# NOAA COASTAL MAPPING PROGRAM
# PROJECT COMPLETION REPORT

## *PROJECT OH1601B-CS-N*

## *Port of Kelleys Island, Ohio*

## Introduction

Coastal Mapping Program (CMP) Project OH1601B-CS-N provides highly accurate digital shoreline data for key areas of change within the Port of Kelleys Island, Ohio. 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 OH1601B-CS-N was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for timely updates to the NOAA nautical chart suite within key U.S. ports. Project requirements were formulated as a result of analysis conducted within the Coast and Shoreline Change Analysis Program (CSCAP), in which NOAA nautical chart products are compared to contemporary high resolution imagery to ascertain the need for more current shoreline data. A Chart Evaluation File (CEF) was forwarded to the Applications Branch (AB) of RSD once the change analysis was complete. Refer to the CSCAP memorandum for Project OH1602-CS-T dated August 2nd, 2016 for details of the chart comparison process.

## Field Operations

The field operations consisted of the collection of static and kinematic GPS data and Inertial Measurement Unit (IMU) data, and the acquisition of digital aerial imagery. Aerial survey operations were conducted on August 24, 2016 with the NOAA King Air aircraft (N68RF). Project imagery included two flight lines of natural color and near-infrared (NIR) imagery acquired concurrently using an Applanix DSS 580/560 dual lens camera. All imagery was acquired at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 1.15 feet (0.35 meters). The NIR imagery was not used for this project.

## 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 MMS (ver. 7.1) in August 2016. For further information refer to the Airborne Positioning and Orientation Report (APOR) on file with other project data within the RSD Electronic Data Library.

## Aerotriangulation

The aerotriangulation (AT) phase of project completion was performed in February 2017. Routine softcopy AT 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 accomplished by a member of AB 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 Multi-Sensor Triangulation (MST) module of BAE Systems SOCET SET (version 5.6) software. 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 0.54 meters based on a 95% confidence level. An AT Report was written and is on file with other project data within the RSD Electronic Data Library. 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 RSD in February 2017. Digital feature data was compiled using SOCET SET (version 5.6.0) software. Feature identification and attribution within the GC were based on image analysis of the digital photographs and information extracted from the appropriate NOAA nautical charts 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 OH1601B-CS-N 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. These predicted accuracies of well-defined points measured during the compilation phase were derived by doubling the circular errors 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 | Lake Level* |
|---|---|---|---|---|
| 8-24-2016 | 14:49 – 14:51 | 16VC72 | 17758 - 17767 | 174.4 m |
| 8-24-2016 | 14:57 – 14:59 | 16VC72 | 17768 - 17778 | 174.4 m |

\* Lake water levels are given in meters above IGLD 1985 and are based on verified observations at the NOS water level station in Marblehead, OH. The Low Water Datum (LWD) for the portion of Lake Erie covered by this project is 173.5 meters above IGLD 1985.

## Quality Control / Final Review

The final review of the project was completed by a member of RSD in February 2017 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 10.3.1 software. All project data was evaluated for compliance to CMP requirements.

## 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

- CSCAP evaluation memorandum
- Project database
- Project Completion Report (PCR)
- GC11303 in shapefile format
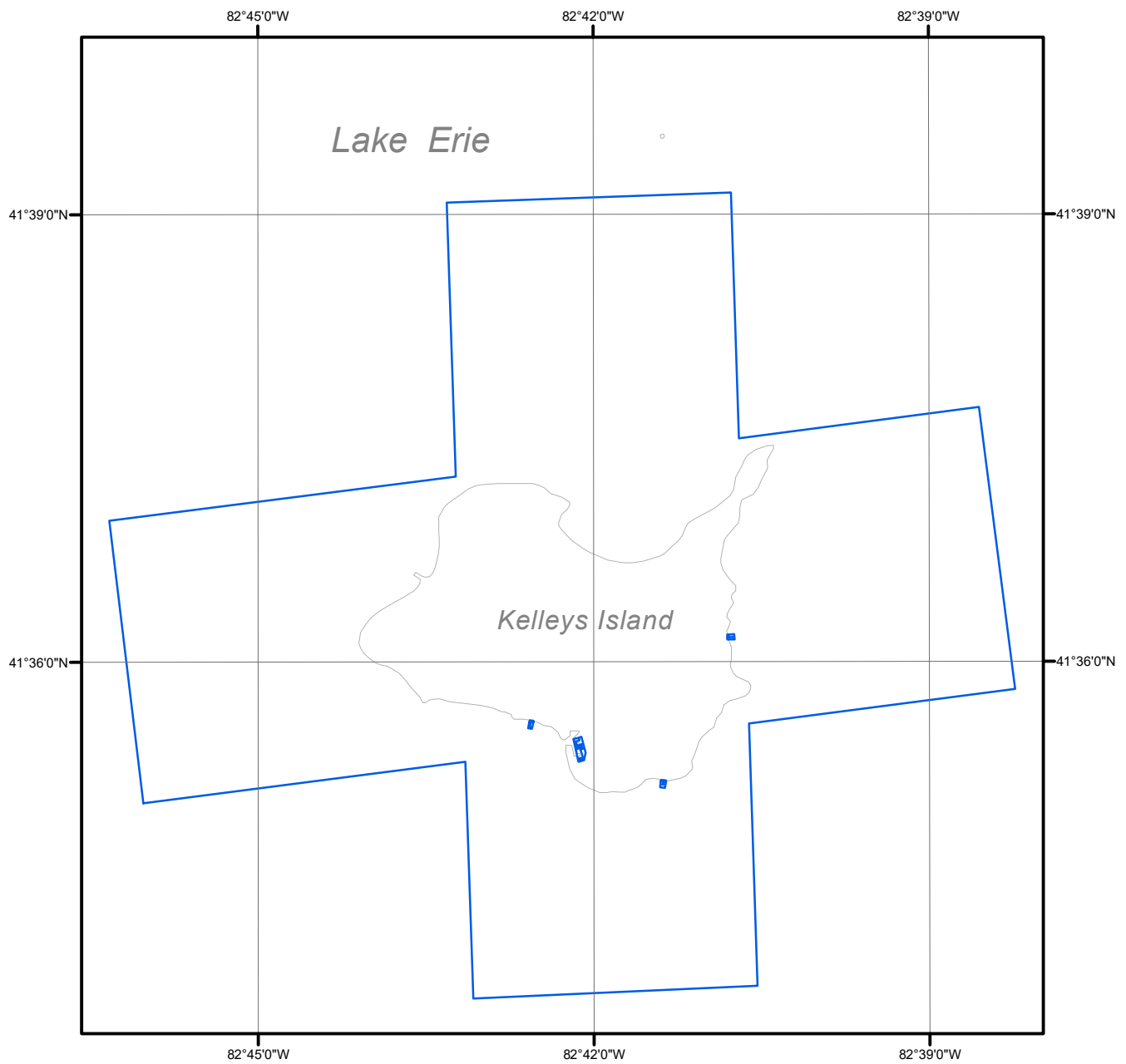- Chart Evaluation File in shapefile format

### NOAA Shoreline Data Explorer

- GC11303 in shapefile format
- Metadata file for GC11303
- Digital copy of the PCR

## End of Report

# PORT OF KELLEYS ISLAND

# OHIO

82°45'0"W          82°42'0"W          82°39'0"W

*Lake  Erie*

41°39'0"N

41°36'0"N

*Kelleys Island*

82°45'0"W          82°42'0"W          82°39'0"W

Overview

OH

OH1601B-CS-N

GC11303