NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT ME1101A

Monhegan Island, Maine

Introduction

Coastal Mapping Program (CMP) Project ME1101A provides highly accurate digital shoreline data for Monhegan Island, Maine, including Monhegan Harbor. ME1101A is a subproject of a larger project, ME1101, which covers numerous small harbors along the coast of Maine. 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

The design of Project ME1101A was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD). RB formulated the photographic mission instructions for this project following the guidelines of the Photo Mission Standard Operating Procedure. The instructions discussed the project's purpose, geographic area of coverage, scope and priority; photographic requirements; flight line priority; Global Positioning System (GPS) 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 Global Positioning System (GPS) data and Inertial Measurement Unit (IMU) data and the acquisition of aerial imagery. The photographic mission operations were conducted on June 20, 2011 with the NOAA King Air (N68RF) aircraft. Two strips of RGB (color) digital images were acquired with an Applanix Digital Sensor System (DSS) 439 aerial camera at a nominal altitude of 10,000 feet, resulting in an approximate ground sample distance (GSD) of 0.35 meters.

GPS Data Reduction

The GPS/IMU data were processed by RSD personnel to yield precise camera positions in order to provide a control network necessary for aerotriangulation. The base station's geodetic position was derived using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. The kinematic GPS data was processed using Applanix POSPAC (ver. 5.4.0) software in December 12, 2012. For further information refer to the Airborne Positioning and Orientation Reports (APOR) on file with other project data within the RSD Project Archive.

Aerotriangulation

Routine softcopy aerotriangulation methods were applied to establish a 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 performed by RSD personnel in October 2013 utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components, and other associated peripheral devices. The digital images were measured and adjusted as a single block using the SOCET GXP (version 4.1.0) suite of digital photogrammetric software. The Triangulation module of SOCET GXP was used to perform point measurements and aerotriangulation adjustment, and evaluate the accuracy of the adjustment. Upon successful completion of this process, the triangulation software provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.5 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. Positional data is referenced to the North American Datum of 1983 (NAD83).

Compilation

The data compilation phase of this project was accomplished by a member of AB in January 2014. Digital feature data was compiled using SOCET GXP (v4.1.0) software. 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.

Spatial data accuracies for Project ME1101A were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.1 meters at the 95% confidence level. This predicted accuracy of compiled well-defined points is derived by doubling the circular error calculated from the aerotriangulation statistics.

The following table provides information on the imagery used to complete this project:

Date	Time (UTC)	Roll Number	Photo Numbers	GSD (nominal)	Tide Level*
06-20-2011	15:28 – 15:29	11NC55	18006 – 18009	0.35 m	1.0 m
06-20-2011	15:34 – 15:35	11NC55	18010 – 18014	0.35 m	1.0 m

* Tide levels are given in meters above MLLW and were calculated using verified water level observations at the time of photography from the Portland, ME tide gauge, with offsets applied to the Monhegan Island sub-station. The elevation of the MHW tidal datum in the project area is approximately 2.8 meters above MLLW.

Quality Control / Final Review

The final review of the project was completed by a senior member of RSD in January 2014, and included 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 10.1 software. All project data was evaluated for compliance to CMP requirements.

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

13301, Muscongus Bay, ME, 1:40,000 scale, 21st Edition, August 6, 2011

End Products and Deliverables

The following specifies the location and identification of end 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 GC11023 file contents, attached to PCR

