

# **NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT**

## ***PROJECT OR1205***

### ***Ports of Longview, Kalama, Vancouver, and Portland, Oregon and Washington***

#### **Introduction**

Coastal Mapping Program (CMP) Project OR1205 provides highly accurate digital shoreline data for key areas of change within several ports on the Columbia River, including Longview, Kalama, Vancouver, and Portland. The digital feature data from Project OR1205 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 OR1205 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 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 November 15, 2012 for details of the chart comparison process.

#### **Field Operations**

The field operations consisted of the collection of static and kinematic Global Positioning System (GPS) and Inertial Measurement Unit (IMU) data and the acquisition of aerial imagery. The photographic mission operations were conducted on September 11, 2012 with the NOAA King Air (N68RF) aircraft. Fifteen lines of color (RGB) and black & white infrared (BWIR) digital images were acquired in tandem with an Applanix Digital Sensor System (DSS) 439 aerial camera at a nominal altitude of 10,000 feet, resulting in an approximate ground sample distance (GSD) of 0.35 meters. Although imagery was not acquired in strict coordination with local tides, the goal was to collect all imagery below Mean High Water (MHW). Due to the project's focus on changes to port infrastructure, the IR imagery was not used for compilation.

#### **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 and IMU data was processed using Applanix POSPac MMS 6.1.0 software on 09/28/2012. For further information refer to the Airborne Positioning and Orientation Reports (APOR) on file with other project data within the AB Project Archive.

## 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 July 2013 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 (v5.6.0) 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 0.3 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. 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 December 2013. Digital feature data was compiled using SOCET SET (v5.6.0) 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 OR1205 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.6 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*
09-11-2012	16:20 – 16:32	12NC70	25995 – 26070	0.35 m	(-0.2) – (-0.3)
09-11-2012	16:37 – 16:44	12NC70	26071 – 26115	0.35 m	(-0.2) – (-0.3)
09-11-2012	16:47 – 16:48	12NC70	26123 – 26126	0.35 m	(-0.1)
09-11-2012	16:54 – 16:57	12NC70	26137 – 26157	0.35 m	0.0 – (-0.1)
09-11-2012	17:01 – 17:02	12NC70	26158 – 26164	0.35 m	(-0.1)
09-11-2012	17:09 – 17:15	12NC70	26168 – 26212	0.35 m	(-0.2) – (-0.3)
09-11-2012	17:20 – 17:23	12NC70	26213 – 26234	0.35 m	(-0.3)
09-11-2012	17:27 – 17:32	12NC70	26235 – 26263	0.35 m	(-0.3) – (-0.2)
09-11-2012	17:36 – 17:41	12NC70	26264 – 26293	0.35 m	(-0.2) – (-0.3)

09-11-2012	17:45 – 17:49	12NC70	26294 – 26324	0.35 m	(-0.3) – (-0.2)
09-11-2012	17:54 – 17:59	12NC70	26325 – 26355	0.35 m	(-0.2) – (-0.3)
09-11-2012	18:03 – 18:07	12NC70	26356 – 26386	0.35 m	(-0.3)
09-11-2012	18:12 – 18:16	12NC70	26387 – 26417	0.35 m	(-0.3)
09-11-2012	18:21 – 18:25	12NC70	26418 – 26448	0.35 m	(-0.3)
09-11-2012	18:30 – 18:35	12NC70	26450 – 26479	0.35 m	(-0.3)
09-11-2012	18:43 – 18:47	12NC70	26480 – 26508	0.35 m	(-0.3)

\* Tide levels are given in meters above MLLW and were calculated using the Pydro software tool with discrete tidal zones referenced to verified water level observations at NOS gauges. Note that the water levels are all negative, meaning the tide was below MLLW during this entire project. The elevation of the MHW tidal datum in the project area varies between 0.80 – 1.47 meters above MLLW.

