NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT NJ1502-CS-N

Ports of Camden/Gloucester and Philadelphia, New Jersey and Pennsylvania

Introduction

Coastal Mapping Program (CMP) Project NJ1502-CS-N provides highly accurate digital shoreline data for key areas of change within the ports of Camden/Gloucester, NJ and Philadelphia, PA. 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 design of Project NJ1502-CS-N was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for timely updates to the NOAA chart suite within key U.S. ports. Project requirements were formulated as a result of analysis conducted within the Coast and Shoreline Change Analysis Program (CSCAP), in which NOAA nautical chart products are compared to contemporary high resolution digital imagery in order to ascertain the need for more current shoreline data. A Chart Evaluation File (CEF) was forwarded to the Applications Branch (AB) of RSD once the change analysis was complete. Refer to the RB CSCAP Memorandum of May 15, 2015 for details of the chart comparison process.

Field Operations

The 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. Digital images utilized for this project were acquired with the NOAA King Air aircraft on April 1, 2015 using an Applanix Digital Sensor System (DSS-539) aerial camera at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 1.21 feet (0.37 meters). Although imagery was not acquired in strict coordination with local tides, the goal was to collect all imagery below the Mean High Water (MHW) tide stage.

GPS Data Reduction

The GPS/IMU data were processed by RSD personnel to yield precise camera positions in order to provide a control network necessary for aerotriangulation. The base station's geodetic position was derived using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. The kinematic GPS data was processed using Applanix POSPac MMS 7.1 software in May 2015. For further information refer to the Airborne Positioning and Orientation Report (APOR) on file with other project data within the RSD Electronic Data Library.

Aerotriangulation

The aerotriangulation (AT) phase of project completion was performed by RSD in January 2016. 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. The aerial images were measured and adjusted as one block using BAE Systems SOCET GXP v.4.1 digital photogrammetric software. The Triangulation module within SOCET GXP was used for the AT portion of the project. Upon successful completion of the aerotriangulation process, the Triangulation module 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 0.39 meters for the block based on a 95% confidence level. An Aerotriangulation Report was written and is on file with other project data within the RSD Electronic Data Library. Positional data is referenced to the North American Datum of 1983 (NAD83).

Compilation

The data compilation phase of this project was accomplished by RSD in January 2016. Digital mapping was performed using the SOCET GXP (version 4.1) Feature Database module. Feature identification and attribution within the Geographic Cell (GC) were based on image analysis of the digital photographs and information extracted from the appropriate NOAA nautical charts, U.S. 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 features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for Project NJ1502-CS-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.8 meters at the 95% confidence level. This predicted accuracy of compiled well-defined points is derived by doubling the circular error calculated from the AT statistics.

The following table provides information on the imagery used to complete this project:

Date	Time (UTC)	Roll #	Photo #s	Tide Level*
04-01-2015	14:08 – 14:10	15NC25	4370 – 4382	1.0 – 1.1 m
04-01-2015	14:14 – 14:16	15NC25	4383 – 4394	1.0 – 0.9 m
04-01-2015	14:20 – 14:23	15NC25	4395 – 4412	1.1 – 1.0 m
04-01-2015	14:27 – 14:30	15NC25	4413 – 4425	1.1 – 1.2 m

* Tide levels are given in meters above MLLW and are based on verified observations from the NOS gauge in Philadelphia, PA at the time of photography, with offsets applied to various substations in the vicinity. The elevation of the MHW tidal datum in the project area varies between 1.83 – 2.10 m. above MLLW.

Quality Control / Final Review

The final review of the project was completed by a senior member of RSD in January 2016, and included analysis of AT results and assessment of the identification and attribution of digital feature data within the Geographic Cell (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 10.2.2 software. All project data was 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:

