

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

## ***PROJECT LA1502F-CM-T***

### ***Houma Navigation Canal to Bayou Terrebonne, Louisiana***

#### **Introduction**

NOAA Coastal Mapping Program (CMP) Project LA1502F-CM-T provides a new database of accurate digital shoreline for various waterways northwest of Terrebonne Bay, extending from Houma Navigation Canal eastward to Bayou Terrebonne, in Louisiana. Project LA1502F-CM-T is a sub-project of a larger project, LA1502-CM-T, which includes the majority of Terrebonne and Timbalier Bays as well as several key bayous extending northwards toward Houma, Louisiana. The Geographic Cell (GC) can be used to complement the Nautical Charting Program (NCP) as well as geographic information systems (GIS) for a variety of coastal zone management applications.

#### **Project Design**

Project LA1502-CM-T was designed per a request from the Office of Coast Survey, NOAA, for general update of charted shorelines in the vicinity of Terrebonne and Timbalier Bays, Louisiana. Based on an analysis of project requirements and results of a source data search, it was determined that CMP procedures for multiple source projects would apply for this project. Available source data deemed adequate for successful completion of this project included sources acquired from November 2015 to January 2016. Due to the large extent of complex marsh shorelines in the requested area and general lack of significant cultural features, various automated feature extraction techniques were used in order to speed the compilation of the shoreline.

#### **Field Operations**

Routine CMP field operations did not apply for this project based on the origin of the project source data.

#### **Aerotriangulation**

The aerotriangulation (AT) task was initiated by Remote Sensing Division (RSD) personnel in April 2016 utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated peripheral devices. The image files were imported into SOCET SET (SS, version 5.6) using the DataThruWay (version 5.6) software extension. The import process converted the stored compressed files to the National Imagery Transmission Format (NITF version 2.1) with headers and metadata. AT procedures were accomplished using the Multi-Sensor Triangulation (MST) module of SS. The Automatic Point Measurement algorithm within MST was used to collect tie points, and a simultaneous solve adjustment was then performed. The predicted horizontal circular error, using all measured image points, was computed to be 5.8 meters at the 95% confidence level. Positional data for this project is referenced to the North American Datum of 1983 (NAD 83).

## **Ortho-Image**

Using the image positions and orientations derived from the AT process, and the Mosaic module from within SS, Ortho-images covering the area of project LA1502F-CM-T were created in May of 2016. A constant elevation of zero meters (as opposed to an elevation model) was utilized to rectify the data.

## **Compilation**

The digital compilation phase of this project was initiated by RSD in May 2016, and entailed a multi-step approach utilizing both automated and manual compilation methods, as reported below.

### ***Automated Mapping Method***

All Shoreline class features present in the database were compiled using this method. The automated feature extraction (AFE) method was performed using the orthoimages, discussed above, in combination with an object-based image analysis (OBIA) approach from within the ENVI Feature Extraction (Fx) software. The Fx software allows the user to interactively create and classify objects, based on image rules that meet in-situ criteria, and then to run a raster-to-vector algorithm to convert the classified image to an ArcGIS polygon shapefile. Upon completion of the AFE process, the polygon shapefile was imported into ArcGIS and 1) aggregated to merge polygons separated by less than the standard minimum distance, 2) smoothed and simplified, 3) converted to a polyline format, and 4) edited to create attribute fields compatible with the RSD interim shapefile format. The interim shapefile was then imported into SS and a Feature Data Base (FDB) was created. The FDB, consisting solely of Shoreline features, was then reviewed and edited within the SS Feature Extraction module, by the original compiler, using stereo-models derived from the AT solution.

### ***Manual Mapping Method***

All non-Shoreline class features present in the database (i.e., Alongshore Features, Obstructions, etc.) were compiled using this method. The manual data compilation phase of this project utilized the *traditional* RSD digital mapping approach of stereoscopic interpretation integrated with “heads-up” digitizing from within the SS Feature Extraction module. The FDB created in the automated mapping method, as described above, was subsequently populated with features derived from this manual method. This served to integrate all coastal features within a single FDB.

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.

Cartographic features were compiled to meet a horizontal accuracy of 8.8 meters at the 95% confidence level. Tidal information for this project was obtained from the NOS reference station Grand Isle, LA (#8761724), with offsets applied to substations throughout the project area. The difference between MHW and MLLW at Grand Isle is 0.3 meters, and source imagery for the entire project area occurred when the stage of tide was between 0.2 and 0.4 meters above MLLW.

## **Quality Control / Final Review**

Quality control tasks were conducted during all phases of project completion by a senior member of the Applications Branch of RSD. The final QC review was completed in April 2018. The review process included analysis of the AT and image ortho-rectification 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 10.5 software. All project data was evaluated for compliance to CMP requirements.

