

# NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

## *PROJECT TX0501B*

### *Port of Beaumont, Texas*

#### **Introduction**

NOAA Coastal Mapping Program (CMP) Project TX0501B provides a highly accurate database of new digital shoreline data for the port of Beaumont, Texas, and surrounding area. The project extends from the city of Beaumont southeastward along the Neches River, to where it runs into Sabine Lake, along the boundary between Texas and Louisiana. The digital cartographic feature file (DCFF) 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 TX0501B was initiated in response to concerns about the possible impacts of severe storm events on shorelines and port infrastructure within the project area, subsequent to the acquisition date of IKONOS satellite imagery used in a prior Coast and Shoreline Change Analysis Program (CSCAP) project covering the same geographic area. An outcome of the CSCAP project was a recommendation for limited compilation of new or changed features from imagery in order to update the NOAA Electronic Navigational Chart (ENC). However, due to the potential for storm damage to render the IKONOS imagery obsolete, it was determined that assessment of the port would be required using a later imagery source.

#### **Project Design**

The photographic mission requirements for this project were formulated as part of NOAA's emergency response program, specifically in response to Hurricane Rita, which made landfall near the Texas-Louisiana border on September 24, 2005. These requirements coincided with requirements for the CSCAP response to the need for timely updates to the NOAA ENC series, and therefore digital imagery products acquired for emergency response were assessed and deemed adequate to support nautical chart evaluation and correction for the project area.

#### **Field Operations**

The field operations consisted of the collection of static and kinematic Global Positioning System (GPS) data and the acquisition of digital aerial imagery. The photographic mission operations were conducted on September 26, September 30, and October 6, 2005, with the NOAA Cessna Citation II aircraft. Eighteen strips of natural color digital images were acquired, with an approximate ground sample distance (GSD) of 0.39 meters, through the use of an Applanix Digital Sensor System (DSS) digital camera. Of the eighteen strips acquired, twelve were used for this project.

A base station was established at Ellington Field, Houston, using static GPS. Airborne kinematic GPS data was collected in conjunction with Inertial Measurement Unit (IMU) data to determine precise camera positions and orientations.

## GPS Data Reduction

GPS and IMU data was collected and processed by Remote Sensing Division (RSD) personnel to yield precise positions and orientations of camera centers as a means of rendering accurately georeferenced digital images. The static GPS base station data was processed in September 2005 using the NGS Online Processing User Service (OPUS) software to compute fixed baseline solutions from three CORS stations. The final NAD83 position reported by OPUS was the average of these three baseline solutions. The airborne kinematic data was processed using Applanix POSGPS (ver. 4.2) software in September 2005. Refer to the *GPS-IMU Processing Report* for Project TX0501B for further information on GPS data processing.

## Georeferencing

As a result of the successful collection and processing of GPS and IMU data, no additional georeferencing of images was necessary. The horizontal accuracy of the georeferenced imagery was assessed using check points acquired from previously measured coastal feature data obtained from the NOAA Shoreline Data Explorer. A horizontal accuracy of 3.3 meters was computed for all twelve strips of the digital imagery based on a 95% confidence level. This accuracy was determined according to standard Federal Geographic Data Committee (FGDC) practices, and the assessment is on file with other project data within the Applications Branch (AB) Project Archive. Positional data is based on the UTM Coordinate System (Zone 15) and is referenced to the North American Datum of 1983 (NAD 83).

## Compilation

The data compilation phase of this project was initiated by RSD personnel in December 2005. The work was accomplished using a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated peripheral devices. The Feature Extraction software module was used within BAE Systems' SOCET SET (version 5.2) photogrammetric software. Feature identification and the assignment of cartographic codes were based on analysis of the project digital images and information extracted from the appropriate NOAA Nautical Charts, U.S. Coast Guard Light List and other ancillary sources. Cartographic feature attribution was assigned in compliance with the Coastal Cartographic Object Attribute Source Table (C-COAST). Selected cartographic features were further modified with additional descriptive information to refine general classification.

Cartographic features were tested to have a horizontal accuracy of 5.1 meters at the 95% confidence level. This predicted accuracy of well-defined points is based on a minimum of twenty (20) check points that were compared to an independent source of higher accuracy.

The following table provides information on aerial imagery used in the completion of this project:

Date	Time (UTC)	Roll Number	Photo Numbers	GSD (meters)	Tide Level*
9-26-05	17:29:00-18:52:00	05IC32	11886-12408	0.39	n/a
9-30-05	18:37:15-18:51:43	05IC34	12920-13021	0.39	n/a
10-06-05	14:52:08-15:49:54	05IC36	13932-14299	0.39	n/a

\* There is practically no periodic tide. The rise and fall of the water depends upon meteorological conditions.

## **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 2006. The review process included analysis of aerotriangulation results and assessment of the identification and attribution of cartographic features within the DCFF according to image analysis and criteria defined in C-COAST. The quality control process concluded with an inspection of topological connectivity within the DCFF using ArcGIS 9.1 software. All project data was evaluated for compliance to CMP requirements.

