

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT AK9702F

WESTERN SHORE OF CLEVELAND PENINSULA, ERNEST SOUND, CLARENCE STRAIT, SE AK.

Introduction

Coastal Mapping Program (CMP) Project AK9702F provides a highly accurate database of new digital shoreline data of the western shore of Cleveland Peninsula. The geographic footprint of project AK9702F covers a portion of the western shore of Cleveland Peninsula, extending from the mouth of Ernest Sound where it enters Clarence Strait, northwards over Deer Island, before turning northwest to the mouth of Zimovia Strait.

Successful completion of this project resulted in a densification of the National Spatial Reference System (NSRS), a set of controlled metric-quality aerial photographs, and a Digital Cartographic Feature File (DCFF) of the coastal zone which meet the requirements of the NOAA CMP.

The project database consists of information measured and extracted from aerial photographs and metadata related to photogrammetric compilation. Base mapping was conducted in a digital environment using stereo softcopy photogrammetry and associated cartographic practices. Project survey data is referenced to the North American Datum 1983 (NAD 83).

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 III (2/01/97). The instructions discussed the project's purpose, geographic area of coverage, scope and priority; photographic requirements; flight line priority; tide coordination; 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.

The RB created a Project Layout Diagram, flight maps and input files for the aircraft's flight management system, and information on airports that may be used as a base of operation. Additional information disseminated at a briefing held for the photo mission crew included data on tide predictions, sun angle computations, flight line priorities, and geodetic control stations which could be used as GPS reference stations.

Field Operations

The photographic mission operation was conducted over two separate flight windows. Between August 9th and August 10th, 1997 three strips of color photography (40-26, 40-31, & 40-32) were acquired. On August 16th, 1997 one strip of panchromatic (40-25), was acquired and added to the first data set.

The second flight window occurred between May 15th and June 1st 1998. Four strips of BW IR images were flown at that time (strip 40-25 on the 15th of May, strip 40-26 on the 30th of May, and strips 40-31 & 40-32 were both flown on June 1st respectively). All photographs were acquired aboard the NOAA Cessna Citation II through the use of a Wild RC-30 camera with the NOS "A" lens cone at a nominal scale of 1:40,000. Kinematic GPS data was acquired for the color and panchromatic photographs as an integral part of NOAA photographic mission operations in compliance with the aforementioned Photo Mission SOP.

GPS Data Reduction

Global Positioning System (GPS) data was collected and processed for the Color and Panchromatic images to provide precise positions of camera centers for application as photogrammetric control in the aerotriangulation phase of project completion. The acquisition of a static GPS dataset of the airport reference station and airborne kinematic GPS dataset was executed in compliance with GPS Controlled Photogrammetry Field Operations Manual, a RSD operational manual. Static GPS data of the airport reference station was collected on August 9, 1997 and processed in August 1997 using NGS's OMNI software to compute two fixed baseline solutions from the nearest CORS station. The final position of the GPS base station was the average of these two baseline solutions. Points of the adjusted Color and Panchromatic were then used as ground control for the Infrared photographs.

The airborne kinematic data for all project mission flights were processed by RSD Applications Branch (AB) personnel using Trimble GPSurvey (ver. 2.30) software between March 1999 and January 2000. The NGS computed precise satellite ephemeris and standard meteorologic data were applied during the data reduction process. A GPS Data Processing Report was written and is on file with other project data within the RSD AB Project Archive.

Aerotriangulation

Routine softcopy aerotriangulation methods were applied to establish the network of precise camera positions and other control for mapping, and to provide model parameters and orientation elements required for softcopy compilation. Three strips of natural color photographs and one strip of panchromatic were measured and adjusted as a single block. Likewise, later, four strips of BW IR photos were measured and adjusted as a single block. During acquisition of the color and panchromatic photography, kinematic GPS control was employed allowing for GPS determined photo center points. Fourteen photo-identifiable points were then transferred from the adjusted color/pan strips to the BW IR strips and used as a basis for ground control on the second set of images. The results from both sets of imagery were then tested against the known locations of five ground features located throughout Ernest Sound and comparisons were made. This work was initiated by the RSD AB CMP personnel in late November 2003 and December 2003 respectively, utilizing a Digital Photogrammetric Workstation (DPW) which is a configuration of a computer processor and monitors, softcopy photogrammetry software (Socet Set ver. 4.4.2), stereo viewing equipment, and associated peripheral devices. The ORIMA (v.6.0) software module was utilized for the aerotriangulation process. Upon successful completion of the aerotriangulation process, the ORIMA software provided the RMS of the standard deviations for all aerotriangulated ground points which were used to compute a predicted horizontal circular error of 1.1 meters for the natural color and panchromatic

photographs, and a predicted horizontal circular error of 1.2 meters for the BW IR, based upon a 95% confidence level. An Aerotriangulation report was written and is on file with other project data in the RSD AB Project Archive.

