

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT FL1601D-CM-N

Intracoastal Waterway, Dollar Bay to Johnson Bay, Florida

Introduction

NOAA Coastal Mapping Program (CMP) Project FL1601D-CM-N provides a highly accurate database of new digital shoreline data for a portion of the Intracoastal Waterway and Gulf of Mexico coastline from Dollar Bay to Johnson Bay, Florida. Project FL1601D-CM-N is a subset of a larger project, FL1601-CU-N, covering a portion of the Gulf of Mexico coastline from South Venice to Marco Island. 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

The Requirements Branch (RB) of the Remote Sensing Division (RSD) originally designed Project FL1601-CU-N to support the Continually Updated Shoreline Product (CUSP), a seamless database of high resolution shoreline data. Subproject FL1601D-CM-N was designed in response to a request for shoreline from the Navigation Services Division of NOAA's Office of Coast Survey. The Requirements Branch (RB) of the Remote Sensing Division (RSD) formulated the photographic mission instructions for FL1601-CU-N 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, 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 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 were conducted on February 11, 2016 with the NOAA King Air aircraft (N68RF). Subproject imagery included six flight lines of natural color and near-infrared (NIR) imagery acquired concurrently using an Applanix DSS-580/560 dual head digital camera system. All imagery was acquired at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.33 meters for the color imagery and 0.35 meters for the NIR. All flight lines were acquired in coordination with the Mean High Water (MHW) tide stage.

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 using Applanix POSPAC (ver. 7.1) software in May 2016. 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.

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 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 1.03 meters for the color imagery and 1.05 meters for the NIR.

Compilation

RSD AB personnel accomplished the data compilation phase of this project in June 2018. Digital mapping was performed using the Feature Extraction software module within SOCET SET (ver. 5.6). Feature identification and attribution within the Geographic Cell (GC) are 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 FL1601D-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 2.1 meters at the 95% confidence level. This predicted accuracy of well-defined points measured during the compilation phase was derived by doubling the imagery accuracy computed from the EO-TPU tool.

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

Date	Time (UTC)	Roll # (Color / IR)	Photo #s (Color / IR)	Tide Level*
2/11/2016	19:20 – 19:22	16VC15 / 16VR15	4111 – 4121 / 4110 – 4120	0.8 m
2/11/2016	19:39 – 19:40	16VC15 / 16VR15	4151 – 4159 / 4150 – 4158	0.8 – 0.6 m
2/11/2016	19:50 – 19:53	16VC15 / 16VR15	4180 – 4192 / 4179 – 4191	0.6 – 0.9 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 near the project. The elevation of the MHW tidal datum in the project area varies from 0.72 to 0.86 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a member of AB. The final QC review was completed in July 2018. 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 (ver. 10.5) software. All project data was evaluated for compliance with 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:

- 11430, Lostmans River to Wiggins Pass, 1:40,000, 28th Ed., Nov. 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 Report (APOR)
- Project Completion Report (PCR)
- Project database
- GC11419 in shapefile format
- Chart Evaluation File in shapefile format

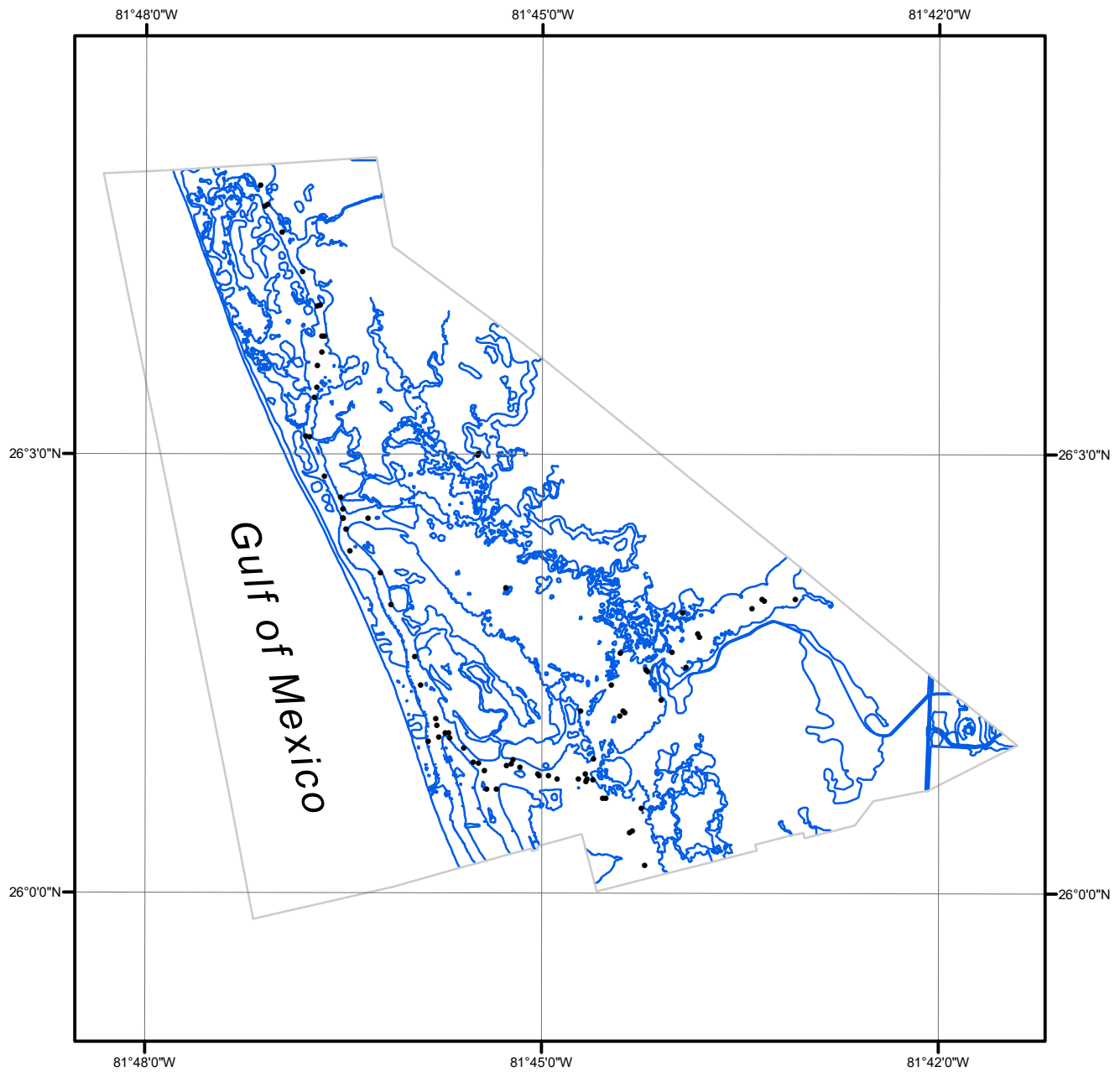
NOAA Shoreline Data Explorer

- GC11419 in shapefile format
- Metadata file for GC11419
- PCR in Adobe PDF format

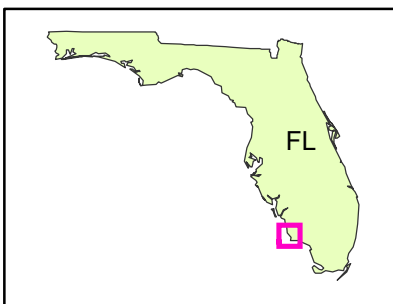
End of Report

ICW – DOLLAR BAY TO JOHNSON BAY

FLORIDA



Overview



FL1601D-CM-N

GC11419