Comparisons of the largest scale NOAA nautical charts with source imagery and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical charts were used in the comparison process:

- Chart 11352, ICW, New Orleans to Calcasieu River, 1:175,000 scale, 42<sup>nd</sup> Ed., Jul. 2012
- Chart 11355, ICW, Catahoula Bay to Wax Lake Outlet, 1:40,000 scale, 31<sup>st</sup> Ed., Jul. 2016
- Chart 11357, Timbalier and Terrebonne Bays, 1:80,000 scale, 43<sup>rd</sup> Ed., May 2014

## **End Products and Deliverables**

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

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

- Project database
- GC11272 in shapefile format
- Project Completion Report (PCR)
- CEF in shapefile format

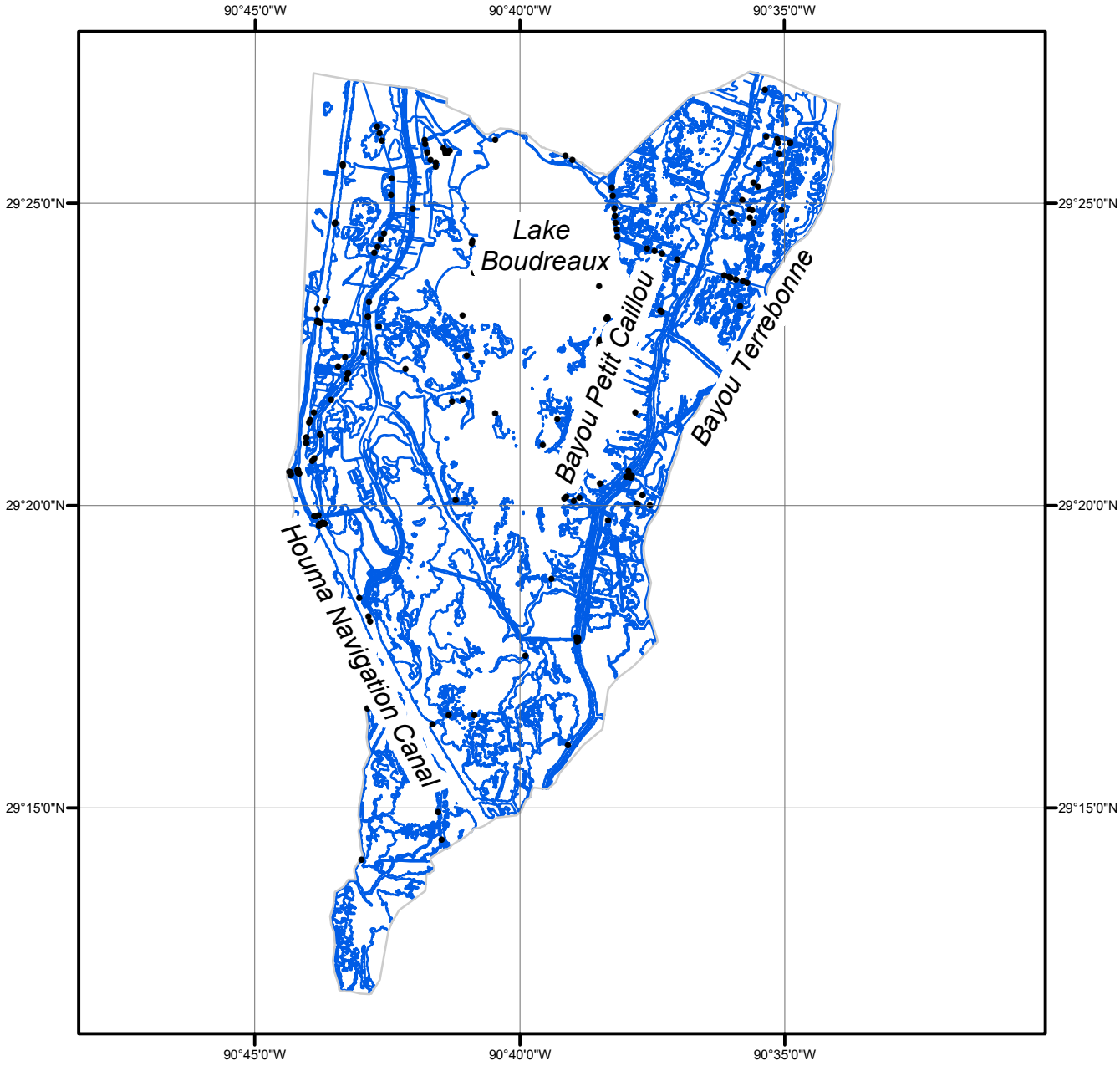
### **NOAA Shoreline Data Explorer**

- GC11272 in shapefile format
- Metadata file for GC11272
- PCR

## **End of Report**

# HOUMA NAVIGATION CANAL TO BAYOU TERREBONNE

## LOUISIANA



Overview



LA1502F-CM-T

GC11272