

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT AK1111

Port of Nikiski/Kenai, Alaska

Introduction

Coastal Mapping Program (CMP) Project AK1111 provides highly accurate digital shoreline data for key areas of change within the Port of Nikiski/Kenai and the Kenai River. 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 AK1111 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 satellite 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 Memorandum of April 18, 2011, "Results of CSCAP Change Analysis for the Port of Nikiski/Kenai, Alaska (AK1111)," for details of the chart comparison process. Although the CSCAP analysis covered the areas of both Nikiski and Kenai, changes within Nikiski were not significant enough to require new feature compilation. Also, additional imagery sources covering the project area were identified subsequent to CSCAP analysis, which enabled more extensive compilation within the areas of change.

Field Operations

Routine CMP field operations did not apply for this project based on the origin of the project source data. Existing sources of horizontal control were used for the georeferencing process.

Georeferencing

One WorldView-1 non-orthorectified color image with a spatial resolution of 0.5 meters was georeferenced using Erdas IMAGINE 10 software on a Windows platform. Ground control points (GCPs), photogrammetrically measured from metric quality aerial photography, were imported into IMAGINE and used to georeference the satellite imagery. In preparation for this task, aerial photography covering a portion of the project area was identified and retrieved from the RSD imagery archive, and aerotriangulation was performed in order to render the photography useful as photo control for the georeferencing phase. An Aerotriangulation Report describing this phase of project completion was written and is on file in the AB Project Archive.

Within IMAGINE, the Raster Geometric Correction tool was used, with the GCPs and a 1st order polynomial model, to georeference the satellite imagery. The imagery was resampled using the Nearest Neighbor sampling method. The RMS of the residuals for measured check points was used to compute a horizontal circular error at the 95% confidence interval (CE95) of 1.5 meters for the satellite image. This CE value was tripled and then added to the CE95 of the source imagery, from which ground control points were extracted, in order to conservatively predict the accuracy of well-defined points measured during the compilation process. A Georeferencing Report was written and is on file with other project data within the AB Project Archive. Positional data is based on the Universal Transverse Mercator coordinate system (Zone 5), and referenced to the North American Datum of 1983.

Compilation

The data compilation phase of this project was initiated by a member of AB in March 2012. Digital mapping was performed utilizing both the georeferenced satellite imagery, using ESRI's ArcGIS 10 desktop GIS software, and the aerial photography, which also served as a source of control for the satellite data, using stereo compilation techniques with the Feature Extraction module within BAE's Socet Set photogrammetric software. The satellite imagery was also used as a source of verification for features extracted from the older aerial imagery. 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 AK1111 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features extracted from the aerial photography were compiled to meet a horizontal accuracy of 1.5 meters CE95, which is a predicted accuracy of compiled, well defined points derived by doubling the circular error obtained from aerotriangulation statistics. Features extracted from the satellite imagery were tested to have a horizontal accuracy of 5.2 meters CE95, a predicted accuracy which is based on a minimum of twenty (20) check points compared to an independent source of higher accuracy.

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

Imagery Source	Acquisition Date/Time	Source ID	Tide Level*
WorldView-1 (satellite)	Date: 2009-06-28 Time: 21:45 GMT	Raw: 09jun28214551-p1bs-052122204010_08_p004_rpc_sub.tif Processed: Ak1111_08_p004_utm_nad83_8bit_georef.tif	1.2 to 1.4 m
RC-30 (aerial)	Date: 2000-08-16 Time: 21:32-21:34 GMT	Roll: 001P01 Frames: 0069-0073, 1:30,000 scale (nominal)	0.0 to -0.6 m

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS reference station at Seldovia at the time of photography, with offsets applied to the Kenai River Entrance and Kenai City Pier sub-stations in the project area. The elevation of the MHW tidal datum in the project area varies from about 5.8 to about 6.1 meters 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 April 2012. The review process included analysis of the georeferencing 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. The entire suite of project products 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 Aerotriangulation Report
- Hardcopy of the Georeferencing Report
- Hardcopy of the Project Completion Report (PCR)
- Page size graphic plot of GC10932 file contents, attached to PCR
- Hardcopy of the CSCAP evaluation memorandum

