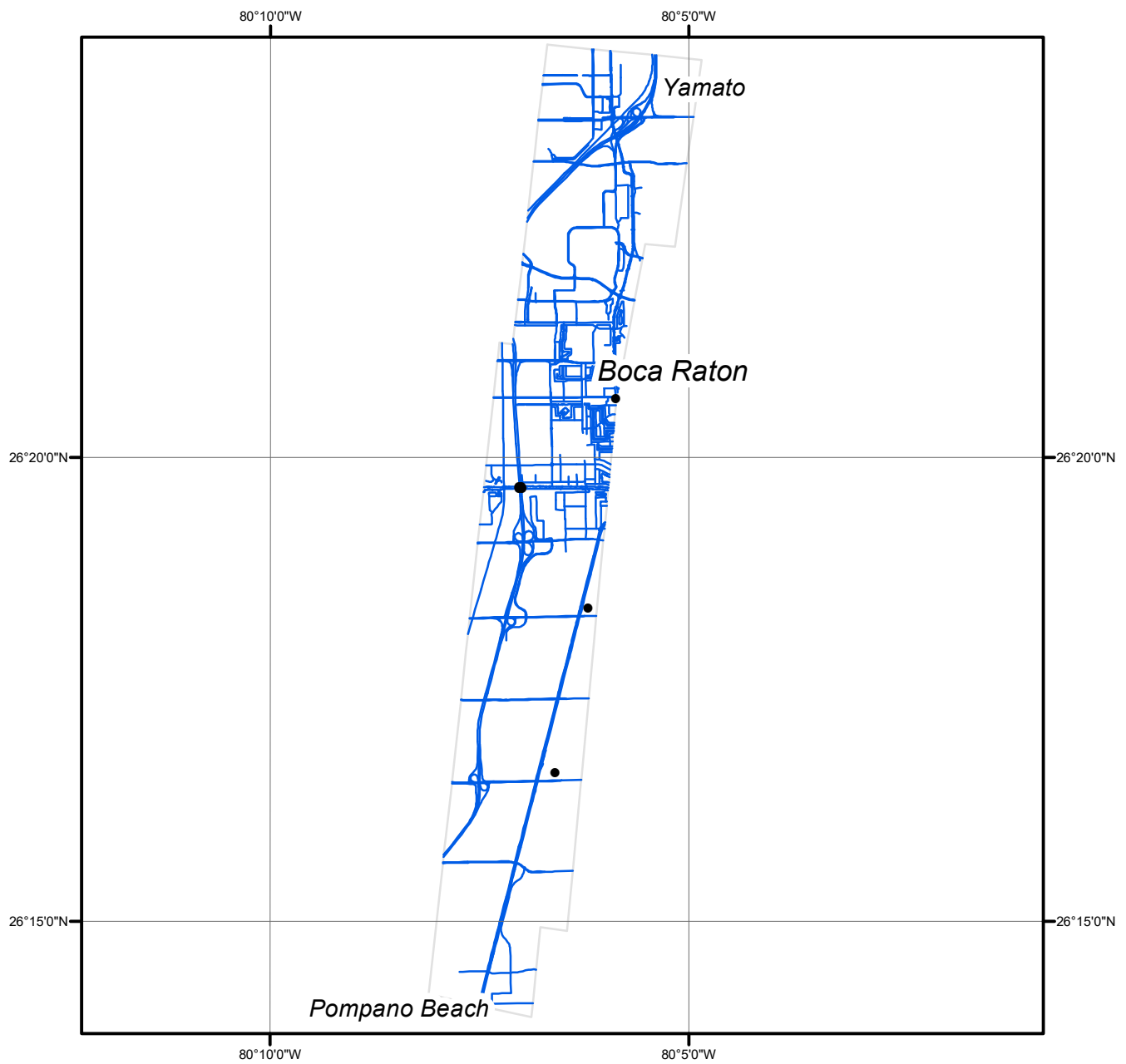
NOAA Shoreline Data Explorer

- GC11757 in shapefile format
- Metadata file for GC11757
- PCR in Adobe PDF format

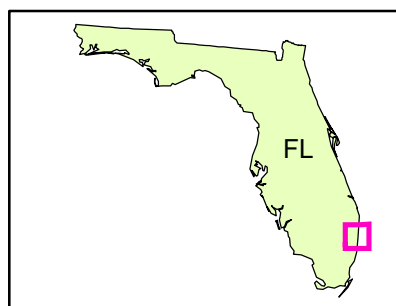
End of Report

BACK CANALS, YAMATO TO POMPANO BEACH

FLORIDA



Overview



FL1809B-CM-N

GC11757