

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT TX9805 INTRA COASTAL WATERWAY CALCASIEU RIVER TO GALVESTON TEXAS

Introduction

Coastal Mapping Program (CMP) Project TX9805 provides a highly accurate database of new digital shoreline data of the Intra coastal Waterway from eastern Galveston Bay at Port Bolivar to Ellender (just east of the Calcasieu River). This project also includes the Turning Basin at West Port Arthur, the Sabine Pass Channel, the Neches River to Beaumont, and the Sabine River to Orange Texas.

The design of project TX9805 was based on a comparison of image analysis to cartographic detail depicted on the pertinent NOAA nautical charts of the project site. Successful completion of this project resulted in a densification of the National Spatial Reference System (NSRS), a set of controlled metric quality aerial photographs, high resolution scans, and the digital cartographic feature files (DCFF) of the coastal zone which meet the requirements of the NOAA CMP.

The project database consists of information measured and extracted from aerial photographs, LIDAR¹, and metadata related to photogrammetric compilation. Base mapping was conducted in a digital environment using stereo softcopy photogrammetry and associated cartographic practices. Project survey data is referenced to the North American Datum of 1983 (NAD 83).

Project Design

The Requirements Branch (RB) of the Remote Sensing Division (RSD) formulated the photographic mission instructions for this project following the guidelines of the Photo Mission Standard Operating Procedure Version II (7/01/93). The instructions discussed the project's purpose, geographic area of coverage, scope and priority; photographic requirements; flight line priority; tide coordination; GPS data collection procedures and guidelines for both kinematic and static surveys; data recording and handling instructions; and contact and communication information. The RB created a Project Layout Diagram, flight maps and input files for the aircraft's flight management system. The RB provided copies of the descriptions of selected geodetic control station at airports that may have been used as bases of operation. A briefing was held to review the photographic mission instructions and to distribute the data to

¹Significant changes in the shoreline at the Bolivar Peninsula (Galveston) (29° 24' N Latitude 94° 46' W Long.) after the source photography was taken. This new shoreline was extracted from LIDAR taken during June 2001 with an accuracy to be determined.

photographic mission personnel.

Field Operations

The photographic mission operation was conducted on March 23rd 1998 and April 1st 1998 with the NOAA Cessna Citation II aircraft. Natural color photographs were acquired through use of a Wild RC-30 camera with the NOS "A" lens cone. No tide coordinated black and white infrared photographs were acquired for this project. All aerial photographs were acquired at the nominal scales of 1:40,000 and 1:50,000. Kinematic GPS data was acquired as an integral part of photographic mission operations in compliance with the aforementioned Photographic Mission SOP.

GPS Data Reduction

Global Positioning System (GPS) data was collected and processed to provide precise positions of camera centers for application as photogrammetric control in the aerotriangulation phase of project completion. The acquisition of a static GPS data set of the airport reference station and two airborne kinematic GPS data sets were executed in compliance with GPS Controlled Photogrammetry Field Operations Manual, a RSD operational manual. Static GPS data of the airport reference station which was collected in March 1998, was processed using the NGS Online User Positioning Service (OPUS). The first kinematic GPS data set (3/23/98) was processed using Trimble GPSurvey™ (version 2.35) software. The second kinematic GPS data set for the project (4/1/1998) was processed using the Applanix POSGPS software. The NGS computed precise satellite ephemeris and standard meteorologic data were applied during the data reduction process. GPS data reduction was completed by a RSD Applications Branch (AB) CMP team member in April and May 2002. A GPS Data processing Report was written and is on file with other project data within the RSD AB Project Archive.

Aerotriangulation

Routine softcopy aerotriangulation methods were applied to establish the network of precise GPS camera positions to provide model parameters and orientation elements required for softcopy compilation. Ten strips of aerial photographs were measured and adjusted as one block. This work was initiated by a RSD AB CMP team member in May 2002 utilizing a digital photogrammetric workstation (DPW) which is a configuration of a computer processor and monitors, softcopy photogrammetry software (SocetSet™ v. 4.4.0), stereographic viewing equipment and associated peripheral devices. A copy of the SocetSet ORIMA™ software module was utilized for the aerotriangulation process. Upon successful completion of the aerotriangulation process, the ORIMA™ software provided the RMS of the standard deviations of the residuals for each aerotriangulated ground point which were used to compute a predicted horizontal circular error of 1.5 meters based on a 95% confidence level. An Aerotriangulation Report was written and is on file with other project data within the RSD AB Project Archive.

