

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

## ***PROJECT LA0801A***

### **Bayou Goreau to Whiskey Pass, Caillou Bay, Louisiana**

#### **Introduction**

NOAA Coastal Mapping Program (CMP) Project LA0801A provides a highly accurate database of new digital shoreline data for a portion of Caillou Bay extending from Bayou Goreau to Whiskey Pass. Project LA0801A is a subproject of the larger project LA0801, which covers Caillou Bay and includes the barrier islands of Terrebonne and Timbalier Bays.

Successful completion of this project resulted in a densification of the National Spatial Reference System (NSRS), a set of controlled metric-quality aerial photographs, and digital feature data of the coastal zone which complements the Nautical Charting Program (NCP) as well as geographic information systems (GIS) for a variety of coastal zone management applications.

The project database consists of information measured and extracted from aerial photographs and metadata related to photogrammetric compilation. Base mapping was conducted in a digital environment using stereo softcopy photogrammetry and associated cartographic practices.

#### **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. The instructions discussed the project's purpose, geographic area of coverage, scope and priority; photographic requirements; flight line priority; Global Positioning System (GPS) and Inertial Measurement Unit (IMU) data collection procedures and guidelines for both kinematic and static surveys; data recording and handling instructions; and contact and communication information. RB created a Project Layout Diagram, flight maps and input files for the aircraft's flight management system.

#### **Field Operations**

The field operations consisted of the collection of static and kinematic GPS/IMU data and the acquisition of film based and digital photographs. The photographic mission operations were conducted on December 1<sup>st</sup>, 2007 and March 05, 2008 with the NOAA Cessna Citation II (N52RF) aircraft. Ten strips of digital natural color photographs were acquired through the use of an Applanix Digital Sensor System (DSS) digital camera with an approximate ground sample distance of 39 cm. Three strips of black and white infrared photographs were acquired through the use of a Wild RC-30 camera with the

NOS “A” lens cone at the nominal scale of 1:30,000. A base station was positioned atop a PKNAIL and the geodetic position was derived via the National Geodetic Survey’s (NGS) Online Positioning Users Service (OPUS). Airborne kinematic and base station static GPS data collections were conducted in accordance with the GPS Controlled Photogrammetry Field Operations Manual. Twelve ground checkpoints were surveyed at well-defined, photo identifiable locations evenly distributed throughout the project area to check the accuracy of the aerotriangulated imagery.

## **GPS Data Reduction**

Global Positioning System (GPS) and Inertial Measurement Unit (IMU) data was collected and processed to provide precise positions and orientations of camera centers for application as photogrammetric control in the aerotriangulation phase of project completion. The static GPS base station data was processed in March and June 2008 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 for the color imagery was processed using Applanix POSPAC (ver. 4.4) software in June 2008. An Airborne Positioning and Orientation Report (APOR) was written and is on file with other project data within the RSD Applications Branch (AB) Project Archive.

## **Aerotriangulation**

Routine softcopy aerotriangulation methods were applied to establish the network of precise camera positions and other control for mapping, and to provide model parameters and orientation elements required for digital compilation. This work was initiated by Aerometric Inc. personnel in August of 2009 utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated peripheral devices. The color photographs and black and white infrared photographs were measured and adjusted as single block using Z/I Imaging’s Image Station Automatic Triangulation (ISAT) software. 112 of the 471 images were completely or mostly over water, and could not be used in the aerotriangulation because of insufficient image detail. Upon successful completion of the aerotriangulation process, the ISAT software provided the RMS of the standard deviations of the residuals for each aerotriangulated ground point, which were then used to compute a predicted horizontal circular error of 0.6 meters based on a 95% confidence level. An Aerotriangulation Report was written and is on file with other project data within the RSD Project Archive.

The project database consists of project parameters and options, camera calibration data, interior orientation parameters, ground control parameters, adjusted exterior orientation parameters, and positional listing of all measured points. Positional data is referenced to the North American Datum of 1983 (NAD 83).

## **Compilation**

The data compilation phase of this project was initiated by Aerometric Inc. in September of 2009. Digital mapping was performed using DAT/EM Summit Evolution digital photogrammetric workstations with DAT/EM Capture for MicroStation software.

Feature identification and attribution within the Geographic Cell (GC) were based on image analysis of the 1:30,000 scale photographs and the digital imagery, as well as information extracted from the appropriate NOAA nautical charts, US Coast Guard Light List 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 LA0801A were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.2 meters at the 95% confidence level. The predicted accuracy of compiled, well defined points is derived by doubling the circular error derived from aerotriangulation statistics.

The following table provides information on images used in the project completion:

Date	Time (UTC)	Roll Number	Photo Numbers	GSD or Scale	Tide Level*
12-01-07	18:30 – 18:30	07NC01	0043 – 0044	0.33 m	0.0
12-01-07	18:37 – 18:40	07NC01	0045 – 0077	0.33 m	0.1
12-01-07	18:46 – 18:50	07NC01	0078 – 0110	0.33 m	0.1
12-01-07	18:55 – 18:57	07NC01	0111 – 0132	0.33 m	0.1
12-01-07	19:03 – 19:04	07NC01	0133 – 0144	0.33 m	0.1
12-01-07	19:12 – 19:13	07NC01	0161 – 0177	0.33 m	0.1
12-01-07	19:29 – 19:31	07NC01	0199 – 0220	0.33 m	0.1
12-01-07	19:36 – 19:39	07NC01	0221 – 0242	0.33 m	0.1
12-01-07	19:44 – 19:44	07NC01	0243 – 0251	0.33 m	0.1
03-05-08	15:56 – 15:59	08AR01	0176 – 0185	1:30,000	0.0
03-05-08	16:07 – 16:10	08AR01	0186 – 0194	1:30,000	0.0
03-05-08	16:16 – 16:20	08AR01	0197 – 0212	1:30,000	0.0
03-05-08	17:52 – 17:54	08NC95	28979 – 28990	0.33 m	0.0

\* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS gauges at Port Fourchon and Grand Isle with offsets applied to substations in the project area. The elevation of MHW at Port Fourchon is equal to 0.37 meters above MLLW. The elevation of MHW at Grand Isle is equal to 0.32 meters above MLLW.

## Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by senior members of Aerometric Inc. Final QC review was completed in November of 2009, including analysis of aerotriangulation 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 9.3 software. All project data was evaluated for compliance to CMP requirements.

Comparisons of the largest scale NOAA nautical charts with natural color digital images, black and white infrared photographs and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical charts were used in the comparison process:

- 11356, Isles Dernieres to Point Aufer, LA, 1:80,000 scale, 38<sup>th</sup> edition
- 11357, Timbalier and Terrebonne Bays, LA, 1:80,000 scale, 40<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 Airborne Positioning and Orientation Report (APOR)
- Hardcopy of the Aerotriangulation Report
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot of GC10789 file contents, attached to PCR

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

- Project database
- GC10789 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

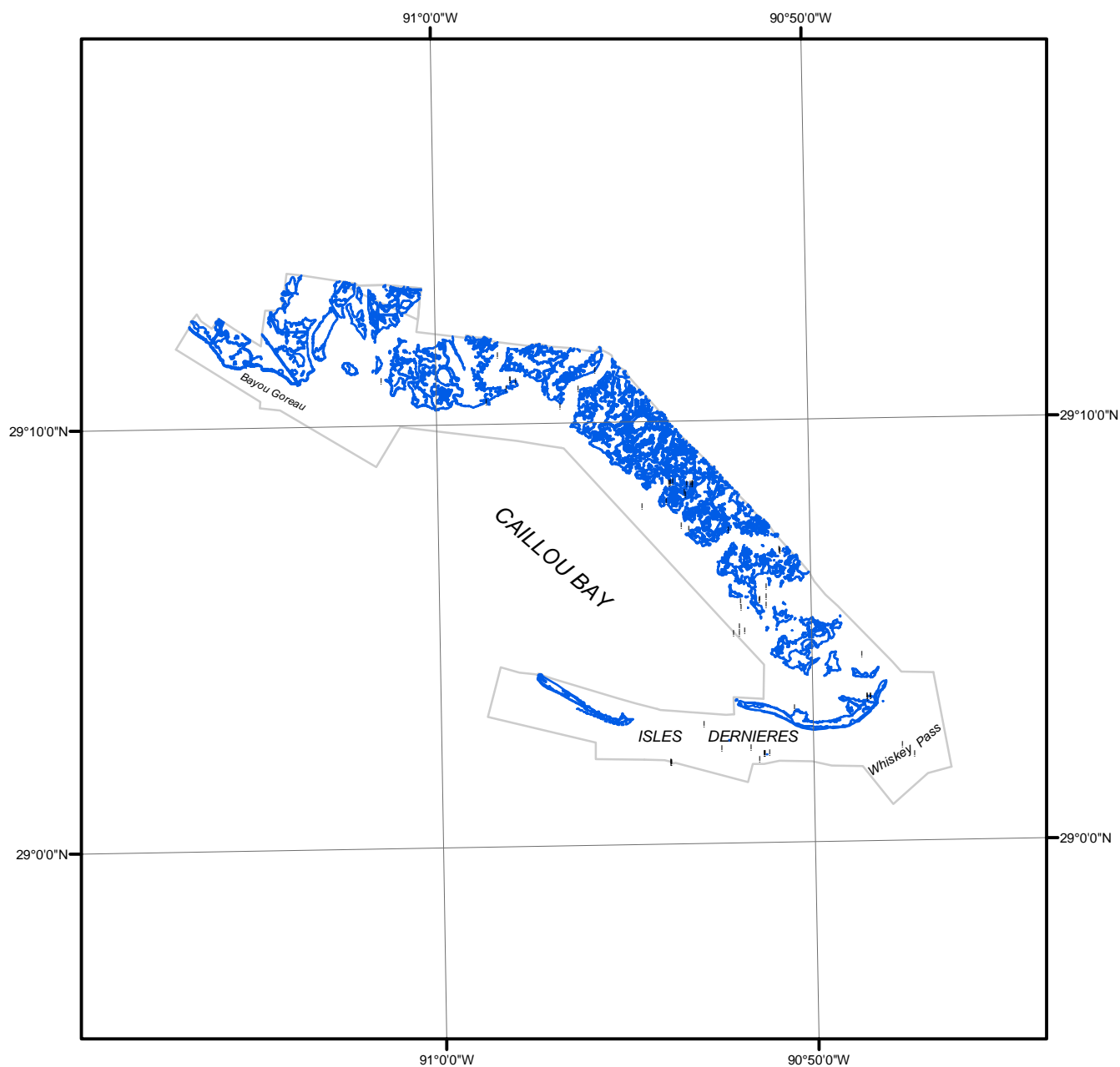
### **NOAA Shoreline Data Explorer**

- GC10789 in shapefile format
- Metadata file for GC10789
- Digital copy of the PCR in Adobe PDF format

## **End of Report**

# BAYOU GOREAU TO WHISKEY PASS, CAILLOU BAY

## LOUISIANA



Overview



LA0801A

GC10789