NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT MS2302A-CM-N

Dauphin Island, Alabama

Introduction

Coastal Mapping Program (CMP) Project MS2302A-CM-N provides highly accurate digital shoreline data for Dauphin Island, Alabama. This project is a subproject of a larger project, MS2302-CM-N, which covers Mississippi Sound from the Chandeleur Islands in Louisiana to Dauphin Island. 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

Photographic mission instructions for MS2302-CM-N were formulated by the Requirements Branch (RB) of the Remote Sensing Division (RSD) following the guidelines of the Photo Mission Standard Operating Procedures. The instructions detailed 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

The field operations for MS2302-CM-N consisted of the collection of kinematic GPS data and Inertial Measurement Unit (IMU) data, and the acquisition of aerial imagery. A total of 29 flight lines of imagery were acquired from June through September 2023 with the NOAA King Air aircraft (N68RF). Both color (RGB) and near-infrared (NIR) imagery acquired concurrently using an Applanix Digital Sensor System (DSS) dual camera. The imagery was collected in strict coordination with both the Mean High Water (MHW) and Mean Lower Low Water (MLLW) tide stages. All imagery was acquired at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.24 meters. A subset of three lines of images were used for subproject MS2302A-CM-N.

GPS Data Processing

The GPS/IMU data were processed by RSD personnel to yield precise camera positions and orientations for direct georeferencing (DG) of the imagery. The Airborne kinematic data for project MS2302-CM-N was processed in June and July 2023 using Applanix POSPac MMS (ver. 8.8) software, utilizing the IN-Fusion PP-RTX processing mode, which is an implementation of Trimble's *CenterPoint RTX* GNSS correction service. For further information refer to the Airborne Positioning and Orientation Reports (APOR) on file with other project data within the RSD Electronic Data Library.

The processed GPS/IMU data were used to derive precise exterior orientation (EO) values of the camera centers required for digital feature extraction. The predicted horizontal accuracy of the imagery was calculated using an 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 0.63 meters. NGS third order control was used to verify the horizontal integrity of the DG data. All stereo models were examined and found to have acceptable levels of parallax for mapping purposes

Compilation

Data compilation was accomplished by RSD Applications Branch (AB) personnel in December 2023. Digital feature data was compiled using stereo extraction capabilities of Esri's ArcGIS Pro software (ver. 3.2). 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 products 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 MS2302A-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.3 meters at the 95% confidence level. This predicted accuracy of compiled, well-defined points was derived by doubling the imagery accuracy computed from the EO-TPU tool. The following table provides information on the images used in the project completion:

Date	Time (UTC)	DSS Color Imagery		DSS Infrared Imagery		Tide Level*
		Roll	Images	Roll	Images	
6/25/2023	19:36 – 19:38	23VC33	61-010 / 94539 – 94561	23VR30	94539 – 94561	0.4 – 0.5 m
6/30/2023	16:01 – 16:07	23VC35	61-008 / 95600 – 95666	23VR32	95600 – 95666	0.4 – 0.5 m
6/30/2023	16:12 – 16:14	23VC35	61-009 / 95667 – 95689	23VR32	95667 – 95689	0.4 – 0.5 m
6/30/2023	22:39 – 22:45	23VC36	61-008 / 96737 – 96803	23VR33	96737 – 96803	0.0 m
7/1/2023	21:05 – 21:07	23VC38	61-009 / 97056 – 97078	23VR35	97056 – 97078	0.1 – 0.2 m
7/1/2023	21:11 – 21:13	23VC38	61-010 / 97079 – 97101	23VR35	97079 – 97101	0.1 m

* Tide levels are given in meters above MLLW and were calculated using the Pydro software tool with a TCARI grid referenced to verified water level observations from various NOS gauges in the vicinity of the project. The elevation of the MHW tidal datum in the project area ranges between 0.37 – 0.42 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a member of the Applications Branch. The final QC review was completed in February 2024. 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 (ver. 10.8.2) software. All project data was evaluated for compliance to CMP requirements.