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

11343, Sabine and Neches Rivers, TX, 1:40,000 scale, 37<sup>th</sup> edition

## **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 GPS-IMU Processing Report
- Hardcopy of the Accuracy Assessment
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot of GC10591 file contents, attached to PCR

### **Remote Sensing Division Electronic Data Library**

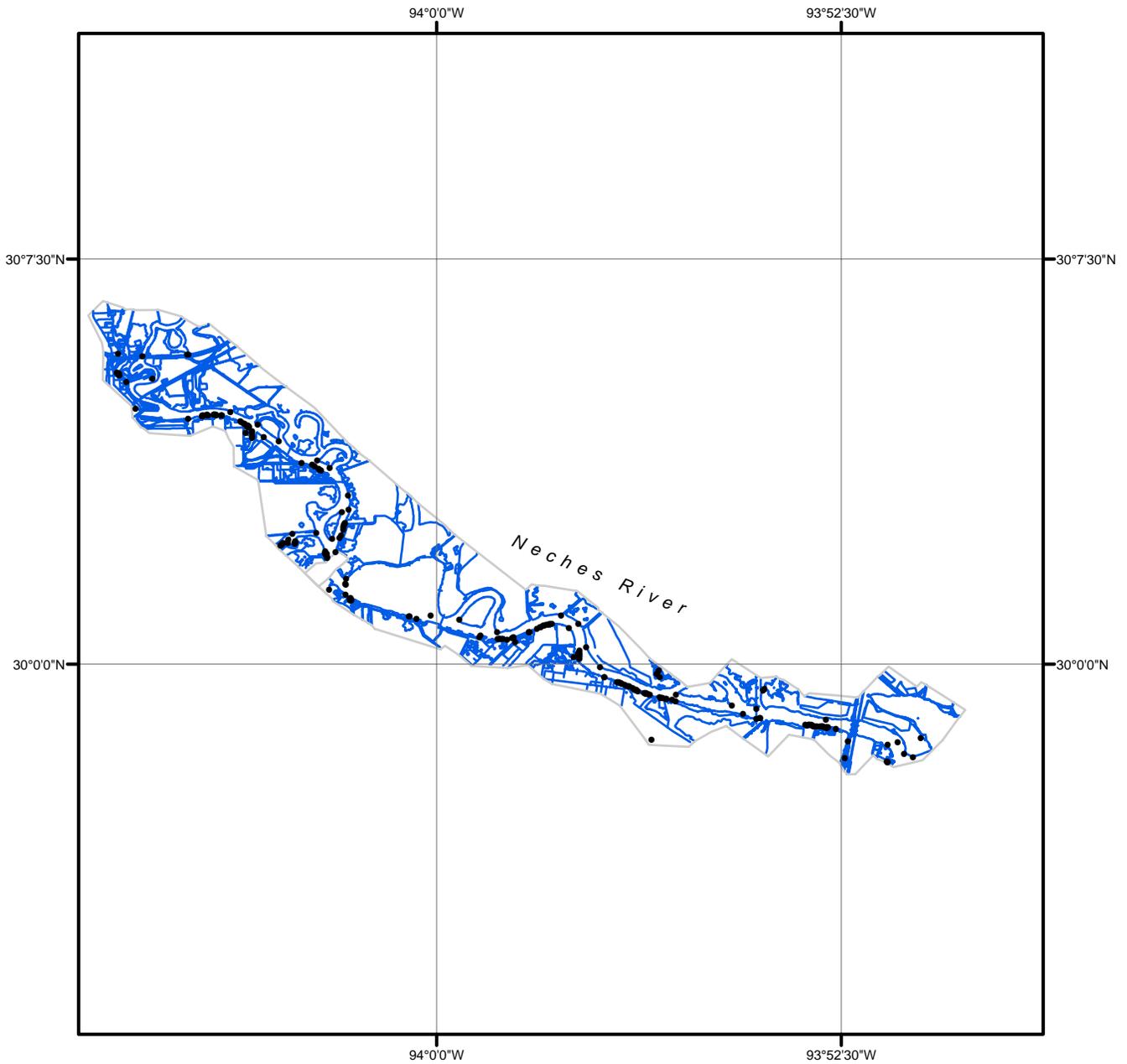
- Project Database
- Digital copy of DCFF GC10591 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- Chart Evaluation File in shapefile format

### **NOAA Shoreline Data Explorer**

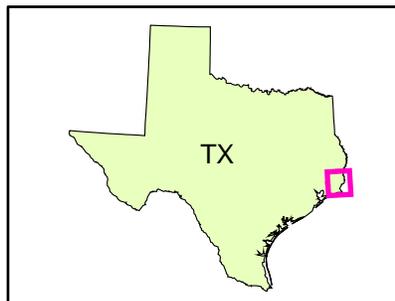
- DCFF for GC10591
- Metadata file for GC10591
- Digital copy of the PCR in Adobe PDF format

## **End of Report**

# PORT OF BEAUMONT TEXAS



Overview



TX0501B

GC10591