

**NOAA COASTAL MAPPING PROGRAM  
PROJECT COMPLETION REPORT**

**PROJECT AK9702E  
EASTERN PASSAGE AND BRADFIELD CANAL  
NORTHERN ERNEST SOUND, SOUTHEAST ALASKA**

**Introduction**

Project AK9702E a subproject of AK9702 provides a highly accurate database of new digital shoreline data of southeastern Alaska. The subproject covers Eastern Passage and Bradfield Canal in the northern part of Ernest Sound.

Completion of this project resulted in a densification of the National Spatial Reference System (NSRS), a set of controlled metric quality aerial photographs and Digital Cartographic Feature Files (DCFF) of the coastal zone which compliment the Nautical Charting Program (NCP) and other geographic information systems.

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 of 1983 (NAD 83).

**Project Design**

The Requirements Branch (RB) of the Remote Sensing Division (RSD) formulated the photographic mission instructions for this project following standard operating guideline of the photo mission standard operating procedure version III (2/01/1997). The instructions discussed the project's purpose, geographic area of coverage, scope and priority; tide coordination 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.

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 operations were conducted on August 10 and 16, 1997 and on May 27 and 30, 1998, with the NOAA Cessna Citation II aircraft. Two strips of natural color photographs, one strip of panchromatic photographs, and three strips of infrared photographs were acquired through use of a Wild RC-30 camera with the NOS "A" lens cone at the nominal

scale of 1:40,000. Kinematic GPS data was acquired for the color and panchromatic photographs, but not for the infrared photographs.

### **GPS Data Reduction**

Global Positioning System (GPS) data was collected and processed 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. 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 digital compilation. This work was initiated by the RSD AB CMP personnel in June 2003 utilizing a digital photogrammetric workstation (DPW) which is a configuration of a computer processor and monitors, softcopy photogrammetry software (SOCET SET v. 4.4.1), stereographic viewing equipment and associated peripheral devices. The SOCET SET ORIMA (ver. 6.01) software module was utilized for the aerotriangulation process where the two strips of color and one strip of panchromatic aerial photographs were measured and adjusted as one block and the three strips of infrared aerial photographs were measured and adjusted as another block. Upon successful completion of the aerotriangulation process, the ORIMA software provided the RMS of the standard deviations of the residuals for all aerotriangulated ground points, which were used to compute a predicted horizontal circular error of 1.2 meters for the color and panchromatic photographs and 0.8 meters for the infrared photographs. All accuracies were based on a 95% confidence level. An Aerotriangulation Report is on file with other project data within 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 positional listing of all measured points. Positional data is based on the North American Datum 1983, and is referenced to the UTM Coordinate System, zone 8 north.

## Compilation

The data compilation phase of the project, in which approximately 201 nautical miles of the shoreline were compiled, was accomplished by the RSD Applications Branch (AB) in January 2004. The digital mapping was performed using a DPW in conjunction with the Socet Set (v. 5.0) 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 infrared photographs and information extracted from the appropriate NOAA Nautical Charts, US Coast Guard Light List and US Coast Pilot. 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 2.4 meters for all photography. All accuracies were based at the 95% confidence level. 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:

<b>Date</b>	<b>Time (UTC)</b>	<b>Roll Number</b>	<b>Photo Numbers</b>	<b>Scale (nominal)</b>	<b>Tidal Stage (m) (MLLW)</b>
8/10/97	2212-2221	97ACN11	2143-2158	1:40,000	2.50-2.56
8/10/97	2230-2240	97ACN11	2160-2175	1:40,000	2.71-2.77
8/16/97	2104-2113	97AP02	2482-2493	1:40,000	4.31-4.25
5/27/98	1810-1820	98AR04	2004-2018	1:40,000	-0.19- -0.03
5/30/98	1824-1834	98AR04	2020-2034	1:40,000	0.09- .33
5/30/98	2028-2033	98AR04	2161-2175	1:40,000	0.44-.51

\*The Tidal Stage is based on actual observations recorded by the NOS gauge at Ketchikan, AK at the time of photography and interpolated for Blake Island in the Blake Channel of the Eastern Passage.

## Final Review

The final review was completed by a senior AB CMP team member in February 2004. The DCFE 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 photographs. A copy of NOAA nautical chart 17385 Ernest Sound-Eastern Passage and Zimovia Strait 1:80,000, 14<sup>th</sup> edition was used for the chart comparison process.