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

- US5AL1DC, Mississippi Sound, 1st Ed., Aug. 2023
- US5AL1DB, Petit Bois Pass to Mississippi Sound, 1st Ed., Aug. 2023
- US5AL1CB, Gulf of Mexico to Petit Bois Pass, 1st Ed., Aug. 2023
- US5MOBBF, Gulf of Mexico, 1st Ed., May 2023
- US5MOBCF, Mobile Bay Approaches and Lower Half, 1st Ed., May 2023
- US5MOBCE, Gulf of Mexico, Dauphin Island Bay, Mobile Bay, 1st Ed., May 2023
- US5MOBCD, Gulf Intracoastal Waterway to Passage Aux Herons, 1st Ed., May 2023
- US5MOBBE, Gulf of Mexico, 1st Ed., May 2023

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
- Airborne Positioning and Orientation Reports
- GC11992 in shapefile format
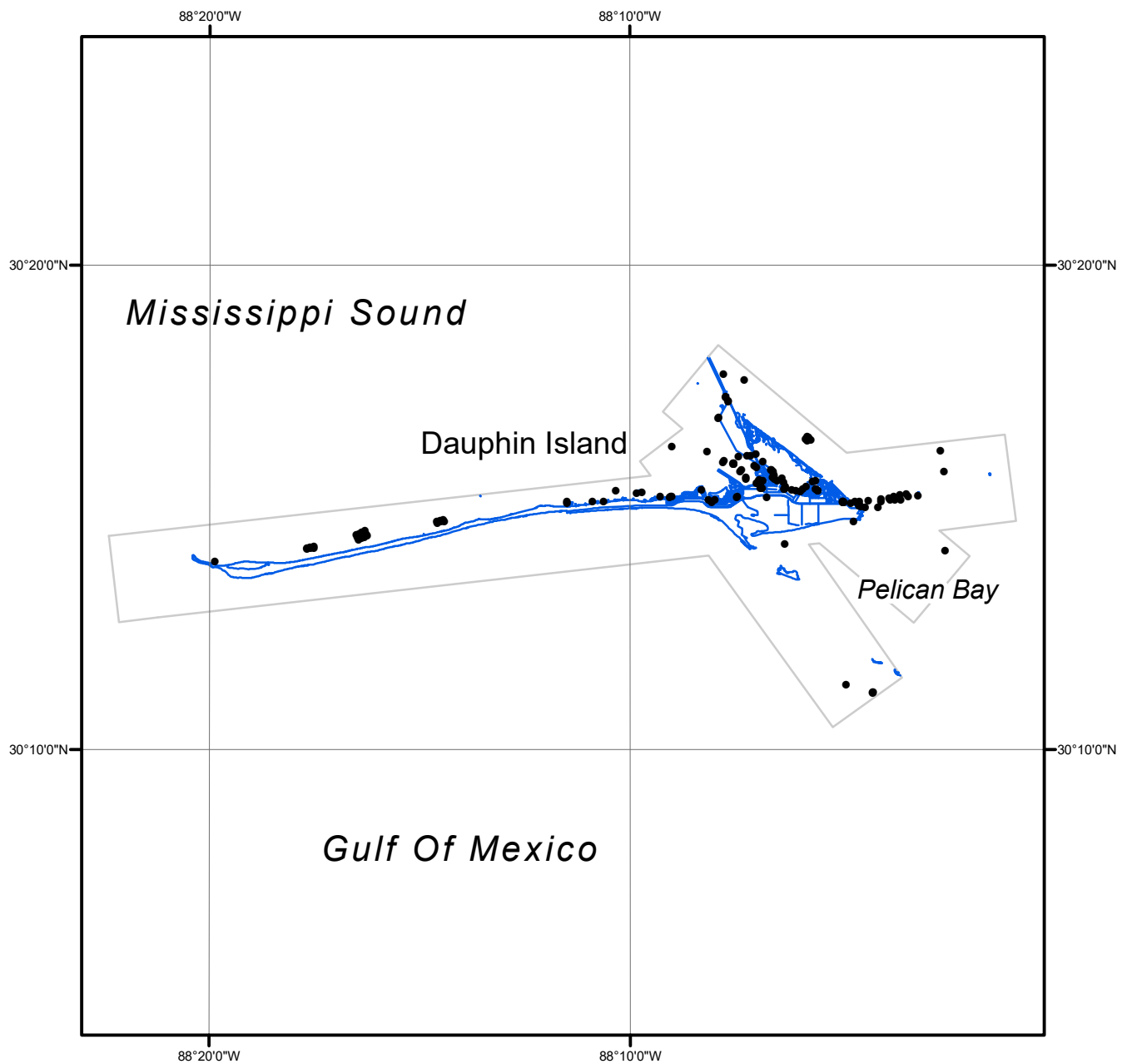- Project Completion Report (PCR)
- CEF in shapefile format

NOAA Shoreline Data Explorer

- GC11992 in shapefile format
- Metadata file for GC11992
- PCR in Adobe PDF format

End of Report

DAUPHIN ISLAND

ALABAMA

88°20'0"W   88°10'0"W

30°20'0"N   30°20'0"N

Mississippi Sound

Dauphin Island

Pelican Bay

30°10'0"N   30°10'0"N

Gulf Of Mexico

88°20'0"W   88°10'0"W

Overview

MS2302A-CM-N

AL

GC11992