

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT NJ0101

Barnegat Inlet to Great Egg Harbor Inlet, New Jersey

Introduction

Project NJ0101 provides a highly accurate database of new digital shoreline data for Atlantic City, New Jersey, and surrounding coastal areas. The project extends from Barnegat Inlet southward to Great Egg Harbor Inlet, New Jersey, and includes a portion of the Intracoastal Waterway.

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) and other geographic information systems.

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 survey data is referenced to the North American Datum of 1983 (NAD 83).

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.

The RB created a Project Layout Diagram, flight maps and input files for the aircraft's flight management system. The RB provided copies of the descriptions of selected geodetic control stations at airports that may have been used as bases of operation. A briefing was held to review the photographic mission instructions and to distribute the data to photographic mission personnel.

Additional project requirements were submitted by the Office of Coast Survey (OCS) regarding Electronic Navigational Chart (ENC) production which had the effect of increasing the compilation scale and level of feature inclusion.

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 from July 21 to July 31, 2001, with the NOAA Cessna Citation II aircraft. Three strips of natural color photographs and four 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. The collection of the B&W Infrared photographs was coordinated with the MLLW tide level, based on predicted tides at the Atlantic City, NJ gauge (#8534720).

A base station was established at the Atlantic City 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

GPS data was processed to provide accurate positions of camera centers for application as photogrammetric control in the aerotriangulation phase of the project, however this data was later deemed unsuitable for the intended purpose and ground control was used instead.

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 2003 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 (ver. 4.4.2) photogrammetric software utilizing the Multi-Sensor Triangulation (MST) software module. Upon successful completion of the aerotriangulation process, the MST 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 2.2 meters for strip 1 of the color photographs and 1.2 meters for the rest of the project photographs based on a 95% confidence level. An Aerotriangulation Report was written and is on file with other project data within the RSD AB 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 based on the North American Datum of 1983.

Compilation

The data compilation phase of the project was initiated by RSD in February 2004. The digital mapping was performed using a DPW in conjunction with the SOCET SET Feature Extraction software module. Feature identification and the assignment of cartographic codes 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. Cartographic feature attribution was assigned in compliance with the Coastal Cartographic Object Attribute Source Table (C-COAST). Selected cartographic features were further modified with additional descriptive information to refine general classification.

For the majority of the project, cartographic features were compiled to meet a horizontal accuracy of 2.4 meters at the 95% confidence level. For strip 1 of the color photographs, features were compiled to meet a horizontal accuracy of 4.3 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.

After data compilation had begun, it was determined that the actual tide levels in the project area, during the time that all of the B&W Infrared photographs were being collected, were well above the predicted levels, outside of the normal ± 0.3 foot (0.09 meter) tolerance for delineation of the MLLW line. Therefore, the Infrared photographs were only used to supplement data collection from the color photographs, and the MLLW line was not delineated.

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

Date	Time (UTC)	Roll Number	Photo Numbers	Scale (nominal)	Tide Level* (m) (above MLLW)
7-21-01	1432-1439	01ACN07	1428-1449	1:30,000	1.0
7-27-01	1337-1340	01ACN07	1498-1506	1:30,000	0.4
7-27-01	1345-1347	01ACN07	1507-1515	1:30,000	0.5
7-27-01	1252-1259	01AR02	1457-1481	1:30,000	0.1 – 0.2
7-27-01	1311-1314	01AR02	1485-1495	1:30,000	0.1 – 0.3
7-31-01	1509-1521	01AR02	1538-1562	1:30,000	0.4 – 0.1
7-31-01	1529-1534	01AR02	1563-1573	1:30,000	0.4 – 0.3

* Actual tide levels based on the Atlantic City station, and on various substations throughout the project area with corrections applied from the Sandy Hook, NJ reference station. The mean tide range in the project area varied between 0.2 m. and 1.2 m.

Quality Control / Final Review

The final review was completed by a senior AB CMP team member in June 2005. The Digital Cartographic Feature File (DCFF) was evaluated for completeness and accuracy. Data review consisted of an on-line and off-line evaluation of digital compilation and hard copy products. The on-line review comprised of reviewing stereo models on a DPW for cartographic feature

codes selection and positional accuracies of features. The cartographic feature attribution was judged to conform to C-COAST specification. The offline evaluation compared the project data in shapefile format with the largest scale NOAA digital raster nautical charts available and the natural color photographs. The following nautical charts were used in the comparison process:

- 12316, Little Egg Harbor to Cape May, NJ, 1:40,000 scale, 29th edition
- 12324, Sandy Hook to Little Egg Harbor, NJ, 1:40,000 scale, 30th 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 GC10556 file contents, attached to PCR

