

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

## ***PROJECT SC0902***

### ***Port of Georgetown, South Carolina***

#### **Introduction**

NOAA Coastal Mapping Program (CMP) Project SC0902 Phase II: provides a highly accurate database of new digital shoreline data for Winyah Bay and the Port of Georgetown in the State of South Carolina.

Successful completion of this project resulted in a densification of the National Spatial Reference System (NSRS), a set of controlled metric-quality aerial photographs, and digital feature data of the coastal zone which complements the Nautical Charting Program (NCP) as well as geographic information systems (GIS) for a variety of coastal zone management applications.

The project database consists of information measured and extracted from aerial photographs and metadata related to photogrammetric compilation. Base mapping was conducted in a digital environment using stereo softcopy photogrammetry and associated cartographic practices.

#### **Project Design**

The Requirements Branch (RB) of the Remote Sensing Division (RSD) formulated the Project Instructions for this project following the guidelines of the “Scope of Work, Shoreline Mapping for the Coastal Mapping Program” (SOW), Version 13B, dated January 2008. The instructions discussed the project’s purpose, geographic area of coverage, scope and priority; data acquisition, processing, accuracy, and compilation requirements; product delivery and reporting instructions; and contact and communication information.

Project imagery, aerotriangulation output data, and ground control coordinates were provided by the National Geodetic Survey (NGS). NOAA provided shapefiles depicting the shoreline to be mapped, the boundaries of the project compilation areas, and flight lines and exposure centers of the imagery to be used for compilation.

#### **Field Operations**

All project digital imagery was acquired by NOAA between March 5th and 6th, 2010 using a dual mounted Applanix DSS 439 digital camera aboard NOAA’s King Air aircraft (N68RF) at an altitude of 10,000 feet giving a Ground Sample Distance (GSD) of 1.13 feet (0.35 m). NOAA provided eight (8) strips for a total of one hundred sixty-seven (167) Applanix DSS frames of RGB color imagery, photo center and photo frame outlines in ESRI shape file format, and processed airborne GPS and IMU data in order to support photogrammetric processing and feature compilation. NOAA also provided shapefiles depicting the shoreline to be mapped, the boundaries of the project compilation areas, and flight lines and exposure centers of the imagery to be used for compilation. This project did not require tide coordination.

## **GPS Data Reduction**

GPS/IMU data was collected and processed by RSD personnel to yield precise positions and orientations of camera centers for application as photogrammetric control in the aerotriangulation phase of project completion. 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 in April 2010 using POSPAC 4.4.0. For further information refer to the Airborne Positioning and Orientation Report (APOR) that is on file with other project data within the RSD Applications Branch (AB) Project Archive.

## **Aerotriangulation**

Routine softcopy aerotriangulation methods 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. This work was initiated by RSD personnel in August 2011 utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated peripheral devices. The color photographs were measured and adjusted as one block using BAE Systems' SOCET SET (version 5.5) photogrammetry suit using the Multi-Sensor Triangulation (MST) module. Upon successful completion of the aerotriangulation process, the RMS of the standard deviations of the residuals for each aerotriangulated ground point were used to compute a predicted horizontal circular error of 0.3 meters based on a 95% confidence level. An Aerotriangulation Report was written and is on file with other project data within the RSD Project Archive.

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 (NAD 83).

## **Compilation**

The data compilation phase of the project was initiated by AeroMetric, Inc. in October 2011. Digital feature extraction was completed in a softcopy stereo environment using DAT/EM Systems International Summit Evolution software (ver. 6.2), and Bentley Systems MicroStation V8. All coding and classification of features occurred within the MicroStation environment as features were collected, and was based on interpretation of the project imagery, and on 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 SC0902 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.6 meters at the 95% confidence level. The predicted accuracy of compiled, well defined points is calculated by doubling the circular error derived from the aerotriangulation statistics.

The following table provides information on aerial photographs used in the project completion:

Date	Time (UTC)	Roll Number	Photo Numbers	GSD (nominal)	Tide Level
3-5-2010	20:30-20:32	10NC02	276-288	0.35 m	n/a
3-5-2010	20:36-20:39	10NC02	289-305	0.35 m	n/a
3-5-2010	20:43-20:45	10NC02	306-318	0.35 m	n/a
3-5-2010	20:51-20:53	10NC02	319-334	0.35 m	n/a
3-6-2010	14:24-14:29	10NC07	1472-1503	0.35 m	n/a
3-6-2010	14:34-14:38	10NC07	1504-1532	0.35 m	n/a
3-6-2010	14:43-14:46	10NC07	1533-1548	0.35 m	n/a
3-6-2010	14:50-14:54	10NC07	1549-1579	0.35 m	n/a

### Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion. The final QC review was completed in December 2011. The review process included analysis of aerotriangulation 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 MicroStation 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 NOAA Raster Navigational Charts were used in the comparison process:

- 11532, Winyah Bay, 1:40,000 scale, 21<sup>st</sup> Ed., Jul. /06
- 11534, ICW Myrtle Grove Sound/Cape Fear R. to Casino Cr., 1:40,000 scale, 36<sup>th</sup> Ed, Aug. /09

