

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT TX1106A

Northeast Aransas Bay, Texas

Introduction

Coastal Mapping Program (CMP) Project TX1106A provides highly accurate digital shoreline data for a small area around the Intracoastal Waterway in northeast Aransas Bay, Texas. Project TX1106A is a subproject of a larger project, TX1106, 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 TX1106A 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 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 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 March 2, 2011 through March 11, 2011 with the NOAA King Air aircraft (N68RF). Color (RGB) imagery was acquired with an Applanix DSS-439 dual head digital camera system (two 60 mm lenses). Twenty-eight (28) flight lines of natural color imagery were acquired for TX1106, although only twelve (12) individual color images were used in the completion of subproject TX1106A. 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 TX1106 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 MMS 6.1 GPS/IMU software in April 2011 for the photographs used for TX1106A. For further information refer to the Airborne Positioning and Orientation Report (APOR) for day 0652011 on file with other project data within the RSD Applications Branch (AB) Project Archive.

For Project TX1106A, 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 Excel spreadsheet based 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 1.4 meters for the imagery subset used to compile data for TX1106A.

Published positions of US Coast Guard maintained navigational aids were compared with their positions as measured within the project imagery to verify the horizontal integrity of the DG data. Stereo-models were examined for parallax and found to be acceptable.

Compilation

The data compilation phase of this project was accomplished by AB personnel in October 2014. 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 chart 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 TX1106A were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 2.8 meters at the 95% confidence level. This predicted accuracy of well-defined points measured during the compilation phase was derived by doubling the imagery accuracy computed from the EO-TPU tool.

The following table provides information on the imagery used to complete this project:

Date	Time (UTC)	Roll #	Photo #s	~ GSD	Tide Level*
3/06/2011	17:45	11NC03	762 - 767	0.35 m	-0.06 m
3/06/2011	17:54	11NC03	772 - 777	0.35 m	-0.06 m

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS gauge at Rockport, Aransas Bay Station ID 8774770. The elevation of the MHW tidal datum in the project area is 0.11 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of RSD. The final QC review was completed in October 2014. 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 10.2 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 chart covering the project area:

11314, Intracoastal Waterway, Carlos Bay to Redfish Bay, 1:40,000, 25th Ed., Nov./08

End Products and Deliverables

The following specifies the location and identification of the products generated during the completion of this project:

RSD Applications Branch Archive

- Hardcopy of the Acquisition Summary
- Hardcopy of the Airborne Positioning and Orientation Report (APOR)
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot, attached to PCR

Remote Sensing Division Electronic Data Library

- Project database
- GC11112 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

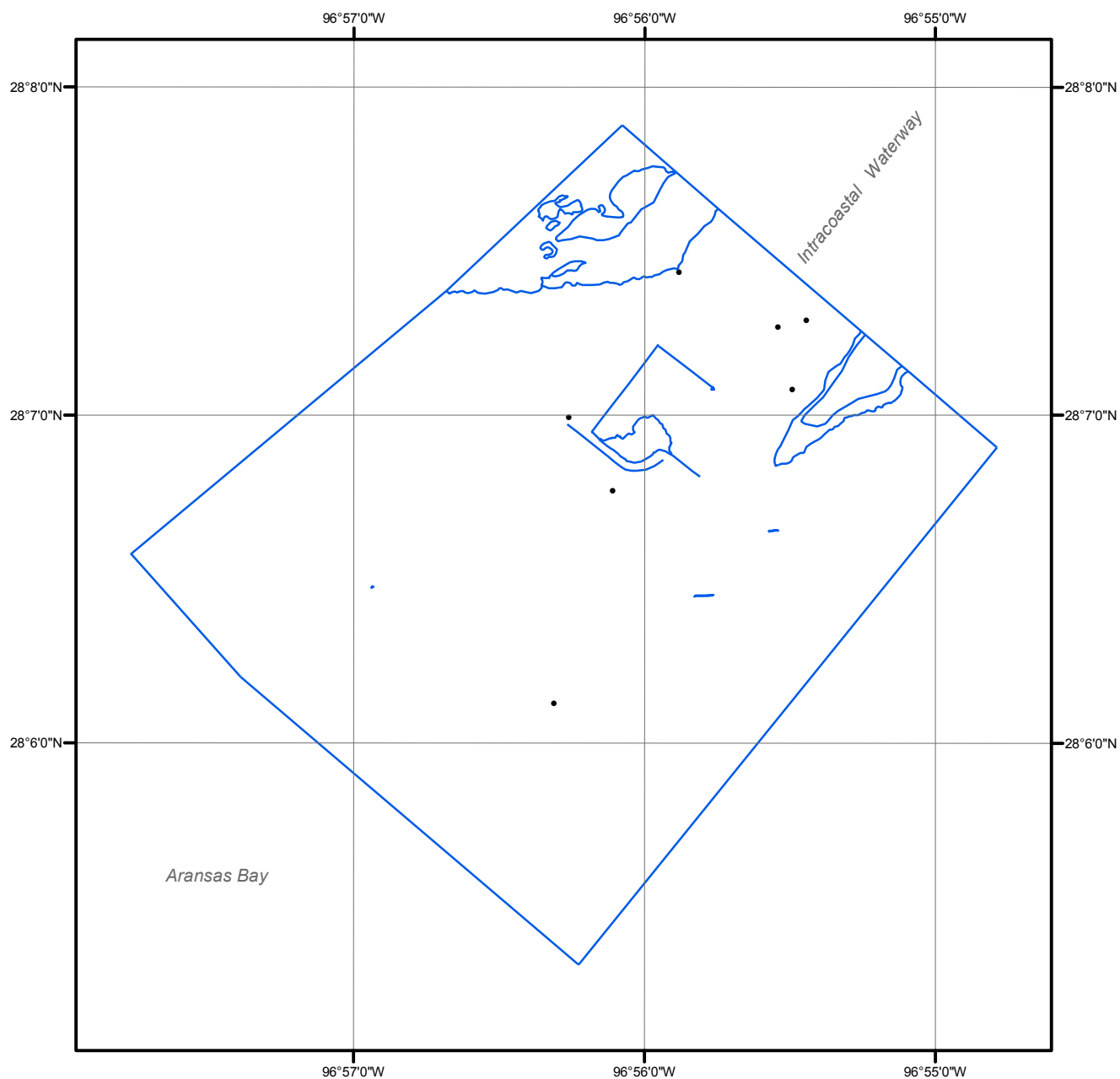
NOAA Shoreline Data Explorer

- GC11112 in shapefile format
- Metadata file for GC11112
- Digital copy of the PCR in Adobe PDF format

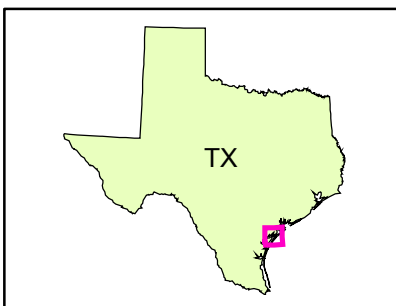
End of Report

NORTHEAST ARANSAS BAY

TEXAS



Overview



TX1106A

GC11112