

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

## ***PROJECT TX1106C-CM-N***

### ***Intracoastal Waterway, Salt Bayou to East Bay, Texas***

#### **Introduction**

Coastal Mapping Program (CMP) Project TX1106C-CM-N provides highly accurate digital shoreline data for a small area around the Intracoastal Waterway from Salt Bayou to East Bay, Texas. Project TX1106C-CM-N is a subproject of a larger project, TX1106-CM-N, Gulf Coast Intracoastal Waterway from Port Isabel to Port Arthur. 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**

Project TX1106C-CM-N was designed in response to a request from the Marine Chart Division (MCD) of the Office of Coast Survey, NOAA. Photographic mission instructions for TX1106-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 TX1106-CM-N consisted of the collection of static and kinematic GPS data and Inertial Measurement Unit (IMU) data, and the acquisition of digital aerial imagery. Aerial survey operations were conducted in March 2011 with the NOAA King Air aircraft (N68RF). Imagery was acquired with an Applanix DSS 439 dual head digital camera system (two 60 mm lenses). Twenty-nine flight lines of natural color imagery were acquired for TX1106-CM-N, with three of them (50-026, 50-027 and 50-028) used in the completion of subproject TX1106C-CM-N. All imagery was acquired at a nominal altitude of 10,000 feet, resulting in an approximate ground sample distance (GSD) of 0.35 meters. Imagery acquisition was not strictly coordinated with a particular tide stage, but the imagery was required to be collected when the water level was below Mean High Water (BMHW).

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

The GPS/IMU data for Project TX1106C-CM-N were processed by RSD personnel to yield precise camera positions and orientations. GPS base stations were established for use as reference stations for kinematic GPS processing operations. The positions of the base stations were determined using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. The airborne kinematic data was

processed using POSPac (ver. 5.3) GPS/IMU software in April 2011 for the photographs used for TX1106C-CM-N. For further information refer to the Airborne Positioning and Orientation Report (APOR) on file with other project data within the RSD Electronic Data Library.

For Project TX1106C-CM-N, no aerial triangulation processing was conducted. Upon completion of the processing of GPS/IMU data, the processed data were used to derive precise exterior orientation (EO) values of the camera centers required for direct georeferencing (DG) of the imagery. A predicted horizontal accuracy of the imagery was determined by propagating sensor EO and image measurement uncertainties through the photogrammetric collinearity equations using an Exterior Orientation Total Propagated Uncertainty (EO-TPU) tool developed by NGS. Using this tool, the predicted horizontal uncertainty at the 95% confidence level was calculated to be 1.6 meters for the imagery subset used to compile data for TX1106C-CM-N.

## Compilation

The data compilation phase of this project was accomplished by AB personnel in April 2019. Digital mapping was performed using the Feature Extraction software module within SOCET SET ver. 5.6. Feature identification and attribution within the GC were based on image analysis of the aerial imagery and information extracted from the largest scale 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 TX1106C-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 3.2 meters at the 95% confidence level. The predicted accuracy of compiled, well-defined points is derived by doubling the horizontal uncertainty computed using the EO-TPU tool. The table below provides information on the images used to complete this project:

Date	Time (UTC)	Roll	Strip / Images	Tide Level*
3/10/2011	17:57 – 17:59	11NC05	50-026 / 1618 – 1628	0.2 m
3/10/2011	18:03 – 18:08	11NC05	50-028 / 1629 – 1661	0.2 – 0.0 m
3/10/2011	18:17 – 18:24	11NC05	50-027 / 1670 – 1711	0.1 – 0.2 m

\* Tide level is 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 area ranges between 0.36 – 0.41 meters above MLLW.

## Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a member of RSD. The final review was completed in April 2019. The review process included analysis of

the DG 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) desktop GIS software. All project data was evaluated for compliance to CMP requirements.

