

# NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

## PROJECT WI1601-CS-N

### *Port of Green Bay, Wisconsin*

#### **Introduction**

NOAA Coastal Mapping Program (CMP) Project WI1601-CS-N provides highly accurate digital shoreline data for areas of change within the Port of Green Bay, Wisconsin. 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 WI1601-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 for Project WI1701-CS-T dated June 29, 2017 for details of the chart comparison process.

#### **Field Operations**

Field operations for Project WI1601-CS-N consisted of the collection of static and kinematic GPS data and Inertial Measurement Unit (IMU) data, and the acquisition of aerial imagery. Aerial survey operations were conducted in August, 2017 with the NOAA King Air aircraft (N68RF). Four flight lines of natural color (RGB) imagery were acquired using an Applanix DSS dual camera system. Near-infrared (NIR) imagery was also acquired concurrently but was not used. Imagery was acquired at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.33 meters for the RGB images.

#### **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 GPS data was processed using Applanix POSPac MMS (ver. 7.1) software in September 2017. For further information refer to the Airborne Positioning and Orientation Reports (APOR) on file with other project data within the RSD Electronic Data Library.

## **Aerotriangulation**

The AT phase of project completion was performed in January 2018. 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. The digital images were measured and adjusted as a single block using the Multi-Sensor Triangulation module of BAE Systems' SOCET SET (ver. 5.6) software on a Windows-based photogrammetric workstation. 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 0.5 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 February 2018. Digital feature data was compiled using the Feature Extraction software module of SOCET SET. 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 WI1601-CS-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.0 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 table below provides information on the imagery used to complete this project:

<b>Date</b>	<b>Time (UTC)</b>	<b>Roll #</b>	<b>Photo #s</b>	<b>Lake Level*</b>
08-08-2017	15:13 – 15:16	17VC47	12036 – 12051	177.0 m
08-08-2017	15:21 – 15:24	17VC47	12052 – 12067	177.0 m
08-08-2017	15:32 – 15:34	17VC47	12068 – 12080	177.0 m
08-08-2017	15:41 – 15:44	17VC47	12081 – 12095	177.0 m

\* Lake water levels are given in meters above IGLD 1985 and are based on verified observations at the Green Bay station in Wisconsin. The Low Water Datum (LWD) for Lake Michigan is 176.0 meters above IGLD 1985.

## **Quality Control / Final Review**

The final review of the project was completed by a senior member of RSD in February 2018, and included analysis of AT 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 ArcGIS (ver. 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 the 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)
- GC11389 in shapefile format
- CEF in shapefile format

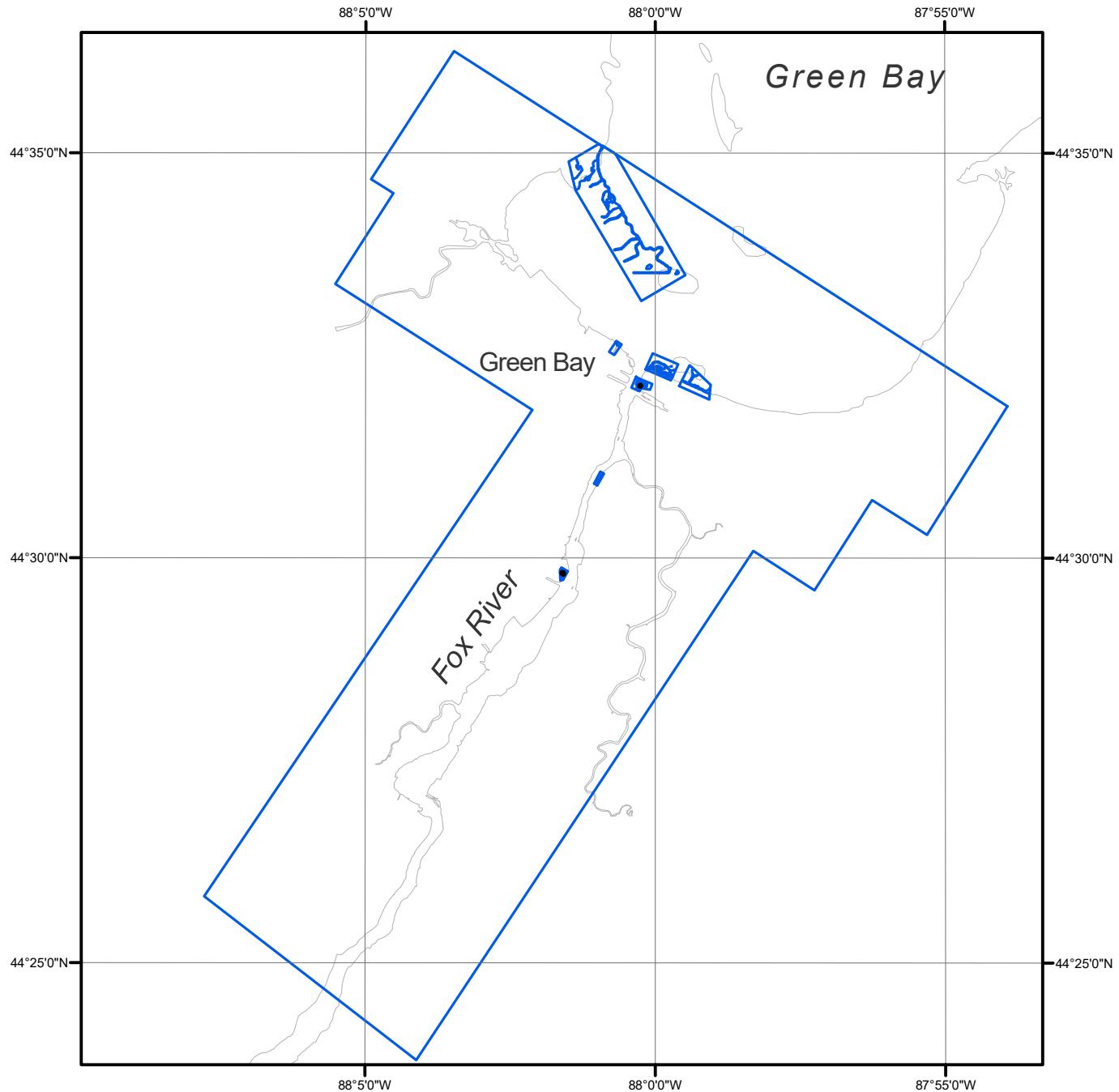
### **NOAA Shoreline Data Explorer**

- GC11389 in shapefile format
- Metadata file for GC11389
- Digital copy of the PCR in Adobe PDF format

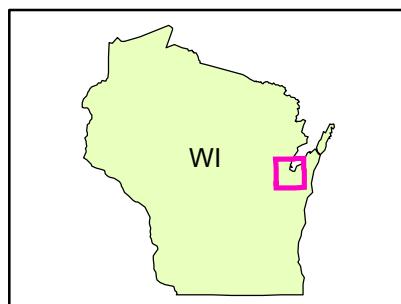
## **End of Report**

# PORT OF GREEN BAY

## WISCONSIN



Overview



WI1601-CS-N

GC11389