## Quality Control / Final Review

The final review of the project was completed by a senior member of RSD in December 2013, 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 Esri's ArcGIS desktop software (ver. 10.1). 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 GC11026 file contents, attached to PCR

### Remote Sensing Division Electronic Data Library

- Project database
- GC11026 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

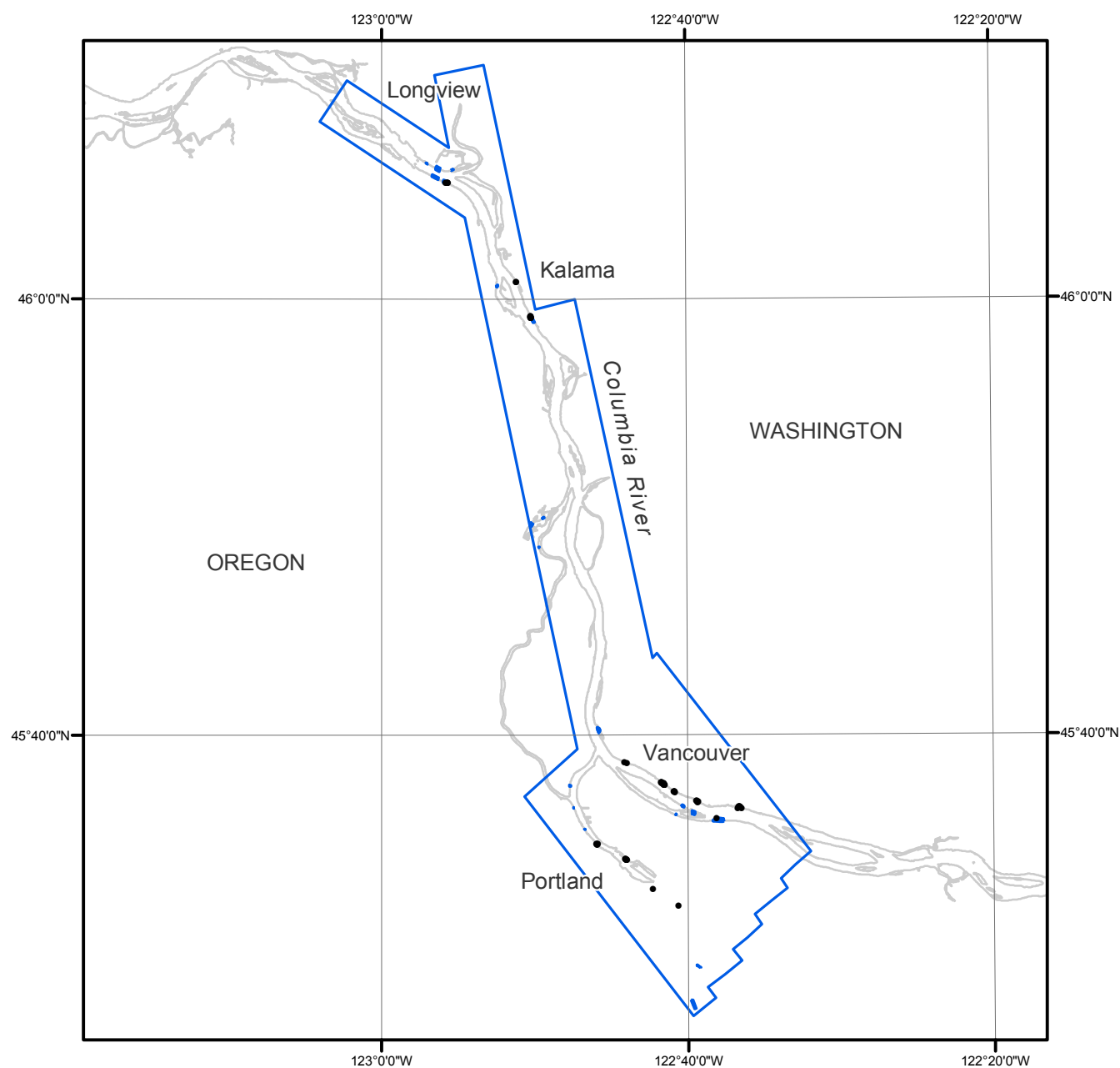
### NOAA Shoreline Data Explorer

- GC11026 in shapefile format
- Metadata file for GC11026
- Digital copy of the PCR in Adobe PDF format

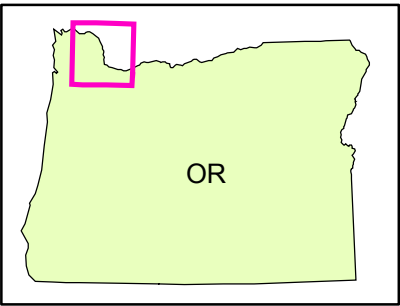
## End of Report

# PORTS OF LONGVIEW, KALAMA, VANCOUVER, PORTLAND

## OREGON AND WASHINGTON



Overview



OR1205

GC11026