

# **NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT**

## ***PROJECT SC1405-CM-N***

### ***Intracoastal Waterway, Coosaw River to South Edisto River, South Carolina***

#### **Introduction**

NOAA Coastal Mapping Program (CMP) Project SC1405-CM-N provides highly accurate digital shoreline data for a portion of the Intracoastal Waterway from Coosaw River to South Edisto River, South Carolina. 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**

This project was designed and planned by the Requirements Branch (RB) of the Remote Sensing Division (RSD) following the guidelines of RSD's 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 14 and May 9, 2014 with the NOAA King Air aircraft (N68RF). Three flight lines of natural color and near infrared (NIR) imagery were acquired in coordination with Mean High Water (MHW) and Mean Lower Low Water (MLLW) using an Applanix DSS 439 aerial camera at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.37 meters.

#### **Direct Georeferencing Data Processing**

The GPS/IMU data for Project SC1405-CM-N were processed by RSD personnel to yield precise camera positions and orientations. GPS base stations were established for use as reference stations for kinematic GPS processing operations. The positions of the base stations were 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 POSPac MMS (ver. 6.2) GPS/IMU software in March and June 2014. For further information refer to the Airborne Positioning and Orientation Reports (APOR) on file with other project data within the RSD Electronic Data Library. Positional data is based on the North American Datum of 1983 (NAD 83).

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 the 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 1.5 meters. The stereo-models were examined for excessive parallax, and the imagery was determined to be suitable for mapping purposes.

## Compilation

The data compilation phase of this project was accomplished by RSD Applications Branch (AB) personnel in July 2017. Digital feature data was compiled using the Feature Extraction module of BAE's SOCET SET (ver. 5.6) photogrammetric software. Feature identification and attribution within the GC were based on analysis of the project images and information extracted from the appropriate 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 SC1405-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 3.0 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 #	Strip / Frame #s	Tide Level *
02-14-2014	18:47 – 18:50	14NC17	53-003 / 4494 – 4514	0.2 m
02-14-2014	18:55 – 18:58	14NC17	53-001 / 4515 – 4540	0.2 m
02-14-2014	19:04 – 19:07	14NC17	53-002 / 4541 – 4561	0.2 – 0.1 m
02-14-2014	18:47 – 18:50	14NR12	53-003 / 1653 – 1673	0.2 m
02-14-2014	18:55 – 18:58	14NR12	53-001 / 1674 – 1699	0.2 m
02-14-2014	19:04 – 19:07	14NR12	53-002 / 1700 – 1720	0.2 – 0.1 m
05-9-2014	20:13 – 20:16	14NC43	53-003 / 10013 – 10033	1.7 – 1.8 m
05-9-2014	20:20 – 20:23	14NC43	53-002 / 10034 – 10054	1.8 – 1.7 m
05-9-2014	20:28 – 20:32	14NC43	53-001 / 10055 – 10080	1.8 m
05-9-2014	20:13 – 20:16	14NR36	53-003 / 7093 – 7113	1.7 – 1.8 m
05-9-2014	20:20 – 20:23	14NR36	53-002 / 7114 – 7134	1.8 – 1.7 m
05-9-2014	20:28 – 20:32	14NR36	53-001 / 7135 – 7160	1.8 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 in the vicinity of the project. The height of MHW in the project area varies between 1.90 – 2.06 meters above MLLW.

## **Quality Control / Final Review**

Quality control tasks were conducted during all phases of project completion by a senior member of RSD. The final review was completed in August 2017. 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 to CMP requirements.

Comparisons of the largest scale NOAA nautical charts with the project imagery and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical charts were used in the comparison process:

- 11517, St Helena Sound, 1:40,000 Scale, 18th Ed., Dec. 2007
- 11518, Casino Creek to Beaufort River, 1:40,000 Scale, 38th Ed., May 2012

## **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
- GC11121 in shapefile format
- Chart Evaluation File (CEF) in shapefile format

