

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT CA1303

Ports of Los Angeles and Long Beach, CA

Introduction

Coastal Mapping Program (CMP) Project CA1303 provides highly accurate digital shoreline data for key areas of change in the ports of Los Angeles and Long Beach, California and vicinity. 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 CA1303 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 digital imagery in order to ascertain the need for more current shoreline data. A Chart Evaluation File (CEF) was forwarded to the Applications Branch (AB) of RSD once the change analysis was complete. Refer to the RB CSCAP Memorandum of June 27, 2013 for details of the chart comparison process.

Field Operations

The field operations consisted of the collection of static and kinematic Global Positioning System (GPS) data and Inertial Measurement Unit (IMU) data, and the acquisition of digital aerial imagery. Aerial survey operations were conducted on April 16, 2013 with the NOAA King Air aircraft (N68RF). Five strips (50-001 through 50-005) of natural color photographs were acquired with an Applanix DSS 439 digital camera with a ground sample distance (GSD) of 0.35 meters. Tide coordination was not required, however all imagery was acquired at a water level below the Mean High Water (MHW) tide stage.

GPS Data Reduction

GPS and IMU data was collected and processed to yield precise positions and orientations of camera centers for use in the aerotriangulation phase. The airborne kinematic data were collected using an Applanix POS/AV510 GPS/IMU System. This data was processed on May 13, 2013 using POSpac MMS (ver. 6.1.0) GPS/IMU software. For further information refer to the Airborne Positioning and Orientation Report (APOR) on file with other project data within the AB Project Archive.

Aerotriangulation

The aerotriangulation (AT) phase of project completion was performed in October 2013. Routine softcopy AT 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. The AT for this project was performed by NGS/RSD

cartographers using BAE Systems SOCET SET ver. 5.6 digital photogrammetric workstation (DPW). The DPW consisted of a high-end Dell Precision Workstation with stereo viewing capability. The Multi-Sensor Triangulation (MST) module, within SOCET SET, was used for the AT portion of the project. Upon completion of the AT process, the simultaneous solve tool within the Triangulation module provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.44 meters based on a 95% confidence level. An AT Report was written and is on file with other project data within the RSD project archive.

Compilation

The data compilation phase of this project was accomplished by RSD in August 2014. Digital mapping was performed using a DPW in conjunction with the SOCET SET ver. 5.6 Feature Extraction module. Feature identification and attribution within the Geographic Cell (GC) were based on image analysis of the digital photographs 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), 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 CA1303 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.9 meters at the 95% confidence level. This value was derived by doubling the circular error computed from the AT statistics in order to conservatively predict the accuracy of compiled well-defined points.

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

| Date | Time (UTC) | Roll # | Photos # | GSD | Tide Level* |
|----------|---------------|--------|-------------|--------|-------------|
| 04-16-13 | 21:41 – 21:45 | 13NC12 | 2448 – 2478 | 0.35 m | 0.9 m |
| 04-16-13 | 21:50 – 21:55 | 13NC12 | 2479 – 2508 | 0.35 m | 0.9 m |
| 04-16-13 | 22:00 – 22:04 | 13NC12 | 2509 – 2539 | 0.35 m | 1.0 m |
| 04-16-13 | 22:11 – 22:15 | 13NC12 | 2540 – 2569 | 0.35 m | 1.0 m |
| 04-16-13 | 22:20 – 22:22 | 13NC12 | 2570 – 2585 | 0.35 m | 1.0 m |

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS gauge at Los Angeles, CA at the time of photography. The elevation of the MHW tidal datum at the NOS gauge is equal to 1.45 m 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 August 2014. The review process included analysis of the AT 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 10.2.1. The entire suite of project products was evaluated for compliance to CMP requirements.

