NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT GA1001

Ports of Kings Bay and Fernandina Beach, Georgia and Florida

Introduction

Coastal Mapping Program (CMP) Project GA1001 provides highly accurate digital shoreline data for key areas of change within the ports of Kings Bay, Georgia and Fernandina Beach, 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

The original design of Project GA1001 was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the general need for updates to NOAA's Electronic Navigational Chart (ENC) series. A standard change analysis was conducted within the Coast and Shoreline Change Analysis Program (CSCAP), in which NOAA nautical chart products are compared to contemporary high resolution imagery to ascertain the need for more current shoreline data. A Chart Evaluation File (CEF) was forwarded from RB to the Applications Branch (AB) of RSD upon completion of the CSCAP analysis. Refer to the RB CSCAP memorandum of March 19, 2010, for more details of the chart comparison process.

Field Operations

Field operations consisted of the collection of static and kinematic Global Positioning System (GPS) data and Inertial Measurement Unit (IMU) data, and the acquisition of aerial imagery. Aerial survey operations were conducted on November 4, 2009 with the NOAA Citation (N52RF) aircraft. Ten strips of digital RGB (color) images were acquired with an Applanix DSS-439 medium format digital camera at a nominal altitude of 10,000 feet, with seven strips actually being used for this project. All photography was acquired when local tides were below MHW.

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 originally processed using Applanix POSPAC (ver. 5.3) software in December 2009. The DG imagery was then used to produce ortho-rectified mosaics for CSCAP analysis. Later, in March 2013, the GPS/IMU data was reprocessed and analyzed for quality using POSPac MMS (ver. 6.1). For further information on steps

used to process this data, refer to the Airborne Positioning and Orientation Report (APOR) on file within the AB Project Archive. Published positions of NGS third order geodetic control points were compared with the locations measured within the imagery to verify image accuracy.

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 EO Total Propagated Uncertainty (TPU) tool developed by NGS. Using this tool, the predicted horizontal uncertainty at the 95% confidence level was calculated to be 1.3 meters.

Compilation

Data compilation was performed by RSD personnel in December 2013. Digital feature data was compiled from DG imagery using a Digital Photogrammetric Workstation (DPW) in conjunction with the SOCET SET (ver. 5.6) Feature Extraction software module. 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 for GA1001 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 2.6 meters. This predicted accuracy of compiled, well-defined points is derived by doubling the horizontal uncertainty value derived from the DG data.

The following table provides information on the aerial imagery used for compilation:

Date	Time (UTC)	Roll #	Strip / Frame #s	~GSD	Tide Level*
11/4/2009	19:02 - 19:04	09NC14	50-010 / 4371-4383	0.35 m	n/a
11/4/2009	19:10 - 19:14	09NC14	50-002 / 4397-4424	0.35 m	n/a
11/4/2009	19:41 – 19:44	09NC14	50-009 / 4478-4492	0.35 m	n/a
11/4/2009	19:47 - 19:50	09NC14	50-006 / 4493-4512	0.35 m	n/a
11/4/2009	19:54 - 19:57	09NC14	50-007 / 4513-4534	0.35 m	n/a
11/4/2009	20:01 - 20:03	09NC14	50-008 / 4535-4547	0.35 m	0.4 m
11/4/2009	20:07 - 20:09	09NC14	50-001 / 4548-4560	0.35 m	n/a

* Tide levels are given in meters above MLLW and are based on actual observations at the NOS tide
   station at Fernandina Beach, FL.

Control / Final Review

Quality control tasks were conducted by a senior member of RSD in January 2014. The review process included analysis of the direct georeferencing 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 9.3.1. All project products were evaluated for compliance to CMP requirements.

End Products and Deliverables

The following specifies the location and identification of end products generated during the completion of this project:

RSD Applications Branch Archive

- Hardcopy of the Project Completion Report (PCR)
- Page size graphic plot of GC11043 file contents, attached to PCR
- Hardcopy of the CSCAP evaluation memorandum

