NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT TX1201A-CM-N

Live Oak Peninsula, Texas

Introduction

NOAA Coastal Mapping Program (CMP) Project TX1201A-CM-N provides accurate digital shoreline data for Live Oak Peninsula in Copano and Aransas Bays, Texas. TX1201A-CM-N is a subproject of a larger acquisition project TX1201-CM-N, which extends from Corpus Christi Bay to St. Charles Bay, 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 TX1201-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 TX1201-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, conducted January 27-29, 2012 with the NOAA King Air aircraft, consisted of the acquisition of twenty one 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 0.35 meters. For subproject TX1201A-CM-N, two flight lines with a total of 19 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 1.56 meters. NGS third order geodetic control points were used to verify the horizontal integrity of the directly georeferenced (DG) 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 2018. 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 TX1201A-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 3.1 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	20:04 – 20:05	12NC12	50-016	3287 – 3295	-0.1 m
1/29/2012	15:57 – 15:58	12NC01	50-017	0008 – 0017	-0.2 m

* Tide levels are given in meters above MLLW and are based on preliminary water level observations at the NOS gauge at Copano Bay (#8774770) at the time of photography. The elevation of the MHW tidal datum in the project area is equal to 0.12 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 2018. 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. 10.5) 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:

- 11314, Carlos Bay to Redfish Bay, TX, 26th Ed., Jul. 2015

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
- GC11420 in shapefile format
- Project Completion Report (PCR)
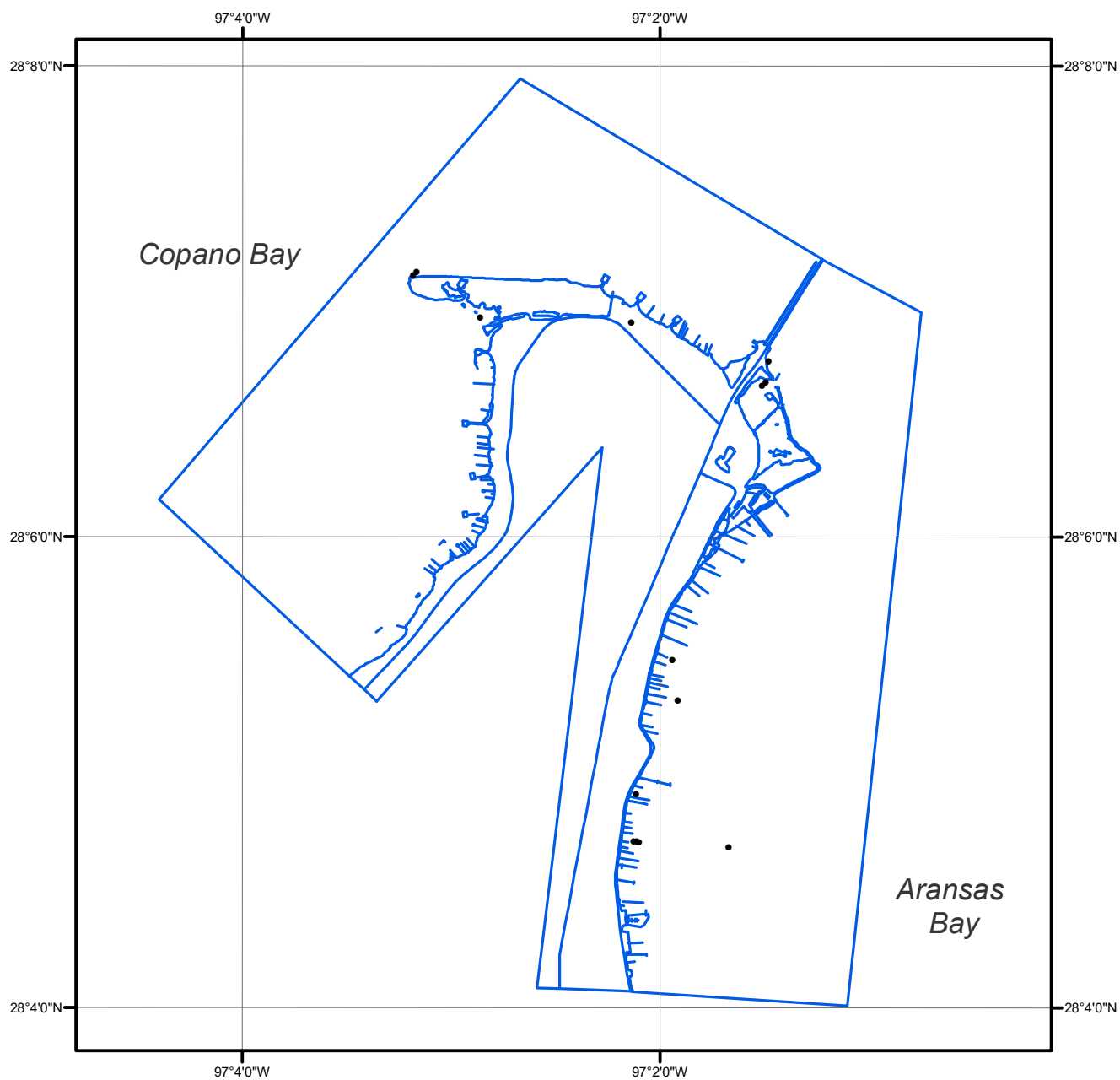- CEF in shapefile format

NOAA Shoreline Data Explorer

- GC11420 in shapefile format
- Metadata file for GC11420
- Digital copy of the PCR

End of Report

LIVE OAK PENINSULA

TEXAS

97°4'0"W 97°2'0"W

28°8'0"N 28°8'0"N

Copano Bay

28°6'0"N 28°6'0"N

Aransas Bay

28°4'0"N 28°4'0"N

97°4'0"W 97°2'0"W

Overview

TX

TX1201A-CM-N

GC11420