The project database consists of project parameters and options, camera calibration data, interior orientation parameters, airborne GPS antenna position and offset data, adjusted exterior orientation parameters, and positional listing of all measured points. Positional data is based on the North American Datum 1983, and is referenced to the UTM Coordinate System.

Compilation

The Compilation phase of the project was accomplished by a RSD AB CMP team member in July 2002. Digital mapping was accomplished using a DPW in conjunction with the SocetSet Feature Extraction TM module. Feature identification and the assignment of cartographic codes were based on image analysis of 1:40,000 and 1:50,000 scale natural color photographs and information extracted from the appropriate NOAA Nautical Charts. Cartographic feature attribution was assigned in compliance with the Coastal Cartographic Object Attribute Source Table (C-COAST). Nomenclature was assigned to selected cartographic features to refine general classification.

Cartographic features were compiled to meet a horizontal accuracy of 3.0 meters at the 95% confidence level. This predicted accuracy of compiled, well defined points is derived by doubling the circular error derived from aerotriangulation statistics.

The following table provides information on aerial photographs used during the project compilation process. Three strips (50-16, 50-17, 50-18) originated from project TX9806 and two strips (40-10, 40-11) from project LA9801. All photographs are found on film roll number 98ACN04.

Date of Acquisition	Time (GMT) of Acquisition	Strip Number	Photograph Numbers	Scale (Nominal)	Stage of Tide
3/23/1998	2103-2107	50-16	0560-0570	1:50,000	0.7*
3/23/1998	2112-2117	50-17	0571-0582	1:50,000	0.7*
3/23/1998	2128-2136	50-18	0589-0605	1:50,000	0.7*
4/01/1998	1524-1530	40-7	0723-0737	1:40,000	-
4/01/1998	1537-1542	40-5	0739-0747	1:40,000	-
4/01/1998	1550-1553	40-8	0749-0757	1:40,000	-
4/01/1998	1558-1600	40-9	0759-0762	1:40,000	-
4/01/1998	1608-1610	40-6	0764-0769	1:40,000	-
4/01/1998	1620-1624	40-10	0771-0782	1:40,000	-
4/01/1998	1642-1644	40-11	0791-0793	1:40,000	-

* Tide stage located at Port Bolivar, Bolivar Roads, TX. Data units are listed in feet and is referenced to the MLLW. - The 1:40,000 scale photographs were located in the Intra coastal Waterway where tidal data was not available at this time and shoreline compilation was performed at the current water levels at time of photography.

Final Review

The final review was initiated by a RSD AB CMP team member in August 2002. The digital cartographic feature file (DCFF) was evaluated for completeness and accuracy. Data review consisted of an on-line and off-line evaluation of digital compilation and hard copy products. The on-line review comprised of reviewing stereo models on a DPW for cartographic feature codes selection, positional accuracies of features, and nomenclature. The cartographic feature

attribution was judged to conform to C-COAST specification. The offline evaluation compared hard copy plots of the project data with the largest scale nautical charts available and the natural color photographs. Copies of NOAA nautical charts used for comparison purposes include:

11324	Galveston Bay Entrance	1:25,000	32 nd Edition
11331 (SC)	Ellender to Galveston Bay (ICW)	1:40,000	18 th Edition
11342	Sabine Pass and Lake	1:40,000	51 st Edition
11343	Sabine and Neches River	1:40,000	36 th Edition

Project Final Data and Products

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

RSD Applications Branch Project Archive

- Hard copy of GPS Processing Report
- Hard copy of Aerotriangulation Report
- Page size graphic plot of DCFF contents
- Hard copy of the Project Completion Report

RSD Electronic Data Library:

- Project Database
- DCFF: GC-10519
- Digital copy of DCFF in Shapefile format
- Digital Copy of Project Completion Report