Remote Sensing Division Electronic Data Library
- CSCAP evaluation memorandum
- Airborne Positioning and Orientation Report (APOR)
- Aerotriangulation Report
- Project Completion Report (PCR)
- Project database
- GC11190 in shapefile format
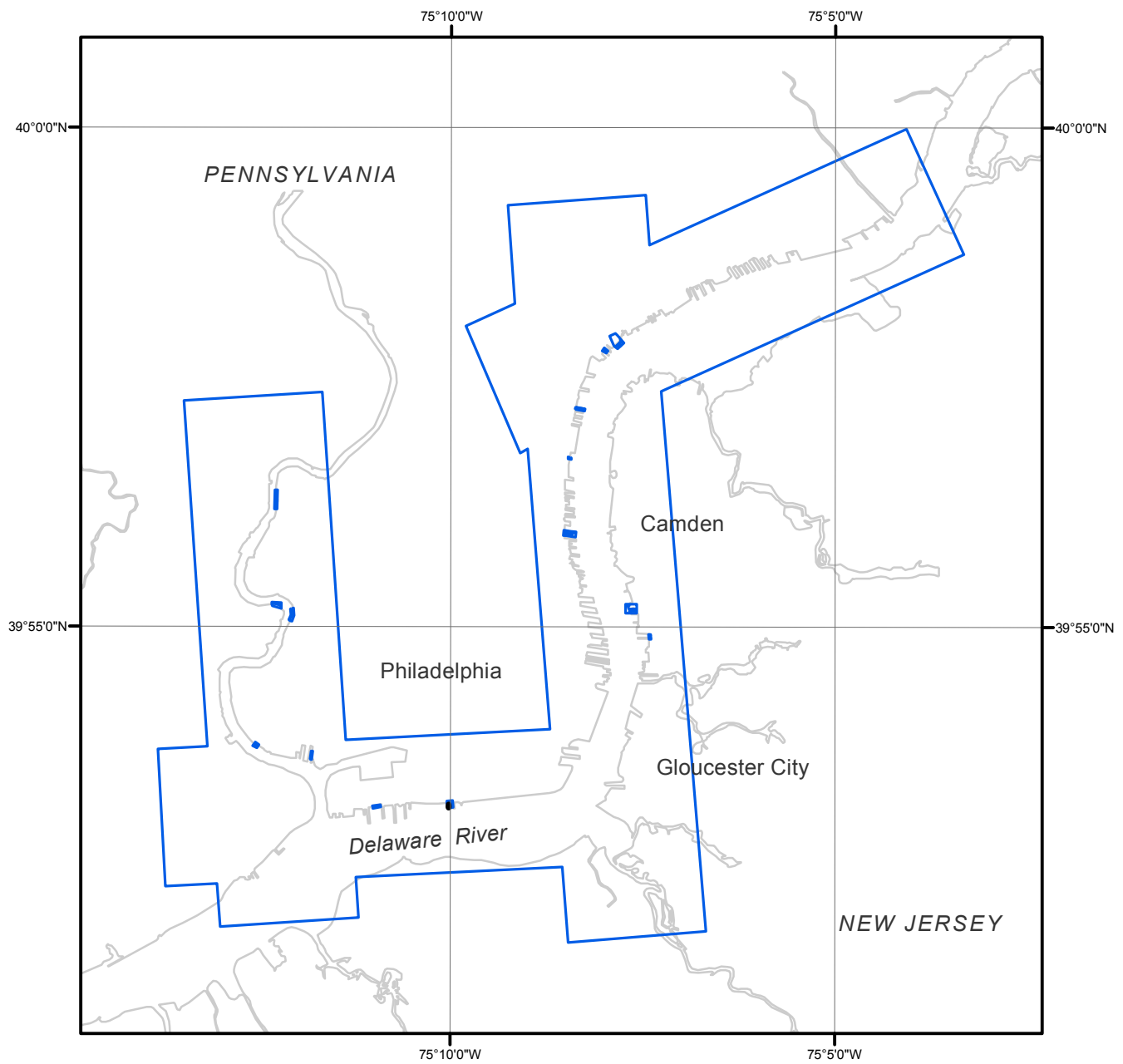- Chart Evaluation File (CEF) in shapefile format

NOAA Shoreline Data Explorer
- GC11190 in shapefile format
- Metadata file for GC11190
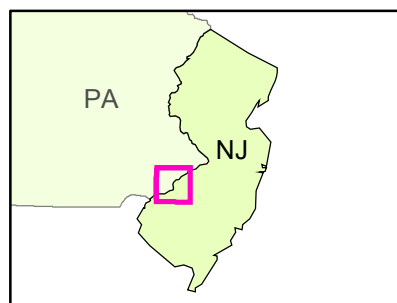- Digital copy of the PCR in Adobe PDF format

End of Report

PORTS OF CAMDEN/GLOUCESTER AND PHILADELPHIA

NEW JERSEY AND PENNSYLVANIA

75°10'0"W   75°5'0"W

40°0'0"N   40°0'0"N

PENNSYLVANIA

Camden

39°55'0"N   39°55'0"N

Philadelphia

Gloucester City

Delaware River

NEW JERSEY

75°10'0"W   75°5'0"W

Overview

PA

NJ

NJ1502-CS-N

GC11190