NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT WA0801

Port of Anacortes, Washington

Introduction

Coastal Mapping Program (CMP) Project WA0801 provides highly accurate digital shoreline data for the Port of Anacortes, including key areas of change within Guemes Channel & Fidalgo Bay, Washington. 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 WA0801 was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for updates to the NOAA Electronic Navigational Chart (ENC) series. 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 in order to ascertain the need for more current shoreline data. A Chart Evaluation File (CEF) was created and forwarded to the Applications Branch (AB) of RSD once a change analysis was completed. Refer to the RB Memorandum of December 23, 2008, "Results of CSCAP Change Analysis for Anacortes, Washington (WA0801)" for details regarding the chart comparison process.

Field Operations

The field operations consisted of the collection of 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 May 15, 2008 with the NOAA DeHavilland Twin Otter (DHC-6) aircraft. Five strips of natural color digital images were acquired with an approximate ground sample distance (GSD) of 0.34 meters through use of an Applanix Digital Sensor System (DSS-439) aerial camera.

No base station was established for field operations. Airborne kinematic GPS and IMU data was collected to determine precise camera positions and orientations.

GPS Data Reduction

GPS data were processed by RSD personnel to yield precise camera positions in order to provide a control network necessary for aerotriangulation. One UNAVCO station (Blyn Mountain or Blyn1360) was processed using the NGS Online Processing User Service (OPUS) software to compute fixed baseline solutions for this station so that it could be used as a reference station during GPS processing. The airborne kinematic data was processed using Applanix POSPAC (ver. 4.4) software in November 2010.

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 February 2011 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) software module of BAE Systems SOCET SET (version 5.5.0) photogrammetric suite. Upon successful completion of this process, the MST software provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.8 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, adjusted exterior orientation parameters, and positional listing of all measured points. 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 February 2011. Digital feature data was compiled using the Feature Extraction module of BAE's SOCET SET 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. Selected features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for Project WA0801 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.6 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*
05-15-2008	22:43-22:44	08NC83	17676 - 17686	0.34 m.	1.6 m.
05-15-2008	22:52-22:53	08NC83	17687 - 17697	0.34 m.	1.6
05-15-2008	23:02-23:04	08NC83	17698 - 17710	0.34 m.	1.6
05-15-2008	23:09-23:11	08NC83	17711 - 17723	0.34 m.	1.6
05-15-2008	23:15-23:17	08NC83	17724 - 17736	0.34 m.	1.6

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS gauge at Port Townsend, with offsets applied to the Anacortes sub-station on Guemes Channel. The elevation of MHW at the Anacortes sub-station is 2.3 meters above MLLW.

Quality Control / Final Review

The final review of the project was completed by a senior member of RSD in February 2011, 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 9.3.1 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:

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 GC10866 file contents, attached to PCR

Remote Sensing Division Electronic Data Library

- Project database
- GC10866 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

NOAA Shoreline Data Explorer

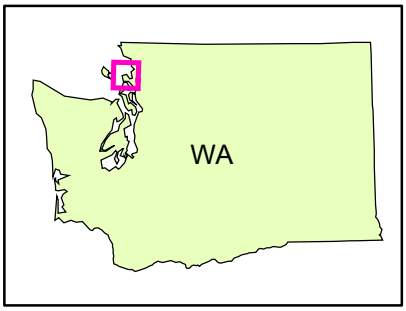
- GC10866 in shapefile format
- Metadata file for GC10866
- Digital copy of the PCR in Adobe PDF format

End of Report

PORT OF ANACORTES

WASHINGTON

Overview



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