

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT CA1302

Port of San Diego, California

Introduction

Coastal Mapping Program (CMP) Project CA1302 provides highly accurate digital shoreline data for key areas of change in the port of San Diego, 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 CA1302 was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for timely 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 11, 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 9, 2013 with the NOAA King Air aircraft (N68RF). Six strips (50-001 through 50-006) 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 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 10, 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 July 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. This work was accomplished by a member of AB 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 BAE Systems SOCET GXP (version 4.0) photogrammetric suite in conjunction with the Triangulation module. 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 0.3 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 2013. Digital mapping was performed using a DPW in conjunction with the SOCET GXP (version 4.0.0) Feature Database. 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 CA1302 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 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*
04-09-13	22:37 – 22:42	13NC11	2307 – 2337	0.35 m	0.2 m
04-09-13	22:46 – 22:49	13NC11	2338 – 2364	0.35 m	0.2 m
04-09-13	22:53 – 22:58	13NC11	2365 – 2394	0.35 m	0.2 m
04-09-13	23:02 – 23:06	13NC11	2395 – 2422	0.35 m	0.3 m
04-09-13	23:11 – 23:13	13NC11	2423 – 2436	0.35 m	0.3 m
04-09-13	23:17 – 23:19	13NC11	2437 – 2447	0.35 m	0.3 m

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS gauge at San Diego, CA at the time of photography. The elevation of the MHW tidal datum at the NOS gauge is equal to 1.5 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 September 2013. 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 9.3.1. 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 GC11011 file contents, attached to PCR
- Hardcopy of the CSCAP evaluation memorandum

Remote Sensing Division Electronic Data Library

- GC11011 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

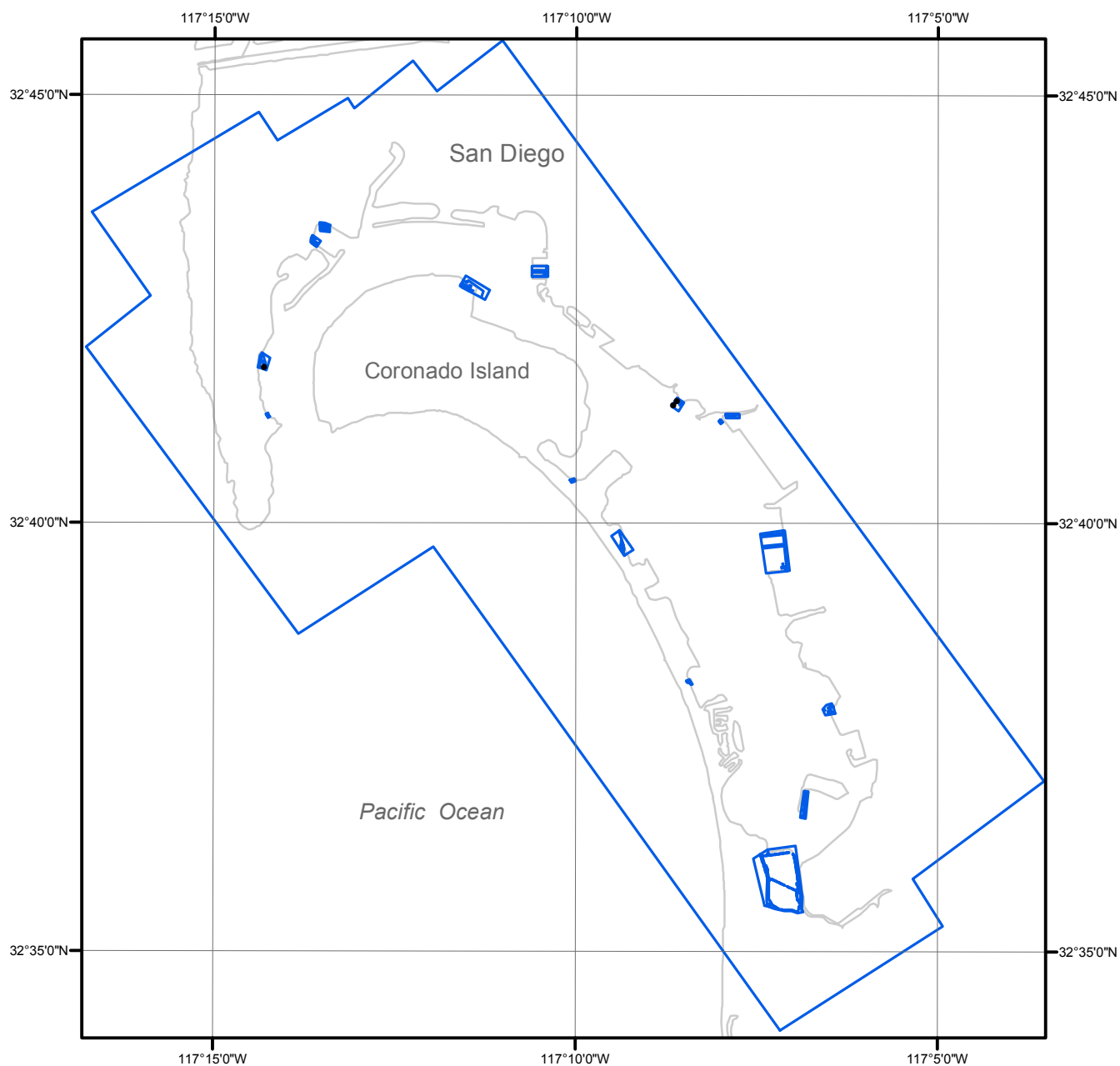
NOAA Shoreline Data Explorer

- GC11011 in shapefile format
- Metadata file for GC11011
- Digital copy of the PCR in Adobe PDF format

End of Report

PORT OF SAN DIEGO

CALIFORNIA



Overview



CA1302

GC11011