

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

## ***PROJECT NC1501-CS-N***

### ***Port of Wilmington, North Carolina***

#### **Introduction**

Coastal Mapping Program (CMP) Project NC1501-CS-N provides highly accurate digital shoreline data for key areas of change within the Port of Wilmington, North Carolina. 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 NC1501-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 CSCAP Memorandum of March 26, 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 consisted of six strips of color imagery acquired with the NOAA King Air aircraft on January 17 & 19, 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 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 (AT). 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 data was processed using Applanix POSpac MMS 7.1 software in February 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 AT phase of the project was completed by a member of AB in August 2017. Routine softcopy AT 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. Of the six strips (196 images) acquired for this project only three strips (111 images) were included in the AT adjustment. These images were measured and adjusted as a single block using the Multi-Sensor Triangulation module of BAE Systems' SOCET SET (version 5.6) software. Upon successful completion of this process, the triangulation software provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.34 meters based on a 95% confidence level. An AT 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 RSD in August 2017. Digital feature data was compiled using SOCET SET (version 5.6.0) software. Feature identification and attribution within the GC were based on image analysis of the digital photographs and 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 NC1501-CS-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.7 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 #	Strip / Photo #s	Tide Level*
01-17-2015	18:34 – 18:38	15NC03	53-001 / 229 – 256	0.5 – 0.7 m
01-17-2015	18:42 – 18:47	15NC03	53-002 / 257 - 286	0.5 – 0.7 m
01-17-2015	18:51 – 18:56	15NC03	53-003 / 287 – 313	0.5 – 0.8 m
01-19-2015	15:47 – 15:52	15NC04	53-005 / 350 - 386	0.4 – 1.2 m
01-19-2015	15:57 – 16:03	15NC04	53-004 / 387 - 423	0.4 – 1.1 m
01-19-2015	16:07 – 16:13	15NC04	53-006 / 424 - 460	0.4 – 1.1 m

\* Tide levels are given in meters above MLLW and were 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 area varies between 1.22 and 1.44 meters above MLLW.

## **Quality Control / Final Review**

The final review of the project was completed by a senior member of RSD in August 2017, 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 10.5 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**

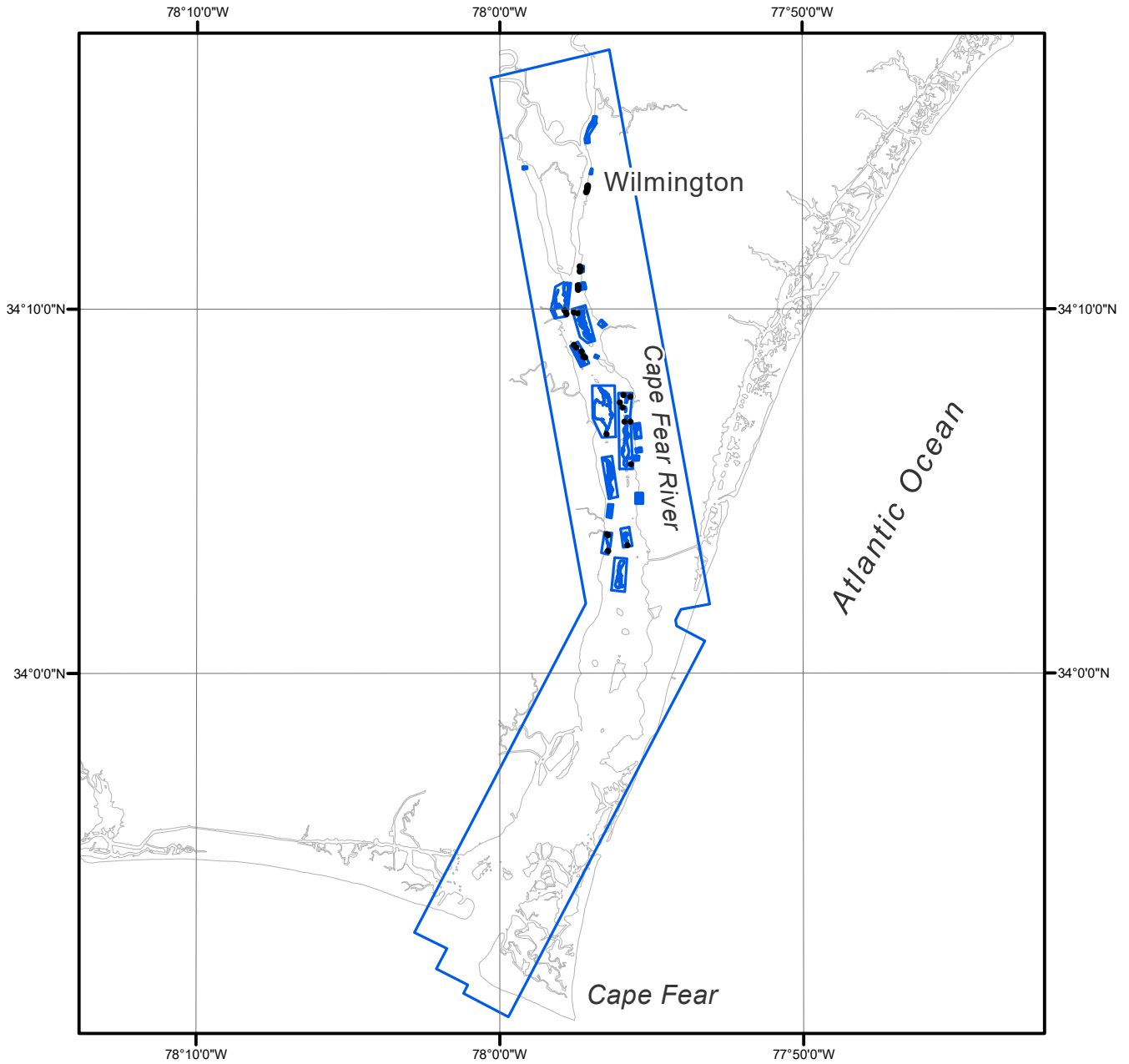
- CSCAP evaluation memorandum
- Airborne Positioning and Orientation Report (APOR)
- Project database
- Aerotriangulation Report
- Project Completion Report (PCR)
- GC11347 in shapefile format
- Chart Evaluation File (CEF) in shapefile format

### **NOAA Shoreline Data Explorer**

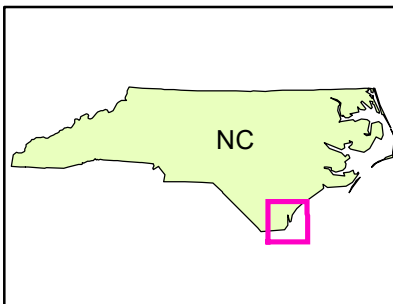
- GC11347 in shapefile format
- Metadata file for GC11347
- Digital copy of the PCR

## **End of Report**

# PORT OF WILMINGTON NORTH CAROLINA



Overview



NC1501-CS-N

GC11347