### End Products and Deliverables

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

#### RSD Applications Branch Archive

- Hardcopy of the Aerotriangulation Report
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot of GC10917 file contents, attached to PCR

#### Remote Sensing Division Electronic Data Library

- Project database
- GC10917 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

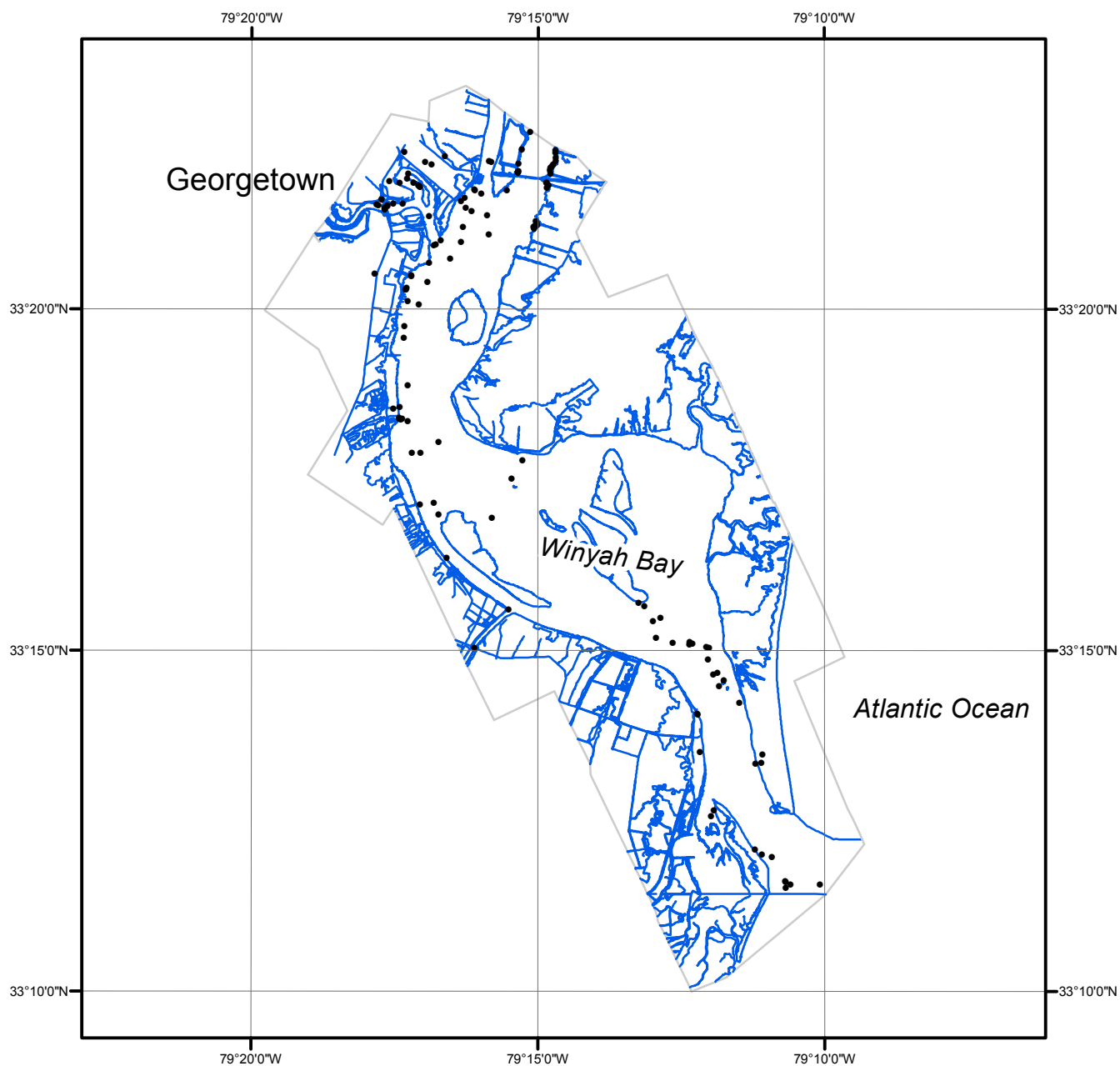
### **NOAA Shoreline Data Explorer**

- GC10917 in shapefile format
- Metadata file for GC10917
- Digital copy of the PCR in Adobe PDF format

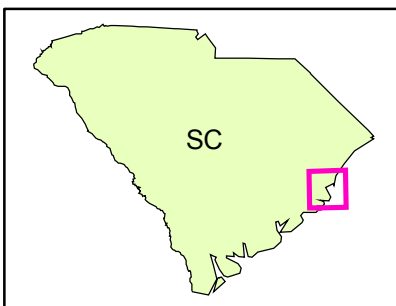
**End of Report**

# PORT OF GEORGETOWN

## SOUTH CAROLINA



Overview



SC0902

GC10917