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 GC11100 file contents, attached to PCR
- Hardcopy of the CSCAP evaluation memorandum

Remote Sensing Division Electronic Data Library

- GC11100 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

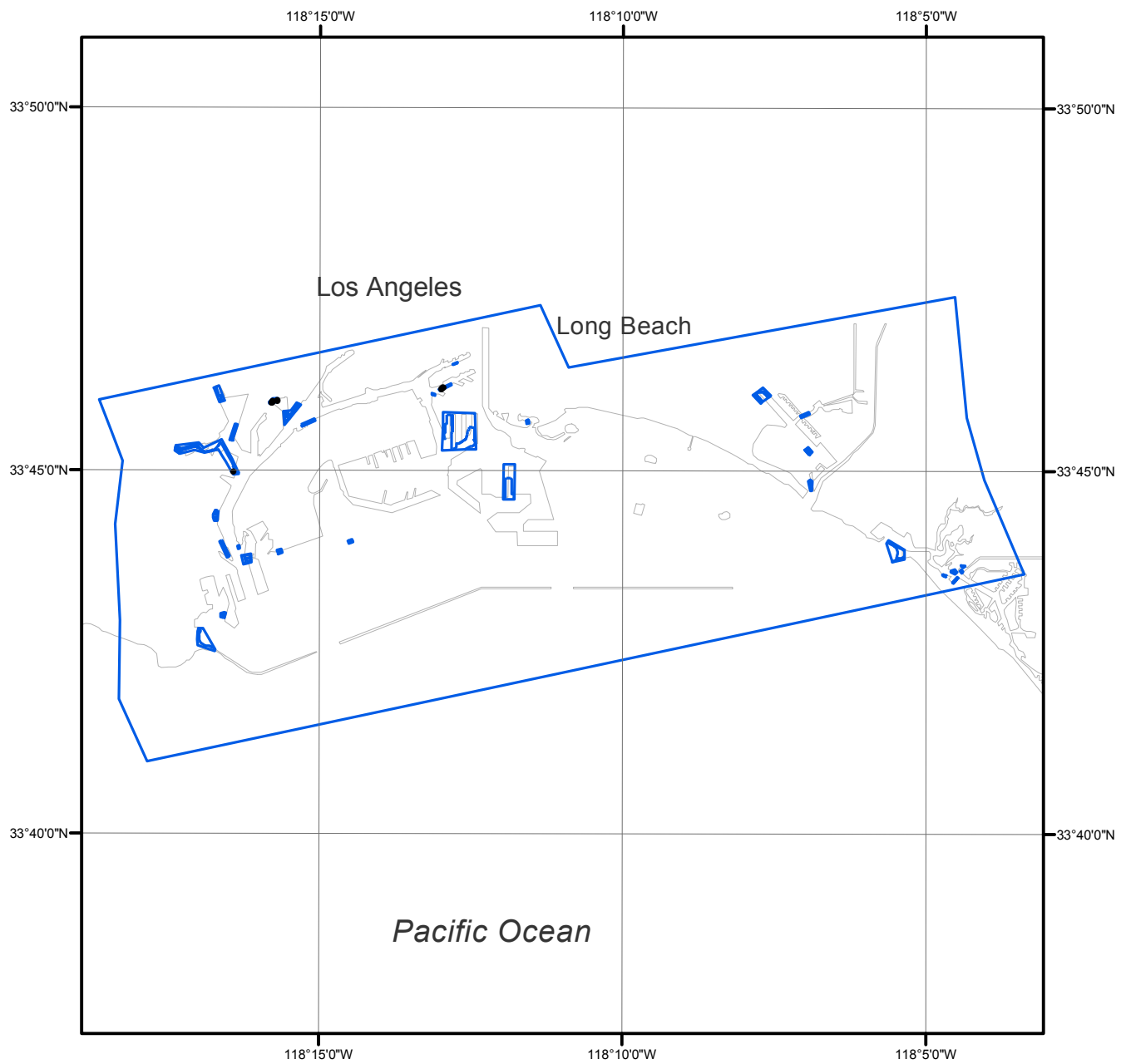
NOAA Shoreline Data Explorer

- GC11100 in shapefile format
- Metadata file for GC11100
- Digital copy of the PCR in Adobe PDF format

End of Report

PORTS OF LOS ANGELES AND LONG BEACH

CALIFORNIA



Overview



CA1303

GC11100