

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

## ***PROJECT TX1202A-CM-N***

### ***Carancahua Bay, Texas***

#### **Introduction**

NOAA Coastal Mapping Program (CMP) Project TX1202A-CM-N provides accurate digital shoreline data for Carancahua Bay, Texas. TX1202A-CM-N is a subproject of a larger acquisition project TX1202-CM-N, which extends from Seadrift to Palacios, Texas. 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**

Photographic mission instructions for TX1202-CM-N were formulated by the Requirements Branch (RB) of the Remote Sensing Division (RSD) following the guidelines of RSD's Photo Mission Standard Operating Procedures. The instructions discussed the project's purpose, geographic area of coverage, scope and priority, image requirements, Global Positioning System (GPS) data collection procedures and guidelines, instructions for data recording and handling, and mission communication protocols. RB created a Project Layout Diagram, flight maps and input files for the aircraft flight management system.

#### **Field Operations**

Field operations for TX1202-CM-N consisted of the collection of static and kinematic GPS data, Inertial Measurement Unit (IMU) data, and the acquisition of digital aerial imagery. Aerial survey operations were conducted January 27<sup>th</sup>, 2012 with the NOAA King Air aircraft (N68RF), and consisted of the acquisition of twenty flight lines of natural color (RGB) imagery using an Applanix DSS-439 digital camera system. All imagery was acquired at a nominal altitude of 10,000 feet, resulting in an approximate ground sample distance (GSD) of 0.32 meters. For subproject TX1202A-CM-N, four flight lines with a total of 81 images were used. Imagery was not acquired in strict coordination with local tides, though the goal was to collect all imagery below the Mean High Water (MHW) tide stage.

#### **Direct Georeferencing Data Processing**

The GPS/IMU data were processed by RSD personnel to yield precise camera positions and orientations for direct geo-referencing (DG) of the imagery. A local GPS base station was established for use as a reference station for kinematic GPS processing operations. The position of the base station was determined using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. Airborne kinematic data was processed using Applanix POSPAC (ver. 5.4) GPS/IMU processing software in February 2012. For further information refer to the Airborne Positioning and Orientation Reports (APOR) on file with other project data within the RSD Electronic Data Library.

The processed GPS/IMU data were used to derive precise exterior orientation (EO) values of the camera centers required for digital feature extraction. The predicted horizontal accuracy of the imagery was determined by propagating sensor EO and image measurement uncertainties through the photogrammetric collinearity equations using the Exterior Orientation Total Propagated Uncertainty (EO-TPU) tool developed by NGS. Using this tool, the predicted horizontal uncertainty at the 95% confidence level for all imagery was 1.3 meters. NGS third order geodetic control points were used to verify the horizontal integrity of the directly georeferenced data. All stereo models were examined and found to have acceptable levels of parallax for mapping purposes.

## Compilation

The data compilation phase of the project was initiated by RSD personnel in April 2020. This work was accomplished using the Feature Extraction module within BAE Systems' SOCET SET (ver. 5.6) photogrammetric software. Feature identification and the assignment of cartographic codes were based on image analysis of the project images 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).

Spatial data accuracies for Project TX1202A-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 2.6 meters at the 95% confidence level. This predicted accuracy of compiled well-defined points is derived by doubling the horizontal uncertainty calculated from the EO-TPU tool. The following table provides information on the imagery used to complete this project:

Date	Time (UTC)	Roll #	Line #	Photos	Tide Level*
1/27/2012	18:43 – 18:45	12NC12	50-013	3147 – 3160	-0.1 m
1/27/2012	18:50 – 18:54	12NC12	50-009	3161 – 3182	-0.1 m
1/27/2012	19:06 – 19:09	12NC12	50-010	3184 – 3205	-0.1 m
1/27/2012	19:13 – 19:16	12NC12	50-008	3206 – 3228	-0.1 m

\* Tide levels are given in meters above MLLW were calculated using the Pydro software tool with a TCARI grid referenced to verified water level observations at NOS gauges. The height of the MHW tidal datum in the project area is 0.24 meters above MLLW.

## Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of AB. The final QC review was completed in May 2020. The review process included analysis of the direct georeferencing 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. 10.7.1) desktop GIS software. All project data was evaluated for compliance to CMP requirements.

