

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT NC0501

Neuse River, North Carolina

Introduction

NOAA Coastal Mapping Program (CMP) Project NC0501 provides a highly accurate database of new digital shoreline data for the portion of the Neuse River from Hampton Shoal up to Street's Ferry in the vicinity of New Bern, North 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 cartographic feature data of the coastal zone which compliments 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 photographic mission instructions for this project following the guidelines of the Photo Mission Standard Operating Procedure Version II (7/1/93). The instructions discussed the project's purpose, geographic area of coverage, scope and priority; photographic requirements; flight line priority; Global Positioning System (GPS) data collection procedures and guidelines for both kinematic and static surveys; data recording and handling instructions; and contact and communication information. RB created a Project Layout Diagram, flight maps and input files for the aircraft's flight management system.

Field Operations

The field operations consisted of the collection of static and kinematic GPS data and the acquisition of aerial photographs. The photographic mission operations were conducted on October 31, 2005, with the NOAA Cessna Citation II (N52RF) aircraft. Two strips of natural color photographs and two strips of black and white infrared photographs were acquired through use of a Wild RC-30 camera with the NOS "A" lens cone at the nominal scale of 1:30,000.

A base station was established at the Craven County airport using static GPS. Airborne kinematic GPS data was collected to determine precise camera positions in order to establish a control network necessary for aerotriangulation. GPS data collection operations were conducted in accordance with the GPS Controlled Photogrammetry Field Operations Manual (10/25/99). Photo-identifiable ground control was collected to supplement the airborne kinematic GPS.

GPS Data Reduction

Global Positioning System (GPS) data was collected and processed to provide precise positions of camera centers for application as photogrammetric control in the aerotriangulation phase of project completion. The static GPS base station data was processed in December 2005 using the NGS Online Processing User Service (OPUS) software to compute fixed baseline solutions from three CORS stations. The final NAD83 position reported by OPUS was the average of these three baseline solutions. The airborne kinematic data was processed using Applanix POSGPS (ver. 4.2) software in December 2005. A GPS Data Processing Report was written and 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 December 2005 utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated peripheral devices. The color photographs and black and white infrared photographs were measured and adjusted as four separate blocks using BAE Systems' SOCET SET (version 5.2) photogrammetric software in conjunction with the Orientation Management (ORIMA version 6.0) aerotriangulation software. Upon successful completion of the aerotriangulation process, the ORIMA software provided the RMS of the standard deviations of the residuals for each aerotriangulated ground point which were used to compute a predicted horizontal circular error of 0.6 meters for strips 01 and 02 of the color photographs and 0.9 meters for the strips 51 and 52 of the infrared photographs 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 this project was initiated by RSD in February 2006. Digital mapping was performed using a DPW in conjunction with the SOCET SET Feature Extraction software module. Feature identification and attribution within the Digital Cartographic Feature File (DCFF) were based on image analysis of 1:30,000 scale photographs and information extracted from the appropriate NOAA nautical charts, US Coast Guard Light List 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 cartographic features were further modified with additional descriptive information to refine general classification. For strips 01 and 02 of the color photographs cartographic features were compiled to meet a horizontal accuracy of 1.2 meters at the 95% confidence level, for strips 51 and 52 of the infrared photographs features were compiled to meet a horizontal accuracy of 1.8 meters at the 95% confidence level. The predicted accuracy of compiled, well defined points is derived by doubling the circular error derived from aerotriangulation statistics.

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

Date	Time (UTC)	Roll Number	Photo Numbers	Scale (nominal)	Tide Level*
10-31-05	1432-1436	05ACN13	1620-1631	1:30,000	N/A
10-31-05	1441-1445	05ACN13	1632-1643	1:30,000	N/A
10-31-05	1514-1518	05AR01	1465-1476	1:30,000	N/A
10-31-05	1524-1528	05AR01	1477-1488	1:30,000	N/A

*NOTE: The periodic tide in the Neuse River has a mean range less than one foot. Local wind conditions affect the water level more strongly. The maximum rise above or fall below normal due to heavy gales amounts to 3 or 4 feet at New Bern. There were no water level gauges operating in the project area at the time of the survey.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of AB. The final QC review was completed in March 2006. The review process included analysis of aerotriangulation results and assessment of the identification and attribution of cartographic features within the DCFF according to image analysis and criteria defined in C-COAST. The quality control process concluded with an inspection of topological connectivity within the DCFF using ArcGIS 9.1 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 nautical chart was used in the comparison process:

11552, Neuse River and Upper Part of Bay River, NC, 1:40,000 scale, 19th edition

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 GC10596 file contents, attached to PCR