The project database consists of project parameters and options, camera calibration data, interior orientation parameters, airborne GPS antenna position and offset data, adjusted exterior orientation parameters, and a positional listing of all measured points. Positional data is based on the North American Datum and was measured in the UTM Coordinate System, Zone 8N.

Compilation

The compilation phase of the project was accomplished by the RSD Applications Branch (AB) spanning from mid December 2003 to the first of February 2004 for the color, panchromatic, and BW IR photo suites. Digital mapping was accomplished using a DPW in conjunction with the SocetSet Feature Extraction module. Feature identification and the assignment of cartographic codes were based on image analysis of 1:40,000 scale natural color, panchromatic, and BW IR photographs and information extracted from the appropriate NOAA Nautical Charts, U.S. Coast Guard Light List, and U.S. Geological Survey quadrangles. Cartographic feature attribution was assigned in compliance with the Coastal Cartographic Object Attribute Source Table (C-COAST). Nomenclature was assigned to selected cartographic features to refine general classification.

Cartographic features were compiled to meet a horizontal accuracy of 2.2 meters at the 95% confidence level for all but the MLLW line, and at a horizontal accuracy of 2.3 meters at the 95% confidence level for the MLLW line. This predicted accuracy of compiled, well defined points is derived by doubling the circular error derived from aerotriangulation statistics.

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

Date of Acquisition	Time(GMT) Of Acquisition	Roll Number	Photograph Numbers	Strip #	Scale (Nominal)	Stage Of Tide*
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Color Imagery

08-16-97	20:52 - 20:58	97AP02	2474 thru 2481	25	1:40,000	2.2-3.1 m
08-10-97	21:31 - 21:44	97ACN11	2108 thru 2115	26	1:40,000	2.7-2.8 m
08-09-97	23:12 - 23:17	97ACN10	2024 thru 2036	31	1:40,000	4.0-4.2 m
08-09-97	23:23 - 23:26	97ACN10	2037 thru 2045	32	1:40,000	4.1-4.3 m

BW IR Imagery

05-15-98	19:43 to 19:51	98AR03	1843 thru 1858	25	1:40,000	0.226-0.408 m
05-30-98	18:54 to 19:05	98AR04	2062 thru 2085	26	1:40,000	-0.280- -0.372m
06-01-98	21:15 to 21:21	98AR05	2239 thru 2248	31	1:40,000	0.311-0.341m
06-01-98	21:25 to 21:28	98AR05	2252 thru 2260	32	1:40,000	0.311-0.341m

* The “Stage of Tide” is referenced to *Above MLLW* and is based upon calculations derived from the (Tide Tables Book, 1989) in reference to the NOS tide station based in Ketchikan, AK , and to the reference points which fell within close proximity to the area mapped (the Union Bay reference point and the Blake Island reference point) at the time of photography. The first number reported is in reference to the Union Bay location, and the second to the Blake Island point of reference. The range of tide (MLLW to MHW) is based upon Mean Tide Ranges for the Color, Panchromatic, and BW IR imagery.

Final Review

The final review was completed by a senior AB CMP team member in February 2004. The DCFF was evaluated for completeness and accuracy. Data review consisted of an on-line and off-line evaluation of digital compilation and hard copy products. The on-line review comprised of reviewing stereo models on a DPW for cartographic feature codes selection, positional accuracies of features, and nomenclature. The cartographic feature attribution was judged to conform to C-COAST specification. The offline evaluation compared hard copy plots of the project data with the largest scale nautical charts available and the natural color, panchromatic, and infrared photographs.

A copy of the following NOAA nautical charts were used for chart comparison purposes:

17385 Ernest Sound - Eastern Passage and Zimovia Strait 1:80000, 14th ed.
17423 Clarence Strait and Behm Canal 1:40,000, 13th ed.

