

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT OR1208A

Columbia River, Wind River to Thirteenmile Point, Oregon and Washington

Introduction

Coastal Mapping Program (CMP) Project OR1208A provides highly accurate digital shoreline data for a portion of the Columbia River in Oregon and Washington, from Wind River to Thirteenmile Point. Project OR1208A is a subset of a larger project, OR1208, covering the Columbia River from Bonneville Dam to Lake Umatilla. 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) designed Project OR1208 to support the Continually Updated Shoreline Product (CUSP), a seamless database of high resolution shoreline data. Comparison of project photography with NOAA nautical charts of the project site revealed significant shoreline changes in the portion of the project area covered by this subproject. Shoreline data was then extracted from CUSP to undergo further processing and formatting to produce a GC.

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 for OR1208 were conducted on September 11-12, 2012 with the NOAA King Air aircraft (N68RF). Natural color and infrared (IR) imagery was acquired (27 flight lines, 960 total images) using an Applanix DSS-439 digital camera system with dual 60 mm lenses. All imagery was acquired at a nominal altitude of 10,000 feet, resulting in an approximate ground sample distance (GSD) of 0.35 meters.

Direct Georeferencing Data Processing

GPS/IMU data were processed by RSD personnel to yield precise camera positions and orientations for direct georeferencing (DG) of the imagery. 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 using Applanix POSPac MMS (ver. 6.1) software in September 2012. For further information refer to the Airborne Positioning and Orientation Reports (APOR) on file with other project data within the RSD Applications Branch (AB) Project Archive.

The processed GPS/IMU data were used to derive precise exterior orientation (EO) values of the camera centers required for digital feature extraction. The predicted horizontal accuracy of the imagery was determined by propagating sensor EO and image measurement uncertainties through the photogrammetric collinearity equations using an Excel spreadsheet based Exterior Orientation Total Propagated Uncertainty (EO-TPU) tool developed by NGS. Using this tool, the predicted horizontal uncertainty at the 95% confidence level (CE95) was calculated to be 1.3 meters.

USCG published positions of fixed navigational aids were used to verify the horizontal integrity of the DG data. Stereo-models were examined and found to have acceptable levels of parallax for mapping purposes.

Compilation

Data compilation activities for OR1208A were performed by AB personnel in May 2013 and November 2013. Limited shoreline features were compiled from monoscopic orthoimagery for the CUSP program. These features were then extracted from the CUSP database and reformatted to create a GC. Additional feature data of significance to nautical charting was compiled in the GC from stereoscopic imagery using the Feature Extraction software module within SOCET SET (ver. 5.6). Feature identification and attribution within the GC was 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 OR1208A were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features extracted from CUSP were assigned a horizontal accuracy of 4.5 meters. Cartographic features delineated from the stereo imagery were compiled to meet a horizontal accuracy of 2.6 meters at the 95% confidence level. This predicted accuracy of well-defined points measured during the compilation phase was derived by doubling the imagery accuracy computed from the EO-TPU tool.

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

Date	Time (UTC)	Roll #	Strip / Photo #s	~ GSD	Water Level*
9/11/2012	19:16 – 19:18	12NC70	50-006 / 26545 – 26558	0.35 m	22.7 m
9/11/2012	19:29 – 19:30	12NC70	50-005 / 26573 – 26580	0.35 m	22.7 m
9/11/2012	19:34 – 19:35	12NC70	50-007 / 26581 – 26583	0.35 m	22.7 m

* Water levels (gauge heights) are referenced to NGVD29 and are based on actual observations recorded at the USGS/USACE gage at Stevenson, WA. The Normal Operating Pool (NOP) level varies between 22.8 – 24.0 m.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by senior members

of RSD. The final QC review was completed in November 2013. The review process included analysis of the DG 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 software. All project data was evaluated for compliance to CMP requirements.