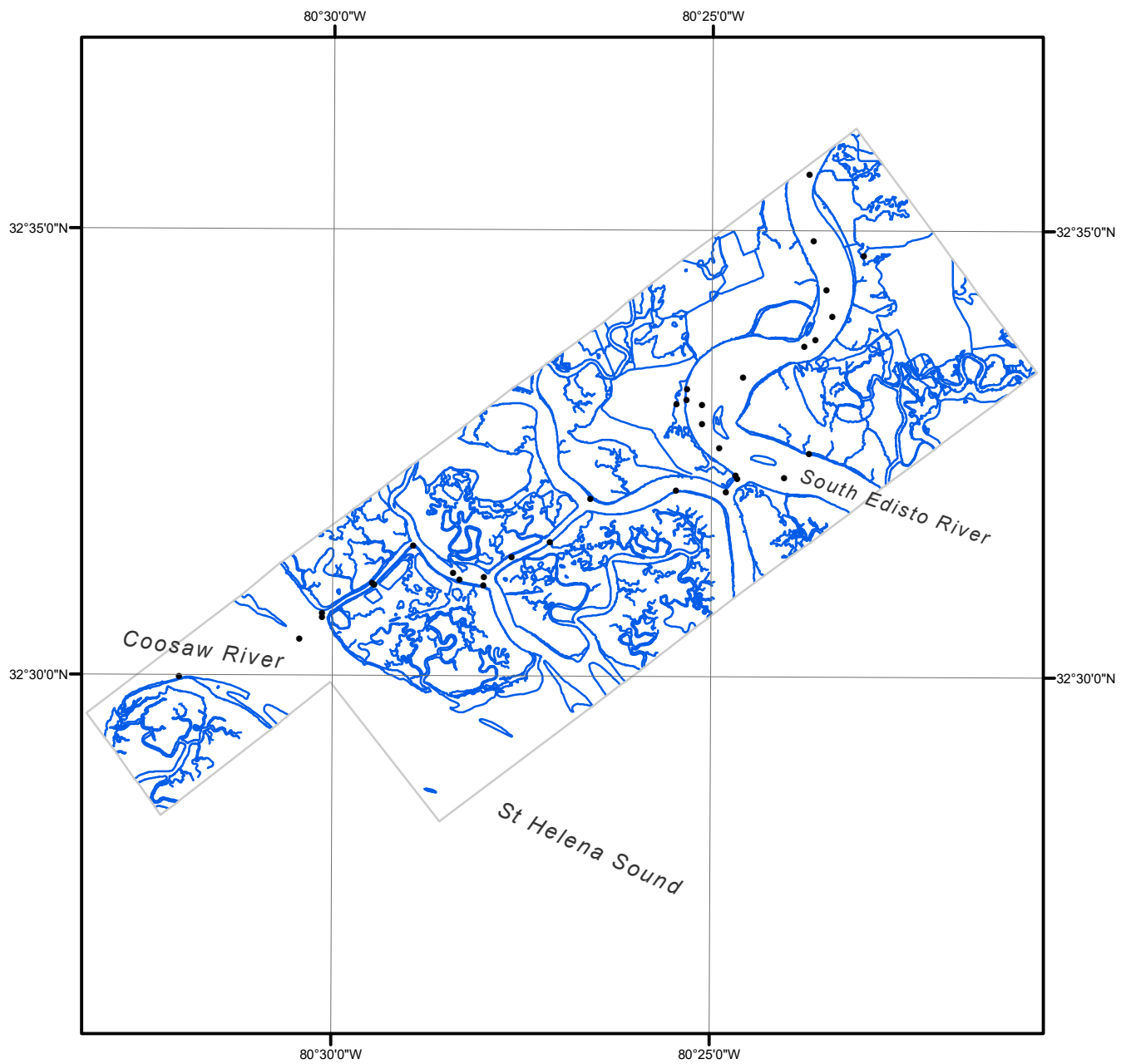
### **NOAA Shoreline Data Explorer**

- GC11121 in shapefile format
- Metadata file for GC11121
- Digital copy of the PCR

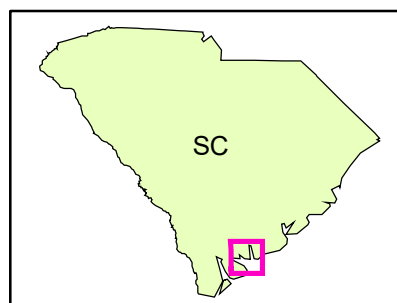
## **End of Report**

# ICW, COOSAW RIVER TO SOUTH EDISTO RIVER

## SOUTH CAROLINA



Overview



SC1405-CM-N

GC11121