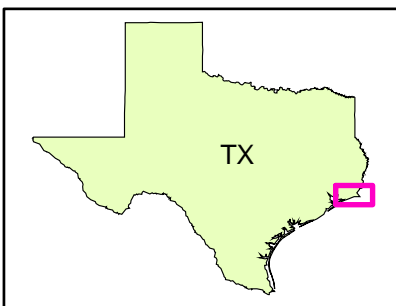
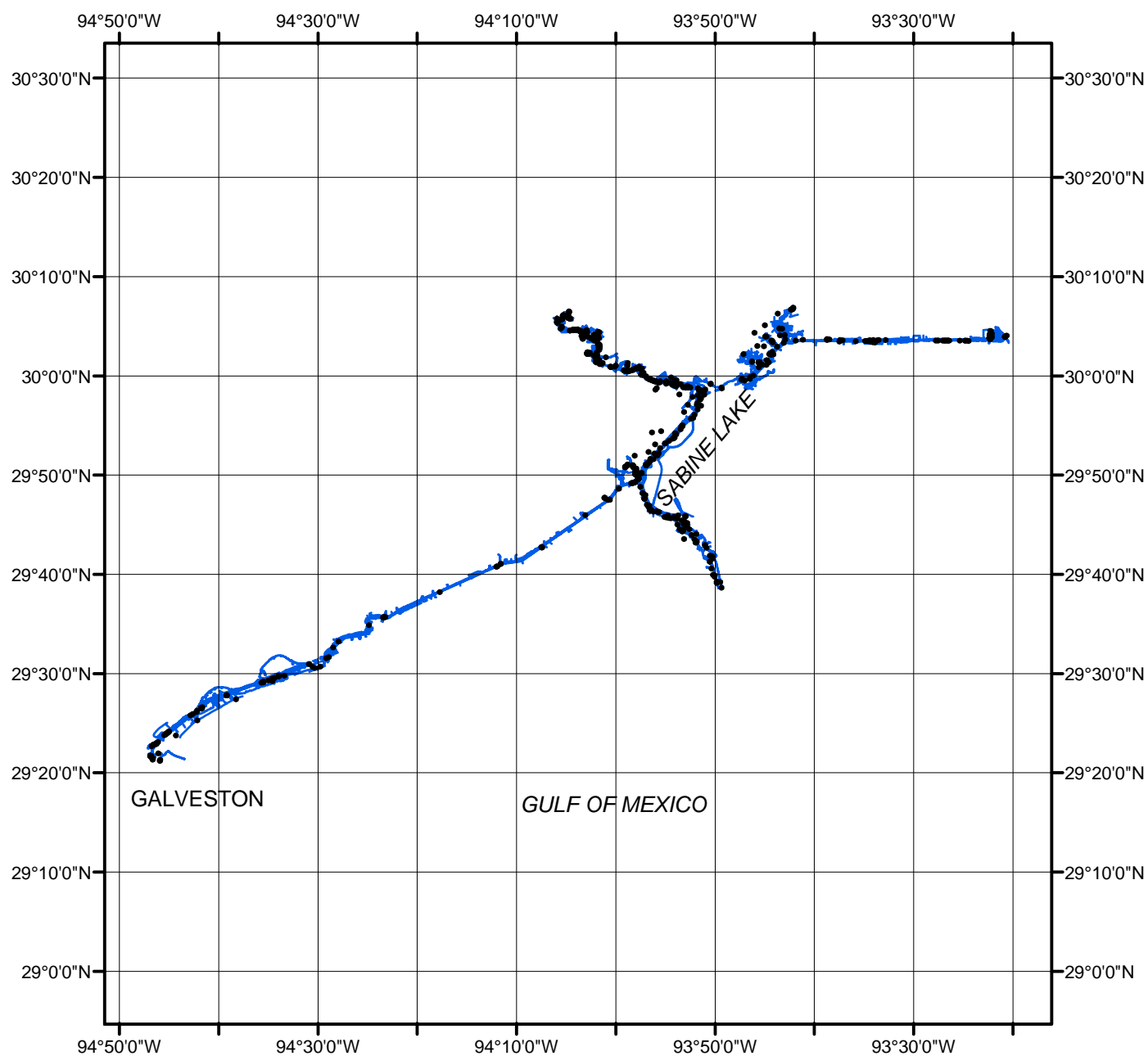
NOAA Shoreline Data Explorer

- DCFF: GC-10519
- Metadata file for GC-10519
- Digital Copy of the Project Completion Report

End of Report

INTRACOASTAL WATERWAY

CALCASIEU RIVER TO GALVESTON, TEXAS



TX9805

GC10519