

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT WA1502-CS-N

Port of Anacortes, Washington

Introduction

Coastal Mapping Program (CMP) Project WA1502-CS-N provides highly accurate digital shoreline data for key areas of change within the Port of Anacortes, 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 WA1502-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 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 created and forwarded to the Applications Branch (AB) of RSD once a change analysis was completed. Refer to the RB CSCAP memorandum of July 5, 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 May 6, 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 dual camera system. All imagery was acquired at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.33 meters. Although imagery was not acquired in strict coordination with local tides, the goal was to collect all imagery below Mean High Water (MHW). 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 May 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

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 AB personnel in February 2017 utilizing a photogrammetric workstation with the SOCET SET (version 5.6) suite of photogrammetric software. The digital images were measured and adjusted as a single block using the Multi-Sensor Triangulation (MST) module of SOCET SET. 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 0.85 meters based on a 95% confidence level. An Aerotriangulation 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 RSD AB personnel in February 2017. Digital mapping was performed using the Feature Extraction software module of SOCET SET. 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 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 WA1502-CS-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.7 meters at the 95% confidence level. This predicted accuracy of well-defined points measured during the compilation phase was 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 #	Strip / Photo #s	Tide Level*
5-6-2016	18:17 – 18:18	16VC54	53-001 / 12436 - 12442	0.3 m
5-6-2016	18:23 – 18:24	16VC54	53-002 / 12443 - 12451	0.3 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 at the time of photography from various NOS gauges in the vicinity of the project. The elevation of the MHW tidal datum in the project area is equal to 2.21 m above MLLW.

Quality Control / Final Review

The final review of the project was completed by a senior member of RSD in March 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 10.4.1 software. All project data was evaluated for compliance to CMP requirements.

End Products and Deliverables

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

Remote Sensing Division Electronic Data Library

- CSCAP evaluation memorandum
- Aerotriangulation Report
- Project database
- Project Completion Report (PCR)
- GC11296 in shapefile format
- Chart Evaluation File in shapefile format

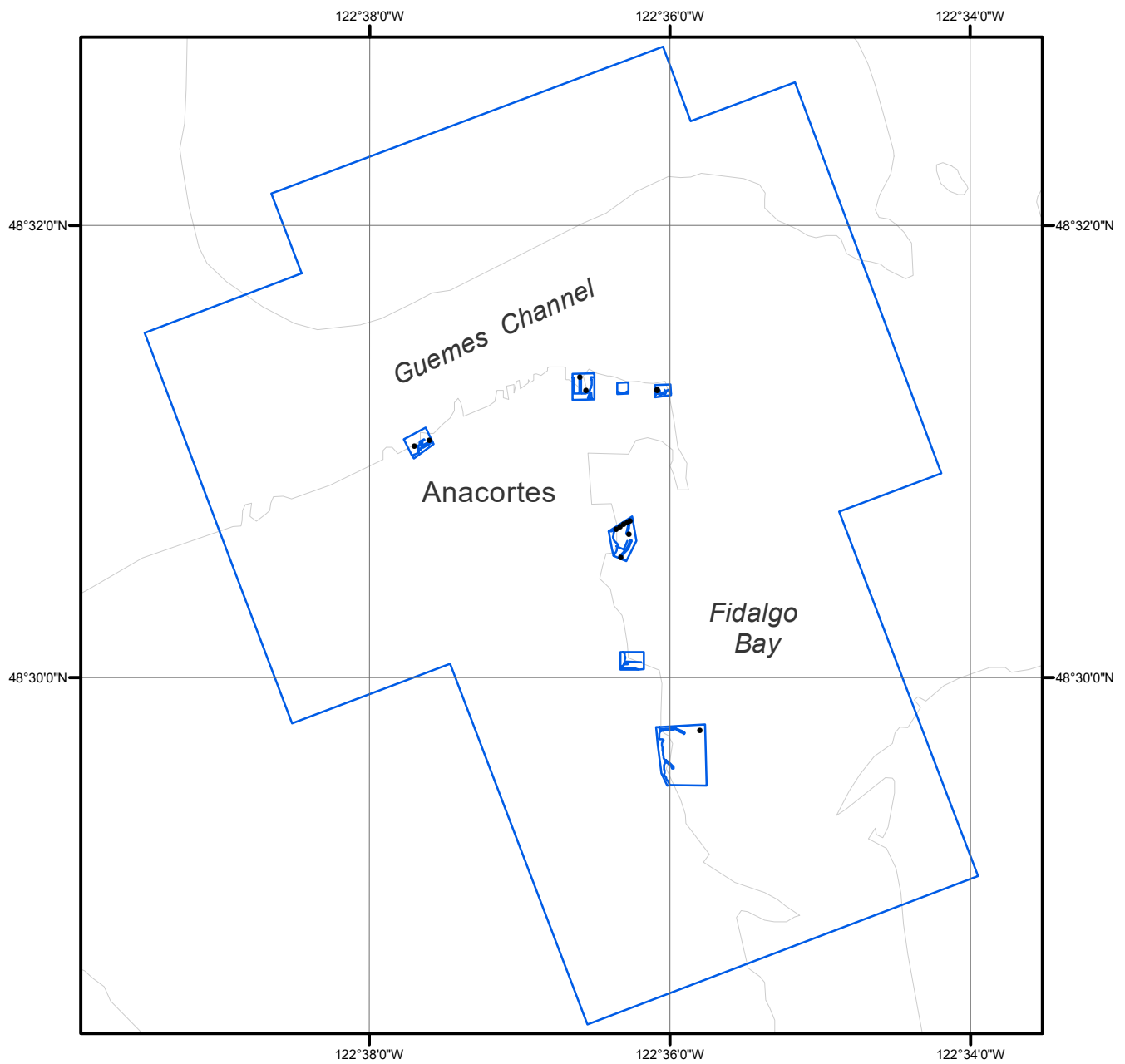
NOAA Shoreline Data Explorer

- GC11296 in shapefile format
- Metadata file for GC11296
- Digital copy of the PCR

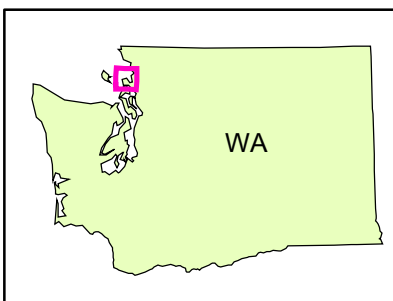
End of Report

PORT OF ANACORTES

WASHINGTON



Overview



WA1502-CS-N

GC11296