Comparisons of the largest scale NOAA nautical charts with natural color images and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical chart was used in the comparison process:

- 11317, Matagorda Bay, TX, 33<sup>rd</sup> Ed., May 2014

## **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**

- Airborne Positioning and Orientation Report (APOR)
- Project database
- GC11651 in shapefile format
- Project Completion Report (PCR)
- CEF in shapefile format

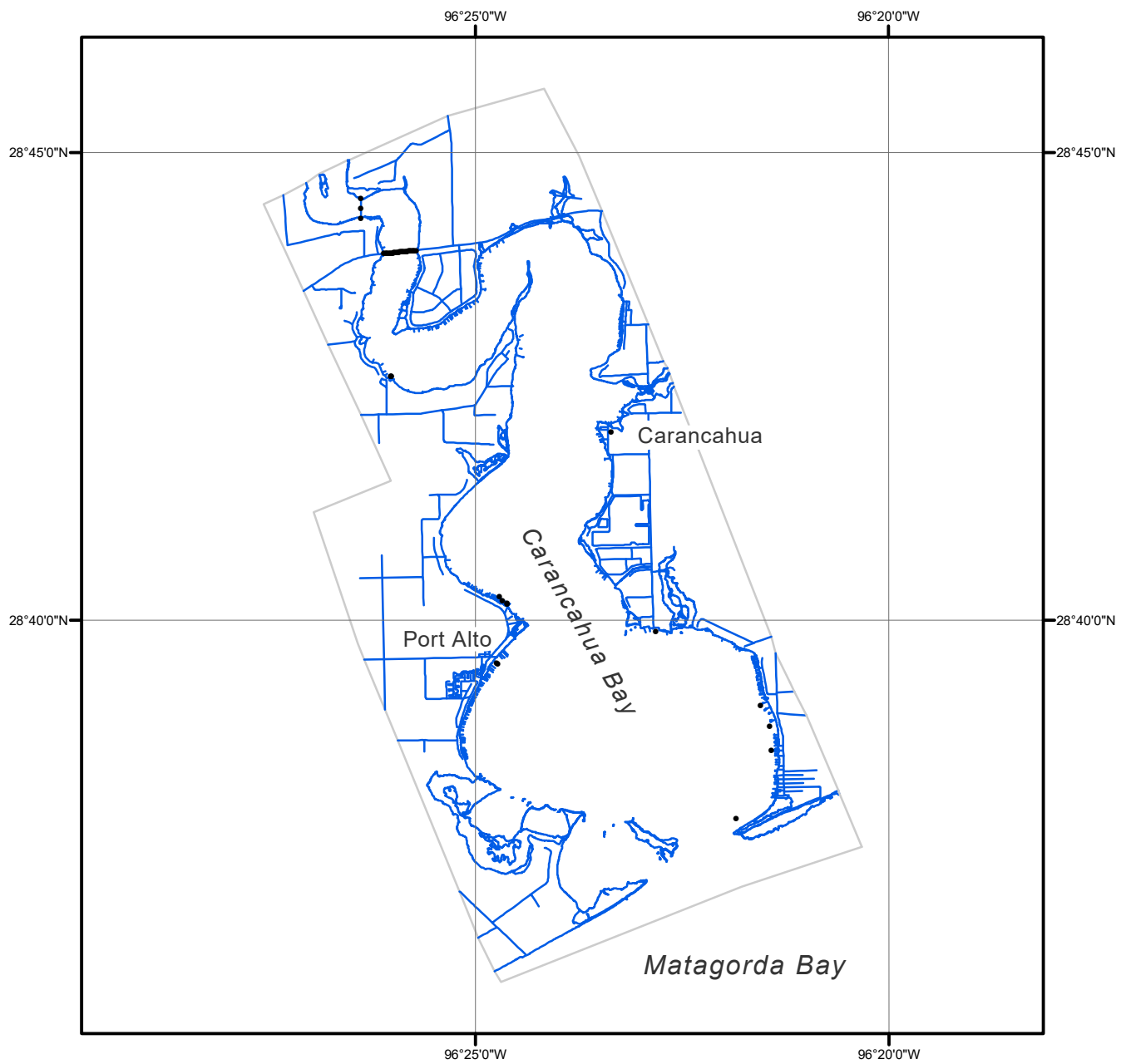
### **NOAA Shoreline Data Explorer**

- GC11651 in shapefile format
- Metadata file for GC11651
- PCR in Adobe (PDF) format

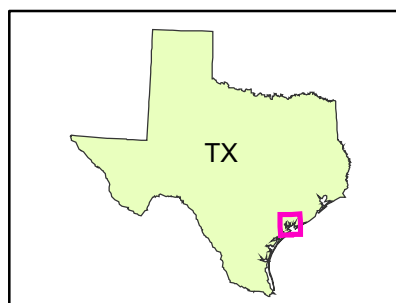
## **End of Report**

# CARANCAHUA BAY

## TEXAS



Overview



TX1202A-CM-N

GC11651