

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT WA1002A-CM-N

Southeast Whidbey Island, Langley to Glendale, Washington

Introduction

NOAA Coastal Mapping Program (CMP) Project WA1002A-CM-N provides a highly accurate database of new digital shoreline data for the southeastern portion of Whidbey Island extending from Langley southward to Glendale. This project is a subproject of a larger acquisition project, WA1002-CM-N, which includes Whidbey Island in its entirety. 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 Requirements Branch (RB) of the Remote Sensing Division (RSD) formulated the photographic mission instructions for WA1002-CM-N 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 for WA1002-CM-N consisted of the collection of static and kinematic GPS data and the acquisition of digital aerial imagery. Aerial survey operations were conducted with the NOAA King Air (N68RF) aircraft from May to July 2014. A total of 26 flight lines of aerial imagery were acquired in coordination with both Mean High Water (MHW) and Mean Lower Low Water (MLLW) tide stages. In each flight both natural color (RGB) and black & white near-infrared (NIR) imagery were collected concurrently using an Applanix DSS 439 dual camera system. For this subproject, portions of 2 flight lines (152 images in all) were used. All imagery was acquired at a nominal altitude of 10,000 feet, resulting in an approximate ground sample distance (GSD) of 0.35 meters.

GPS Data Processing

GPS/IMU data was collected and processed by RSD personnel to yield precise positions and orientations of camera centers for application as photogrammetric control in the aerotriangulation (AT) phase of project completion. A local GPS base station was established for use as a reference station for kinematic GPS processing operations. The position of the base station was determined using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. The airborne kinematic data was processed in June and August 2014 using POSpac MMS (ver. 6.2) processing software. For further

information refer to the Airborne Positioning and Orientation Reports (APOR) that are on file with other project data within the RSD Electronic Data Library.

Aerotriangulation

Routine AT methods were applied to establish the 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 completed by RSD personnel in April 2020 utilizing a softcopy photogrammetric workstation. The RGB and NIR images were measured and adjusted as a single block using BAE Systems' SOCET GXP (ver. 4.4.0.06) photogrammetric software. Upon successful completion of the AT process, the standard deviations of the residuals for each adjusted ground point were extracted and used to compute a predicted horizontal circular error of 0.6 meters at the 95% confidence level. An AT Report was completed and is on file with other project data within the RSD Electronic Data Library.

The project database consists of project parameters and options, camera calibration data, interior orientation parameters, ground control parameters, adjusted exterior orientation parameters, and positional listing of all measured points. Positional data is referenced to the North American Datum of 1983 (NAD 83).

Compilation

The data compilation phase of the project was initiated by RSD personnel in April 2020. Cartographic feature data was extracted using BAE Systems' SOCET GXP software. Feature identification and the assignment of cartographic codes were based on image analysis of the project digital images and information extracted from the appropriate NOAA Nautical Charts, U.S. Coast Guard Light List and other ancillary sources. Feature attribution was assigned in compliance with the Coastal Cartographic Object Attribute Source Table (C-COAST). Selected features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for Project WA1002A-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.2 meters at the 95% confidence level. This predicted accuracy of well-defined points is based on a doubling of the circular error derived from aerotriangulation statistics.

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

Date	Time (UTC)	Roll #	Strip / Photo #s	Tide Level*
5-01-14	20:48 – 20:51	14NC41	650011 / 09376 – 09394	-0.2 m
5-01-14	20:48 – 20:51	14NR34	350011 / 06456 – 06474	-0.2 m
7-26-14	17:39 – 17:41	14NC58	650010 / 12661 – 12681	-0.2 m
7-26-14	17:39 – 17:41	14NR49	350010 / 09412 – 09432	-0.2 m
7-27-14	00:15 – 00:18	14NC60	550010 / 13113 – 13133	3.0 m
7-27-14	00:15 – 00:18	14NR51	250010 / 09861 – 09881	3.0 m

7-27-14	00:58 – 01:01	14NC60	550011 / 13283 – 13301	3.2 m
7-27-14	00:58 – 01:01	14NR51	250011 / 10031 – 10049	3.2 m

* Tide levels given in meters above MLLW and were calculated using the Pydro software tool with a TCARI grid referenced to verified water level observations at NOS gauges. The height of the MHW tidal datum in the project area ranges from 3.06 to 3.10 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of AB. The final QC review was completed in April 2020. The review process 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 (ver. 10.7.1) software. All project data was evaluated for compliance to CMP requirements.