Remote Sensing Division Electronic Data Library

- GC10932 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

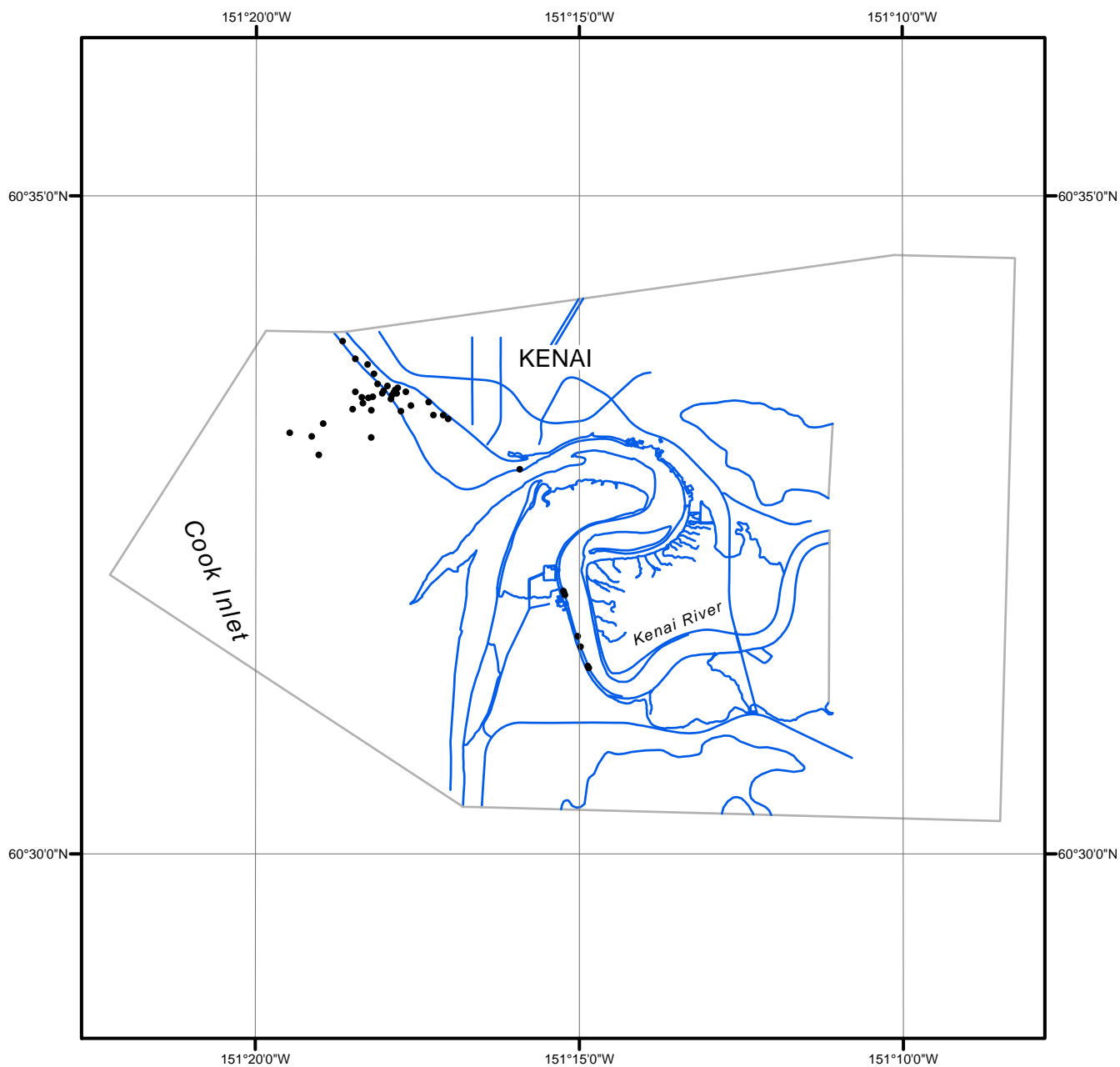
NOAA Shoreline Data Explorer

- GC10932 in shapefile format
- Metadata file for GC10932
- Digital copy of the PCR in Adobe PDF format

End of Report

PORT OF NIKISKI/KENAI

ALASKA



Overview



AK1111

GC10932