

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT CA0702B

Head of Suisun Slough, California

Introduction

NOAA Coastal Mapping Program (CMP) Project CA0702B provides a highly accurate database of new digital shoreline data for the northern part of Suisun Slough, California. The project extends from the head of Suisun Slough at Suisun City, to just north of Sheldrake Slough. Project CA0702B is a sub-project of the larger project, CA0702, which also includes shoreline data in the area of the Sacramento River Deep Water Ship Channel.

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 this project following the guidelines of the Photo Mission Standard Operating Procedure Version II (7/1/93). 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 consisted of the collection of static and kinematic GPS data and the acquisition of aerial photographs. The photographic mission operations were conducted on June 13, 2007 with the NOAA Cessna Citation II aircraft. Two strips consisting of eight natural color photographs were acquired through use of a Wild RC-30 camera with the NOS "A" lens cone at the nominal scale of 1:20,000.

A base station was positioned atop a PKNAIL at Sacramento Mather Airport (MHR) using static GPS. Airborne kinematic GPS data was collected in conjunction with Inertial Measurement Unit (IMU) data to determine precise camera positions and orientations. GPS data collection operations were conducted in accordance with the GPS Controlled Photogrammetry Field Operations Manual.

GPS Data Reduction

GPS and IMU data was processed by RSD personnel to provide precise camera positions and orientations for application as photogrammetric control in the aerotriangulation phase of project completion. The static GPS base station data was processed in June 2007 using the NGS Online Processing User Service (OPUS) software to compute fixed baseline solutions from three CORS stations. The airborne kinematic data was processed using Applanix POSPac (ver. 4.3) software in September 2007. Please refer to the Airborne Positioning and Orientation Report 07MHR164 for further information on GPS data processing.

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 initiated by RSD personnel in October 2007 utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated peripheral devices. The color photographs were measured and adjusted as a single block using the Multi-Sensor Triangulation (MST) module within BAE Systems SOCET SET (version 5.3) photogrammetric software. Upon successful completion of the aerotriangulation process, the MST software provided the RMS of the standard deviations of the residuals for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.7 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.

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 this project was initiated by RSD personnel in November 2007. Digital mapping was performed using a DPW in conjunction with the SOCET SET Feature Extraction software module. Feature identification and attribution within the Geographic Cell (GC) were based on image analysis of the 1:20,000 scale photographs, and information extracted from the appropriate NOAA nautical charts, US 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 CA0702B were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.4 meters at the 95% confidence level. This

predicted accuracy of compiled, well defined points is calculated by doubling the circular error derived from the aerotriangulation statistics.

The following table provides information on aerial photographs used in the project completion:

Date	Time (UTC)	Roll Number	Photo Numbers	Scale (nominal)	Tide Level*
06-13-07	21:15-21:22	07ACN10	1533-1540	1:20,000	1.2 m

* Tide levels are given in meters above MLLW and are based on actual observations at the NOS tide gauge in Port Chicago, CA, with corrections applied to various substations throughout the project area. The mean tide range in the project area is about 1.2 m.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of the RSD Applications Branch (AB). The final QC review was completed in August 2008. The review process included analysis of the 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 9.1 software. The entire suite of project products was evaluated for compliance to CMP requirements.

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

18656, Suisun Bay, CA, 1:40,000 scale, 55th edition, Sep. /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 Aerotriangulation Report
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot of GC10687 file contents, attached to PCR

Remote Sensing Division Electronic Data Library

- Project database
- GC10687 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- Chart Evaluation File in shapefile format

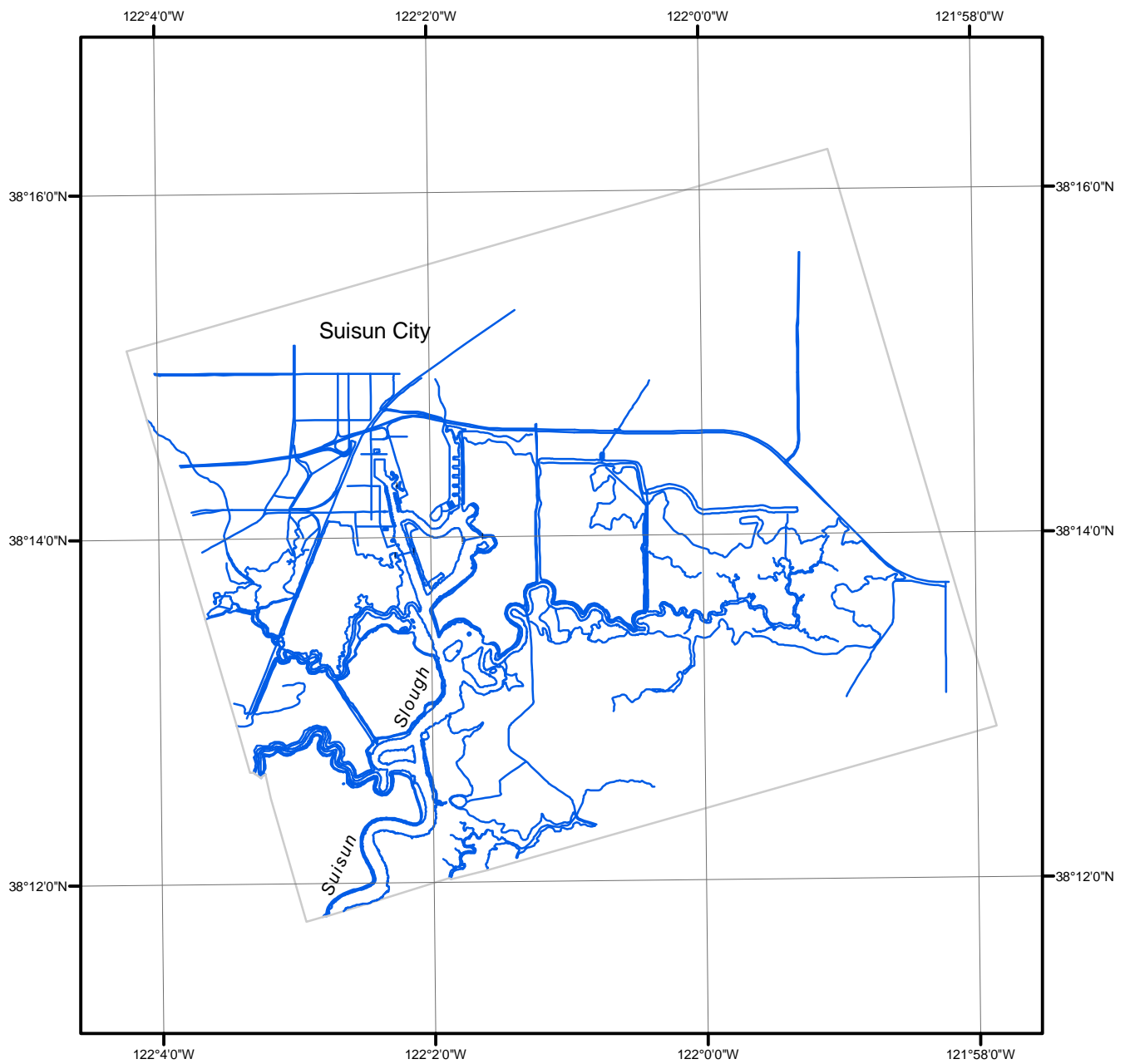
NOAA Shoreline Data Explorer

- GC10687 in shapefile format
- Metadata file for GC10687
- Digital copy of the PCR in Adobe PDF format

End of Report

HEAD OF SUISUN SLOUGH

CALIFORNIA



Overview



CA0702B

GC10687