Project Final Data and Products

The following specifies the location and identification of the products generated during the completion of this project:

RSD Applications Branch Project Archive

- Hard copy of GPS Processing Report
- Hard copy of Aerotriangulation Report
- Hard copy of the Project Completion Report (PCR)

RSD Electronic Data Library:

- Project Database
- Feature Database
- Digital copy of DCFF in ESRI Shapefile format
- Digital copy of the PCR in Adobe Acrobat PDF format

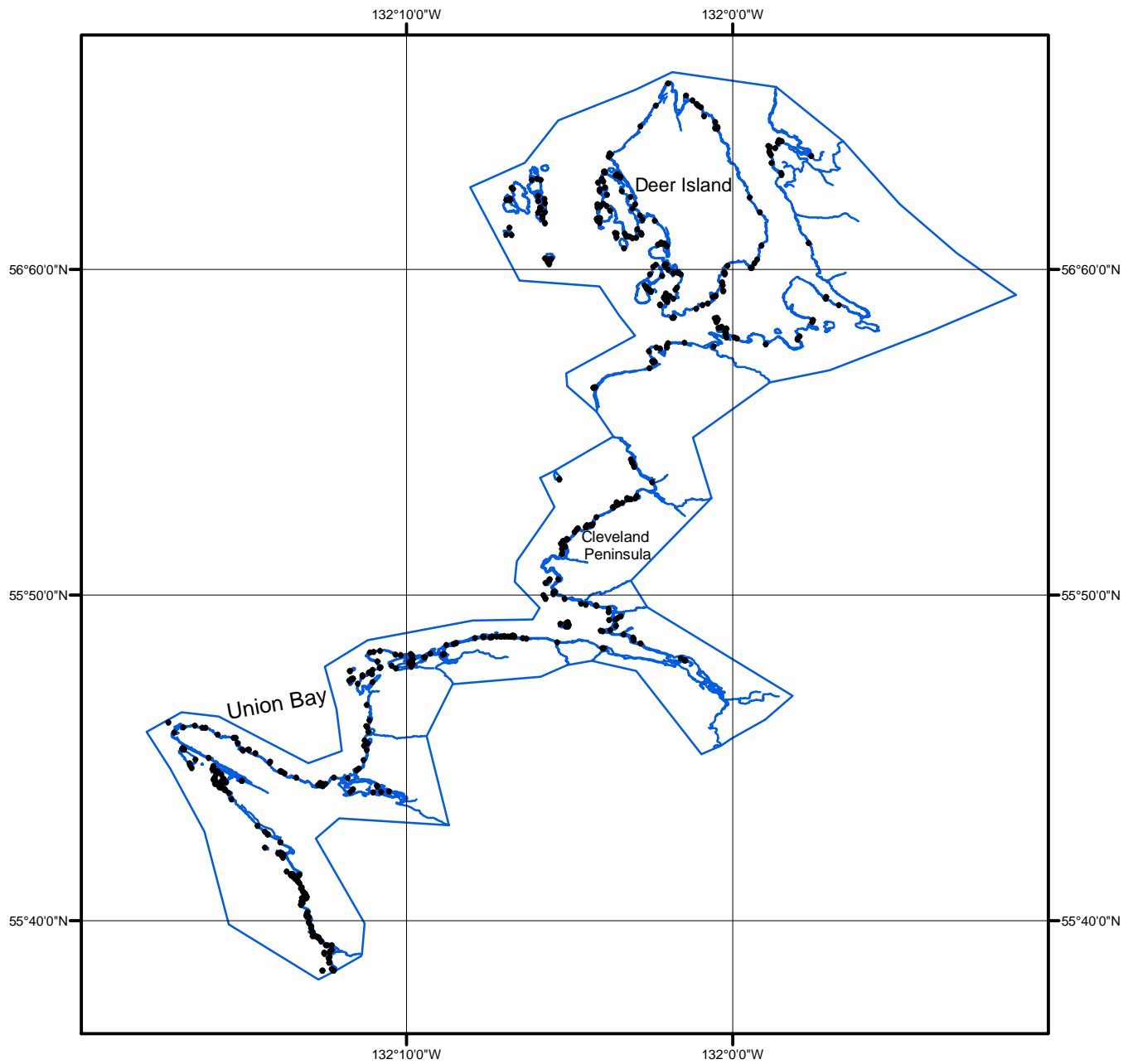
NOAA Shoreline Data Explorer

- Digital copy of Feature Database in ESRI Shapefile Format.
- Metadata file for GC10548
- Digital copy of the PCR in Adobe Acrobat PDF format

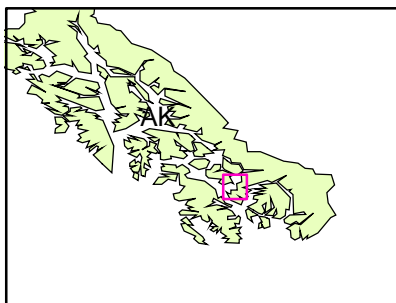
End of Report

Western Shore of Cleveland Peninsula, Ernest Sound, Clarence Strait

SE, ALASKA



Overview



AK9702F

GC10548