## **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
- Page size graphic plot of DCFF contents
- Hard copy of the Project Completion Report

### **RSD Electronic Data Library:**

- Project Database
- DCFF: GC10547
- Digital copy of DCFF in Shapefile format
- Digital Copy of Project Completion Report

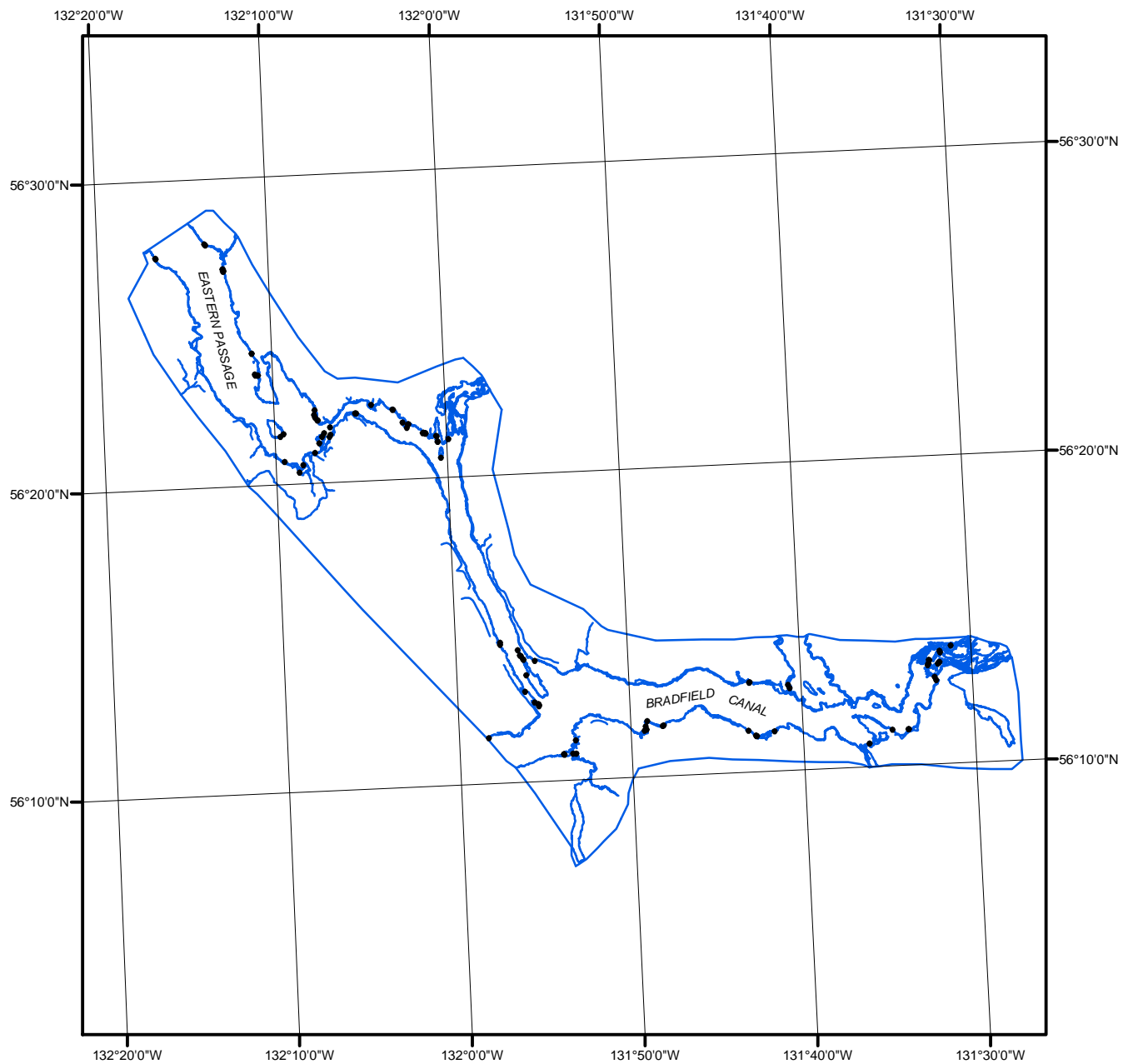
### **NOAA Shoreline Data Explorer**

- DCFF: GC10547
- Metadata file for GC10547
- Digital Copy of the Project Completion Report

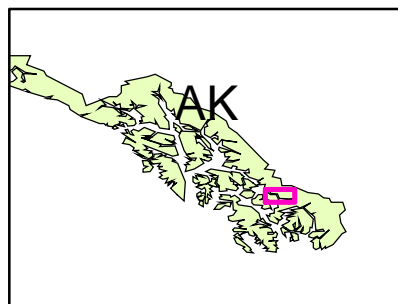
End of Report

# Eastern Passage and Bradfield Canal

## Ernest Sound, Southeast Alaska



Overview



AK9702E

GC10547