

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT PA1901-CS-N

Ports of Philadelphia, Camden-Gloucester, and Paulsboro, Pennsylvania and New Jersey

Introduction

Coastal Mapping Program (CMP) Project PA1901-CS-N provides highly accurate digital shoreline data for key areas of change within the ports of Philadelphia, Pennsylvania, and Camden-Gloucester and Paulsboro, New Jersey. 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 PA1901-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 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 change analysis memorandum of February 20, 2019 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 King Air (N68RF) aircraft in November 2018 using an Applanix Digital Sensor System (DSS) dual aerial camera at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.32 meters. Color (RGB) and near infrared (NIR) imagery was acquired in tandem, but only the color images were used. Although imagery was not acquired in strict coordination with local tides, the goal was to collect all imagery below Mean High Water (MHW).

GPS Data Processing

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 (ver. 8.2) software in November 2018. For further information refer to the Airborne Positioning and Orientation Report (APOR) that is on file with other project data within the Remote Sensing Division Electronic Data Library.

Aerotriangulation

Routine softcopy aerotriangulation methods were applied to establish a 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 performed by AB personnel in April 2019 utilizing SOCET SET (ver. 5.6) software on a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components, and other associated peripheral devices. The RGB images were measured and adjusted as a single block using the Multi-Sensor Triangulation (MST) module of SOCET SET. Upon successful completion of this process, MST provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.28 meters 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 a member of AB in April 2019. Digital feature data was compiled from the aerotriangulated RGB imagery using the Feature Extraction software module of SOCET SET. 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 PA1901-CS-N 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. This predicted accuracy of compiled well-defined points is derived by doubling the circular error calculated from the aerotriangulation statistics.

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

Date	Time (UTC)	Roll #	Flight Line / Photo #s	Tide Level*
8-NOV-2018	15:01 – 15:07	18VC76	62-001/ 21052 – 21081	1.2 – 0.7 m
8-NOV-2018	15:13 – 15:19	18VC76	62-002 / 21082 – 21111	0.8 – 1.4 m
8-NOV-2018	15:25 – 15:29	18VC76	62-003 / 21112 – 21132	1.4 – 1.0 m

* Tide levels are given in meters above MLLW and 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 elevation of the MHW tidal datum in the project varies between 1.77 – 2.00 meters above MLLW.

Quality Control / Final Review

The final review of the project was completed by a senior member of RSD in April 2019, and 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 Esri's ArcGIS desktop GIS software (v10.6.1). 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 memorandum
- Airborne Positioning and Orientation Report (APOR)
- Aerotriangulation Report
- Project database
- Project Completion Report (PCR)
- GC11491 in shapefile format
- CEF in shapefile format

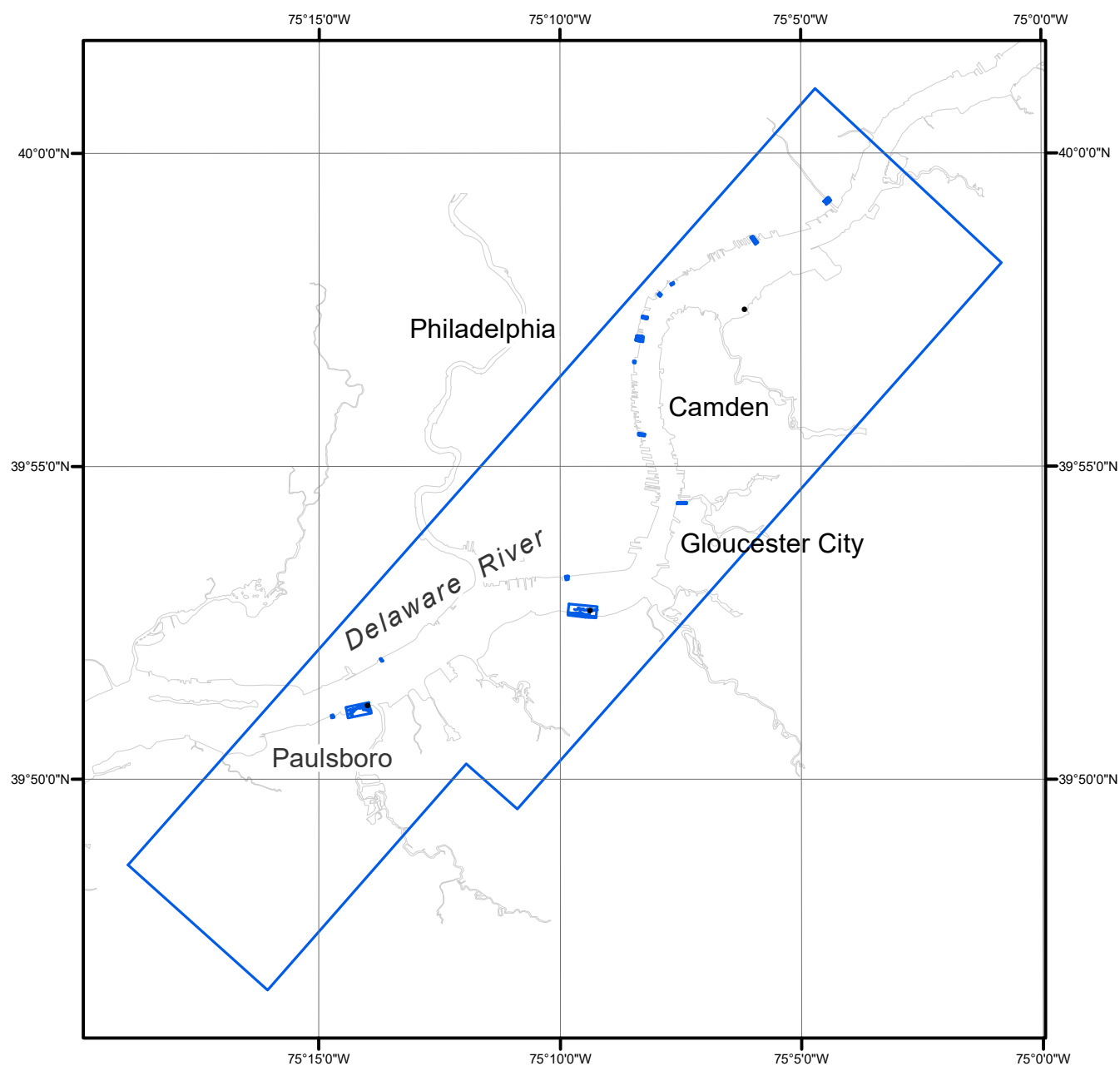
NOAA Shoreline Data Explorer

- GC11491 in shapefile format
- Metadata file for GC11491
- PCR in Adobe (PDF) format

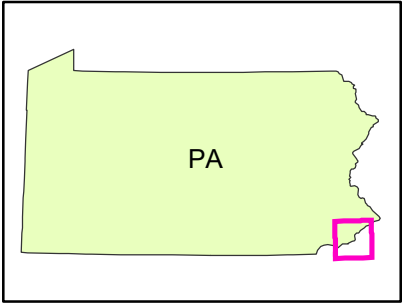
End of Report

PORTS OF PHILADELPHIA, CAMDEN-GLOUCESTER, AND PAULSBORO

PENNSYLVANIA AND NEW JERSEY



Overview



PA1901-CS-N

GC11491