Remote Sensing Division Electronic Data Library

- GC11043 in shapefile format
- Digital copy of the PCR in Adobe PDF format
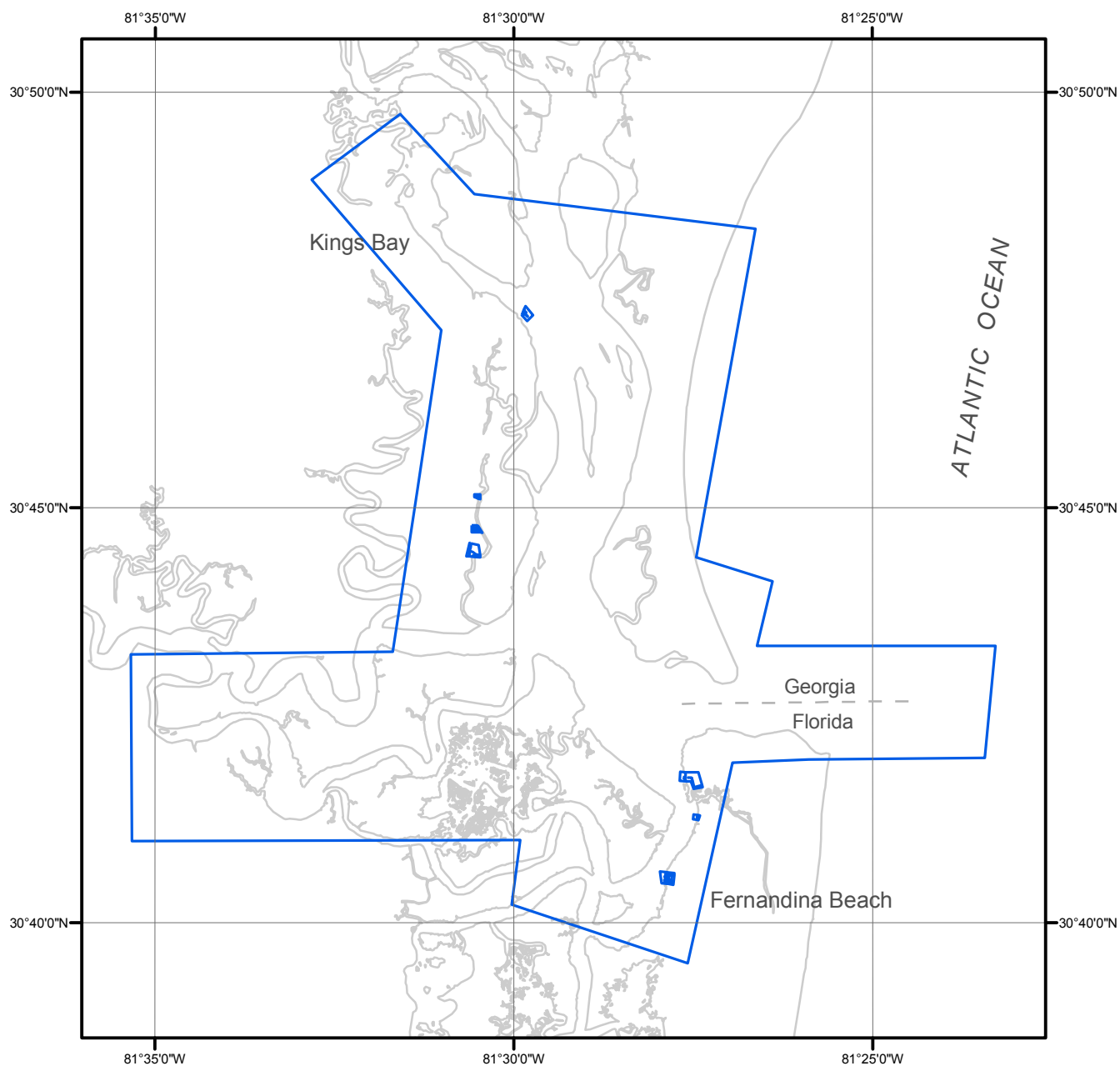- CEF in shapefile format

NOAA Shoreline Data Explorer

- GC11043 in shapefile format
- Metadata file for GC11043
- Digital copy of the PCR in Adobe PDF format

End of Report

PORTS OF KINGS BAY AND FERNANDINA BEACH

GEORGIA AND FLORIDA

81°35'0"W 81°30'0"W 81°25'0"W

30°50'0"N

Kings Bay

ATLANTIC OCEAN

30°45'0"N

Georgia

Florida

Fernandina Beach

30°40'0"N

81°35'0"W 81°30'0"W 81°25'0"W

Overview

GA

GA1001

GC11043