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

- 18473, Puget Sound, Oak Bay to Shilshole Bay, WA, NTM 9.84, Feb. 2020
- 18441, Puget Sound, Northern Part, WA, NTM 48.75, Feb. 2020

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

- Airborne Positioning and Orientation Report (APOR)
- AT Report
- Project Completion Report (PCR)
- Project database
- GC11646 in shapefile format
- CEF in shapefile format

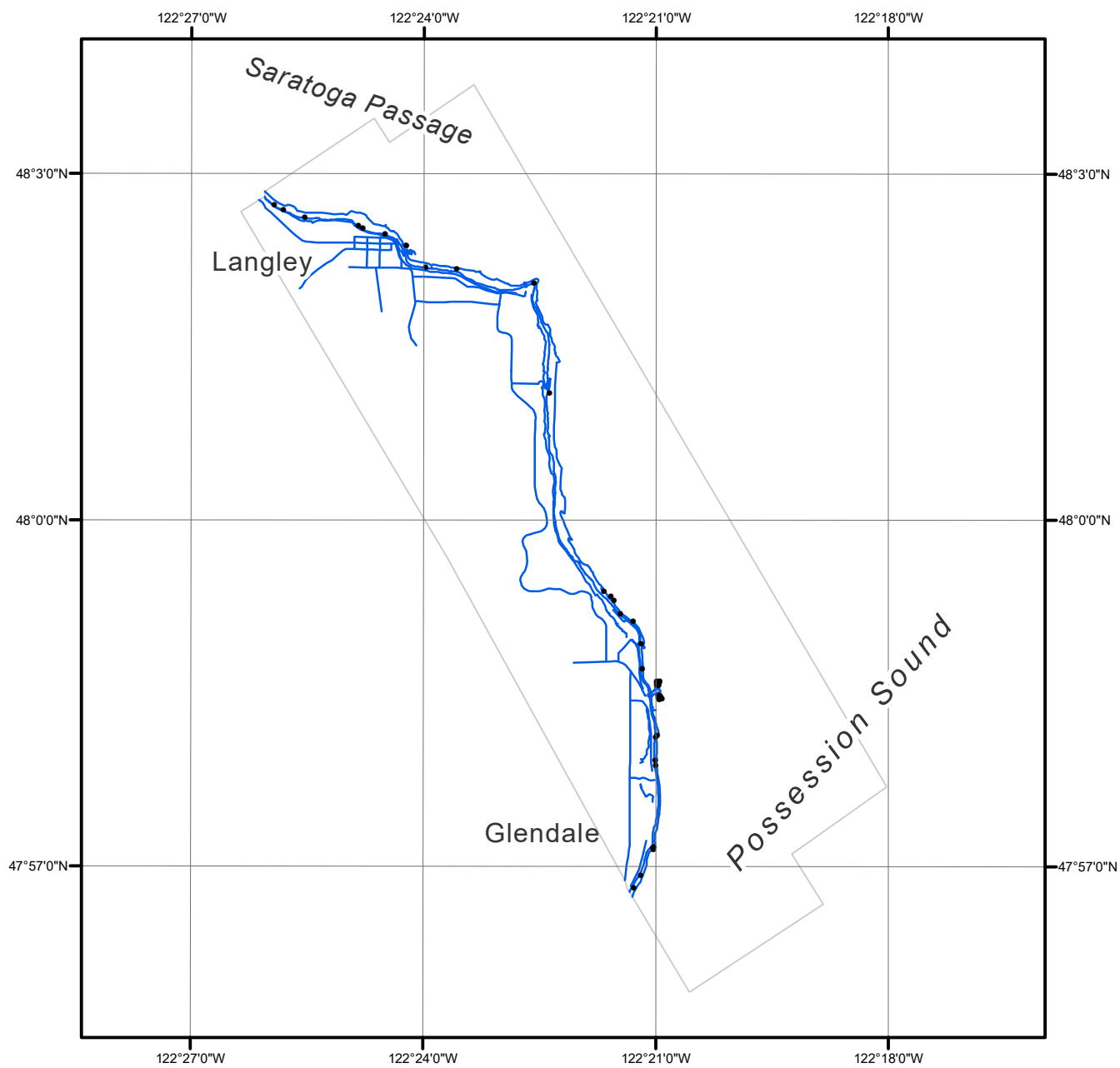
NOAA Shoreline Data Explorer

- GC11646 in shapefile format
- Metadata file for GC11646
- PCR in Adobe PDF format

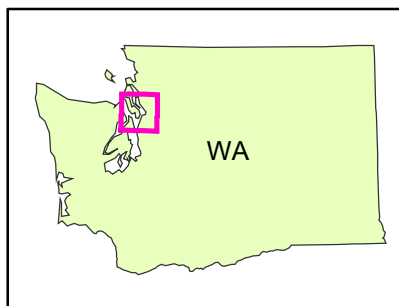
End of Report

SOUTHEAST WHIDBEY ISLAND, LANGLEY TO GLENDALE

WASHINGTON



Overview



WA1002A-CM-N

GC11646