# NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

# PROJECT CA0807

# Dana Point Harbor, California

### Introduction

NOAA Coastal Mapping Program (CMP) Project CA0807 provides a highly accurate database of new digital shoreline data for designated areas of change in Dana Point Harbor and the immediate 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 Requirements Branch (RB) of the Remote Sensing Division (RSD) formulated the photographic mission instructions for this project. Analysis by personnel of the Applications Branch (AB) of RSD revealed minimal changes between charted features and project photography. Therefore it was determined that only significant changes would be compiled.

## **Field Operations**

The field operations consisted of the collection of 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, 2008 with the NOAA Twin Otter aircraft (N48RF). Natural color imagery was acquired (2 flight lines, 16 total images) using an Applanix DSS-439 digital camera system (single cam) with 60 mm lens. Imagery was acquired at a nominal altitude of 10,000 feet, resulting in an approximate ground sample distance (GSD) of 0.35 meters. Imagery was not acquired in coordination with local tides.

## **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. CORS and/or UNAVCO station data was processed using the NGS Online Processing User Service (OPUS) software to compute fixed baseline solutions for the stations. The airborne kinematic data was processed using Applanix POSGPS (ver. 4.4) software in November 2009.

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 was calculated to be 1.5 meters. This accuracy was verified by comparisons with published NGS horizontal control. Positional data is referenced to the North American Datum of 1983.

## Compilation

The data compilation phase of this project was accomplished by RSD AB personnel in June 2013. Digital mapping was performed using the Feature Extraction software module within SOCET SET (ver. 5.6). Feature identification and attribution within the GC were 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.

Spatial data accuracies for Project CA0807 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 3.1 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.

Date	Time (UTC)	Roll #	Photo #s	~GSD	Tide Level*
4-16-08	19:11-19:12	08NC61	16240-16247	0.35 m	0.23 m
4-16-08	19:19-19:20	08NC61	16248-16255	0.35 m	0.20 m

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

\* Tide levels are given in meters above MLLW and are based on tidal zoning corrections applied from the Santa Monica, CA and La Jolla, CA reference stations. The elevation of MHW in the project area is equal to 1.40 meters above MLLW.

# **Quality Control / Final Review**

Quality control tasks were conducted during all phases of project completion by senior CMP personnel. The final QC review was completed in July 2013. The review process included analysis of image geopositioning and assessment of the identification and attribution of compiled 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 natural color images and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical chart was used in the comparison process:

18746, San Pedro Channel, CA, 1:80,000 scale, 38<sup>th</sup> Ed., Nov./09 (including Dana Point Harbor inset, 1:20,000 scale)

## **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 Project Completion Report (PCR)
- Page-size graphic plot of GC10998 file contents, attached to PCR

#### **Remote Sensing Division Electronic Data Library**

- Project database
- GC10998 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

#### NOAA Shoreline Data Explorer

- GC10998 in shapefile format
- Metadata file for GC10998
- Digital copy of the PCR in Adobe PDF format

#### **End of Report**

# DANA POINT HARBOR

# CALIFORNIA