Remote Sensing Division Electronic Data Library

- Project Database
- Digital copy of DCFF GC10556 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- Chart Evaluation File in shapefile format

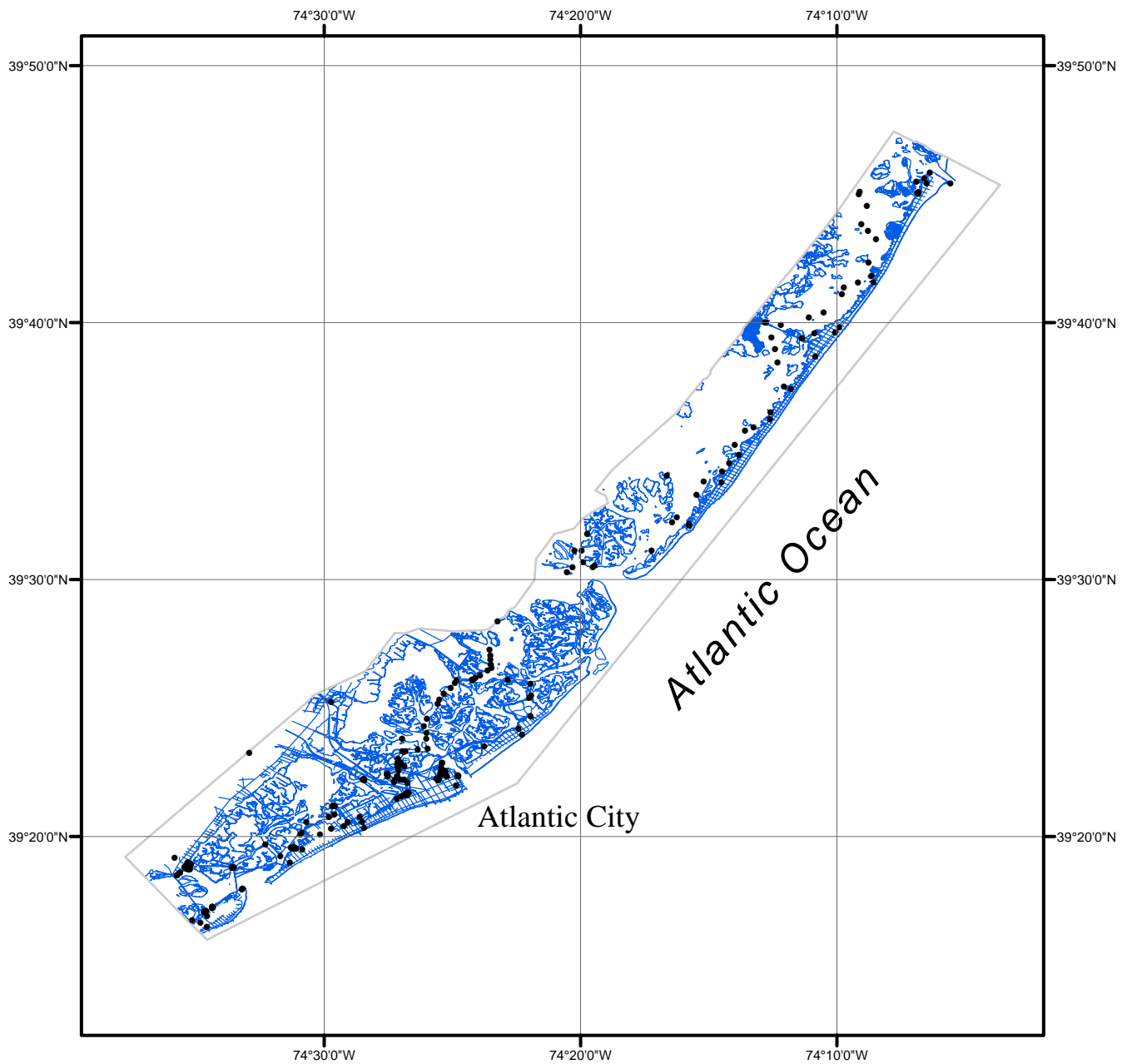
NOAA Shoreline Data Explorer

- DCFF for GC10556
- Metadata file for GC10556
- Digital copy of the PCR in Adobe PDF format

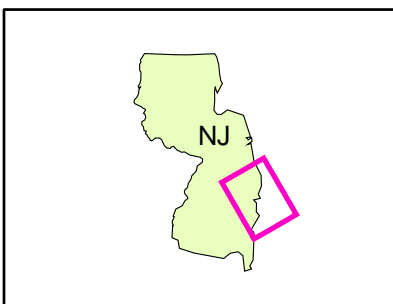
End of Report

BARNEGAT INLET TO GREAT EGG HARBOR INLET

NEW JERSEY



Overview



NJ0101

GC10556