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

18532, Columbia River, Bonneville to The Dalles, 1:40,000, 21st Ed., May/06

End Products and Deliverables

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

RSD Applications Branch Archive

- Hardcopy of the Airborne Positioning and Orientation Report (APOR)
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot of GC11030 file contents, attached to PCR

Remote Sensing Division Electronic Data Library

- Project database
- GC11030 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- Chart Evaluation File in shapefile format

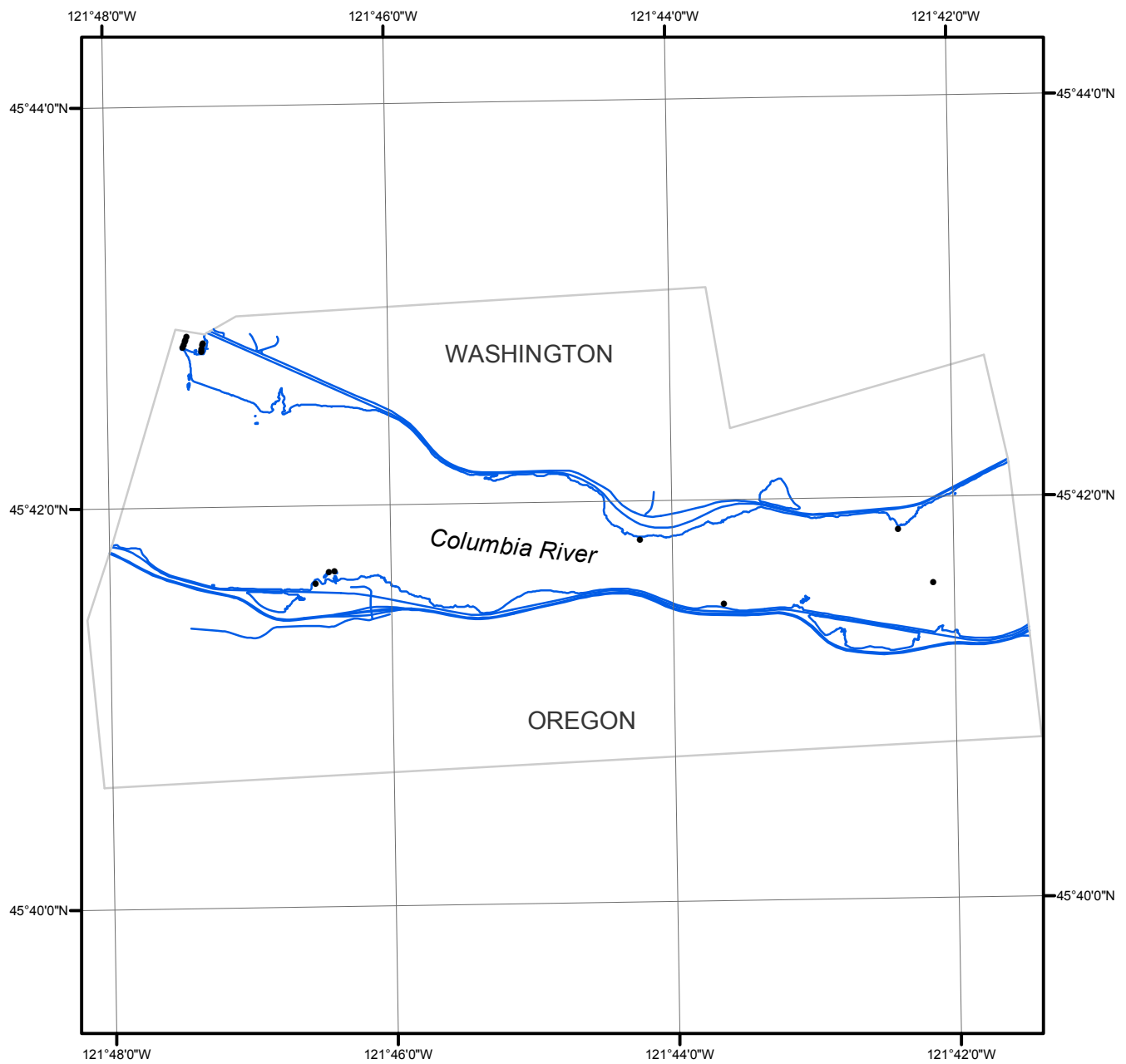
NOAA Shoreline Data Explorer

- GC11030 in shapefile format
- Metadata file for GC11030
- Digital copy of the PCR in Adobe PDF format

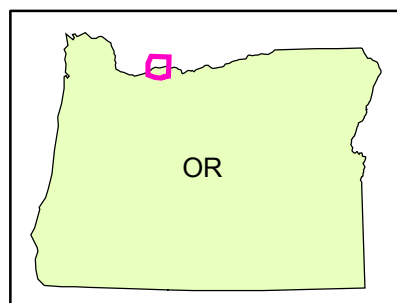
End of Report

COLUMBIA RIVER, WIND RIVER TO THIRTEENMILE PT

OREGON AND WASHINGTON



Overview



OR1208A

GC11030