A Chart Evaluation File (CEF) resulted from the comparison of source imagery and compiled project data with the largest scale NOAA nautical charts covering the project area:

- 11331, Ellender to Galveston Bay, 22<sup>nd</sup> Ed., Feb 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**

- Project database
- Airborne Positioning and Orientation Report (APOR)
- Project Completion Report (PCR)
- GC11472 in shapefile format
- CEF in shapefile format

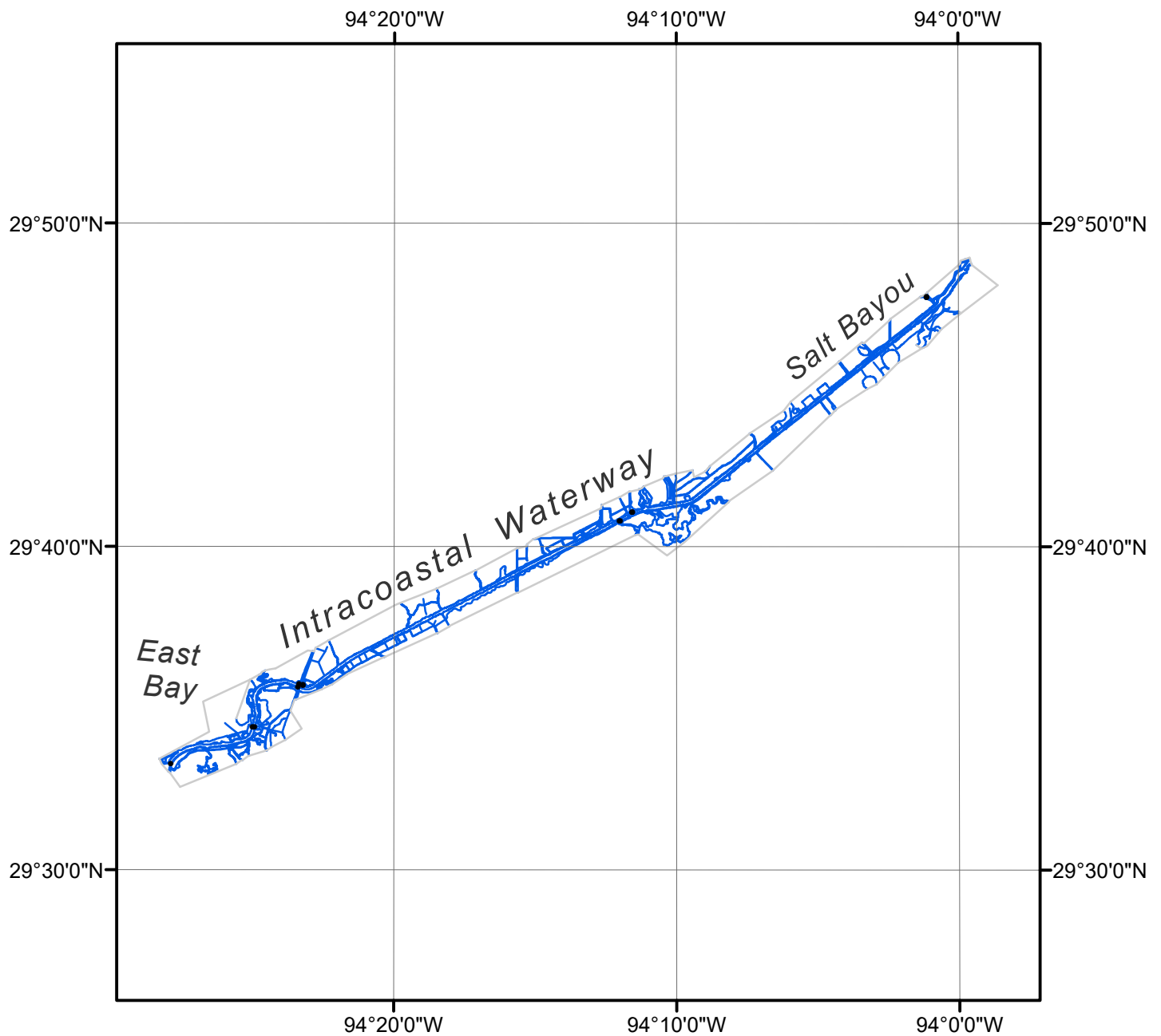
### **NOAA Shoreline Data Explorer**

- GC11472 in shapefile format
- Metadata file for GC11472
- PCR in Adobe PDF format

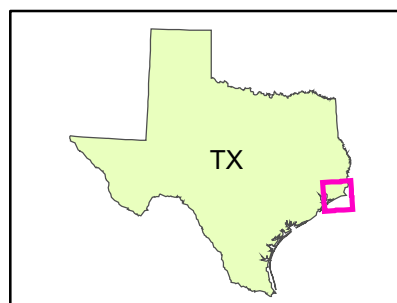
## **End of Report**

# INTRACOASTAL WATERWAY, SALT BAYOU TO EAST BAY

## TEXAS



Overview



TX1106C-CM-N

GC11472