Remote Sensing Division Electronic Data Library

- Project database
- GC11023 in shapefile format
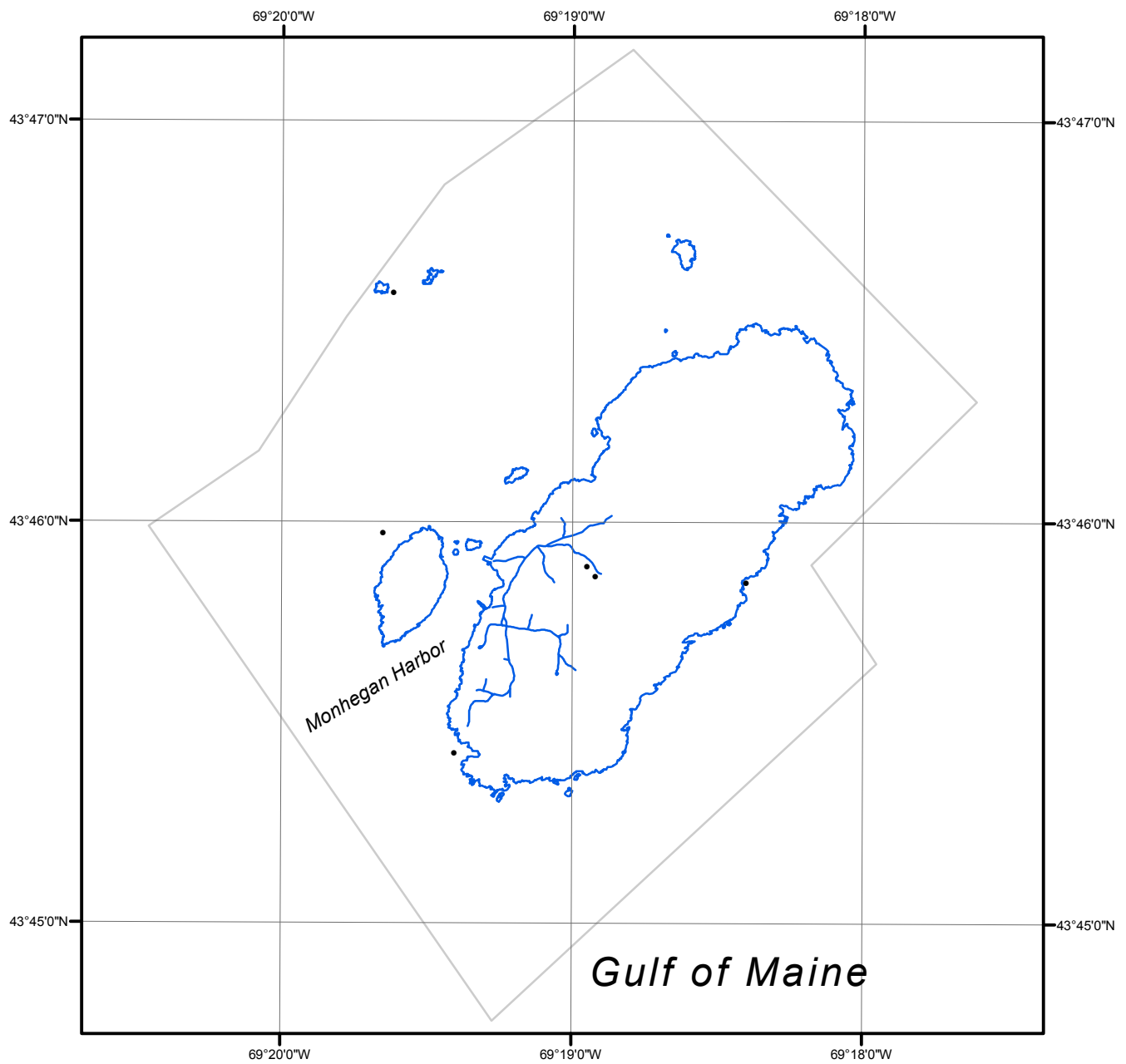- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

NOAA Shoreline Data Explorer

- GC11023 in shapefile format
- Metadata file for GC11023
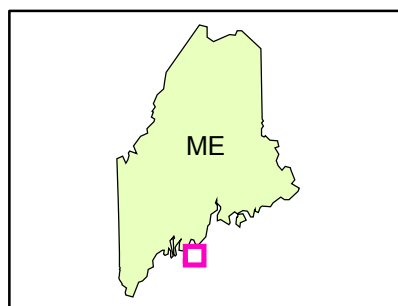- Digital copy of the PCR in Adobe PDF format

End of Report

MONHEGAN ISLAND

MAINE

69°20'0"W | 69°19'0"W | 69°18'0"W

43°47'0"N

43°46'0"N

Monhegan Harbor

43°45'0"N

Gulf of Maine

69°20'0"W | 69°19'0"W | 69°18'0"W

Overview

ME

ME1101A

GC11023