Remote Sensing Division Electronic Data Library

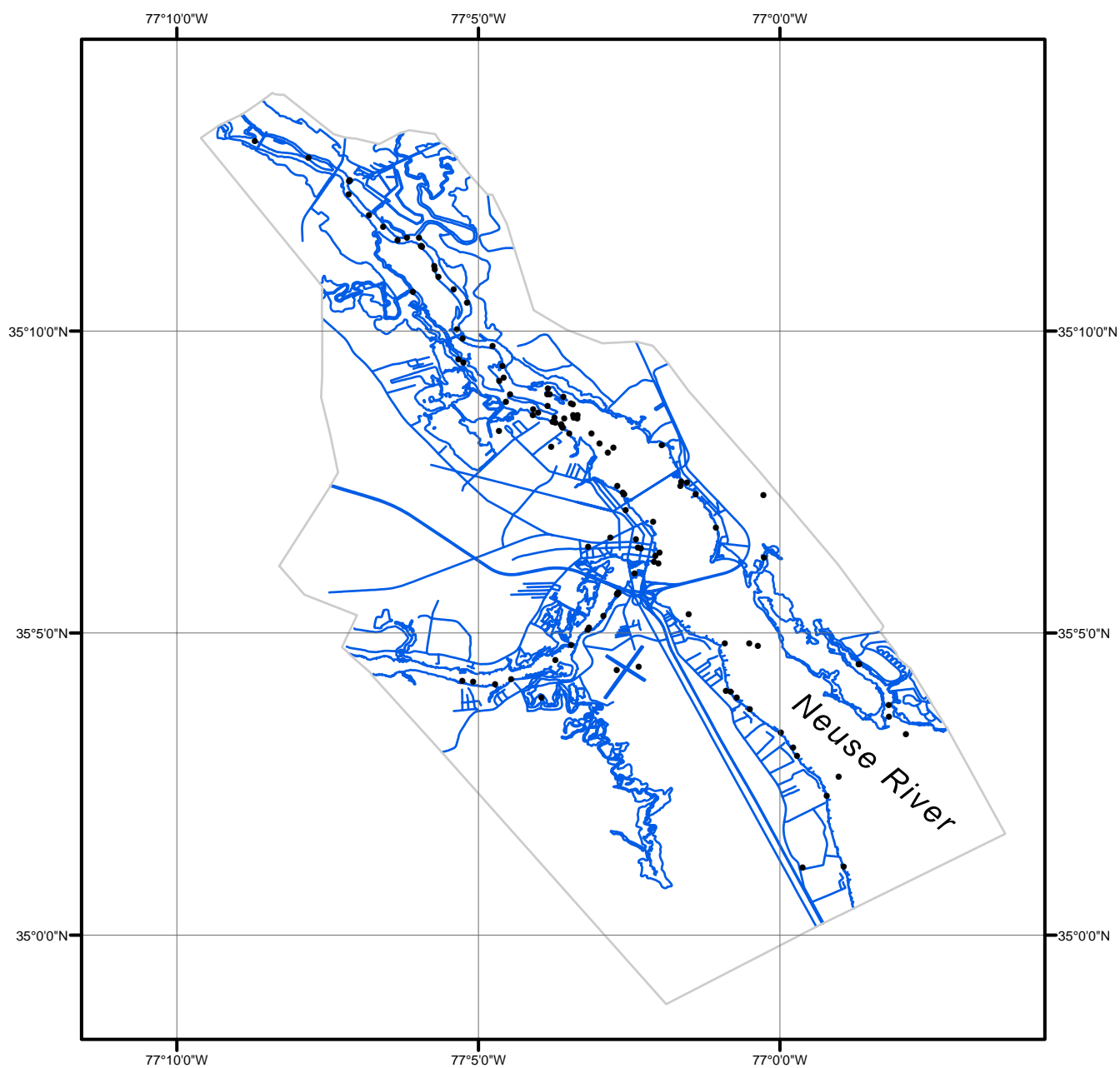
- Project Database
- Digital copy of DCFF GC10596 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

NOAA Shoreline Data Explorer

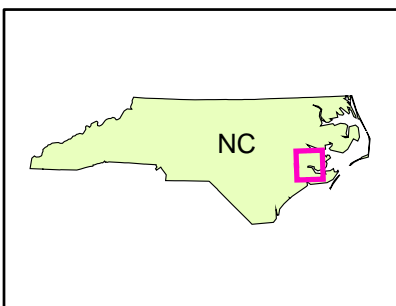
- DCFF for GC10596
- Metadata file for GC10596
- Digital copy of the PCR in Adobe PDF format

NEUSE RIVER

NORTH CAROLINA



Overview



NC0501

GC10596