

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT FL0101

ST. JOHNS RIVER ENTRANCE TO JACKSONVILLE FLORIDA

Introduction

Coastal Mapping Program (CMP) Project FL0101 provides a highly accurate database of new digital shoreline data of St. Johns River, Florida. The geographic footprint of project FL0101 covers the portion of St. Johns River from the entrance to Jacksonville, Florida including the town of Mayport, Blount Island, and several of the adjoining river extensions and marshlands that are typical of the region.

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 on two separate dates. Four strips of color photography were collected on November 8, 2001. On January 27th, 2003, four strips of BW IR images were collected. 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 1:30,000. Kinematic GPS data and ground control data were acquired for the 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 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 over the airport reference station and airborne kinematic GPS dataset was executed in compliance with GPS Controlled Photogrammetry Field Operations Manual, a RSD operational manual.

The static GPS data for the first kinematic session was collected on November 8, 2001 using a Trimble 4000SSi geodetic receiver and a Trimble Compact L1/L2 antenna with ground plane, placed over the Primary Airport Control Station (PACS), STAUPORT 1998.

The second static GPS data set was established fourteen months later on January 27, 2003 utilizing an Ashtech Z-Extreme receiver with a Geodetic IV antenna (no ground plane) set on a 2-m tripod, over the Secondary Airport Control Station (SACS), JAX D 1998.

The airborne kinematic data for both surveys were collected using an Applanix POS/AV510 GPS/IMU System aboard the NOAA Cessna Citation II (N52RF) aircraft. Both data sets were later processed using POSGPS (v. 3.00 for the color) and (v. 3.11 for the BW IR), and the NGS computed precise satellite ephemeris. The Color data set was processed in October 2002, the BW IR, in March 2003.

The session folders for both dates are on file in the RSD GPS Archive, and contain copies of the GPS Processing Report, this report, printouts of the final (Orima) GPS file, and the POSGPS Processing Summary, including plots of the Combined Forward/Reverse Separation, RMS, PDOP, Standard Deviation, and solution maps.

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. During acquisition of both color and BW IR photography, kinematic GPS control of the camera station was employed allowing for GPS determined photo center points. Four strips of natural color photographs were measured and adjusted as a single block. Likewise, later, four strips of BW IR photos were measured and adjusted as a single block. The results were then tested against the known locations of seven ground features located throughout the project along the St. John’s River. This work was initiated by the RSD AB CMP personnel in December 2003 and May 2003 respectively, utilizing a Digital Photogrammetric Workstation (DPW) which is a configuration of a computer processor and monitors, softcopy photogrammetry software (SOCET SET ver. 4.4.1), 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 1.4 meters for the natural color photographs, and a predicted horizontal circular error of 1.6 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 positional listing of all measured points. Positional data is based on the North American Datum and was measured in the UTM Coordinate System, Zone 17N.

Compilation

The compilation phase of the project was accomplished by the RSD Applications Branch (AB) spanning from January 2003 to April 2003 for the color imagery, and from May 2003 to the first of June 2003 for the BW IR. Digital mapping was accomplished using a DPW in conjunction with the SOCET SET Feature Extraction module. Feature identification and the assignment of cartographic codes were based on image analysis of 1:30,000 scale natural color 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 2.8 meters at the 95% confidence level for all but the MLLW line, and at a horizontal accuracy of 3.2 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

11-08-01	18:12 - 18:15	01ACN18	4006 thru 4015	1	1:30,000	1.0-0.7 m
11-08-01	18:20 - 18:23	01ACN18	4016 thru 4025	2	1:30,000	0.7-1.0 m
11-08-01	18:29 - 18:33	01ACN18	4027 thru 4041	3	1:30,000	1.0-1.6 m
11-08-01	18:39 - 18:43	01ACN18	4042 thru 4057	4	1:30,000	1.6-0.9 m

BW IR Imagery

01-27-03	15:45 to 15:50	03AR01	0001 thru 0015	3	1:30,000	- 0.14 m
01-27-03	15:58 to 16:04	03AR01	0016 thru 0030	4	1:30,000	- 0.15 m
01-27-03	16:21 to 16:24	03AR01	0031 thru 0039	1	1:30,000	-0.18m to 0.27m
01-27-03	16:33 to 16:37	03AR01	0040 thru 0048	2	1:30,000	0.75m to -0.19m

* The "Stage of Tide" is referenced to MLLW and are based on actual observations recorded by NOS gauges along the St. Johns River, FL at the time of photography. The range of tide (MLLW to MHW) based on Mean Tide Ranges for the Mayport Bar Pilot Dock Gauge 1.39m, the Dame Point Gauge 1.05m, the Longbranch Gauge 0.758m, and Main Street Bridge Gauge 0.545m for the Color imagery and BW IR images. Results for the Stage of Tide are listed in the direction that the strip was flown.

Final Review

The final review was completed by a senior AB CMP team member in June 2003. 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 and infrared photographs.

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

11489 St. Simons Sound to Tolomato River 1:40000, 33rd ed.
11490 Approaches to St. John's River 1:40,000, 17th ed.
11491 St. Johns River, Atlantic Ocean to Jacksonville 1:20,000, 33rd 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 DCFE in ESRI Shapefile format
- Digital copy of the PCR in Adobe Acrobat PDF format

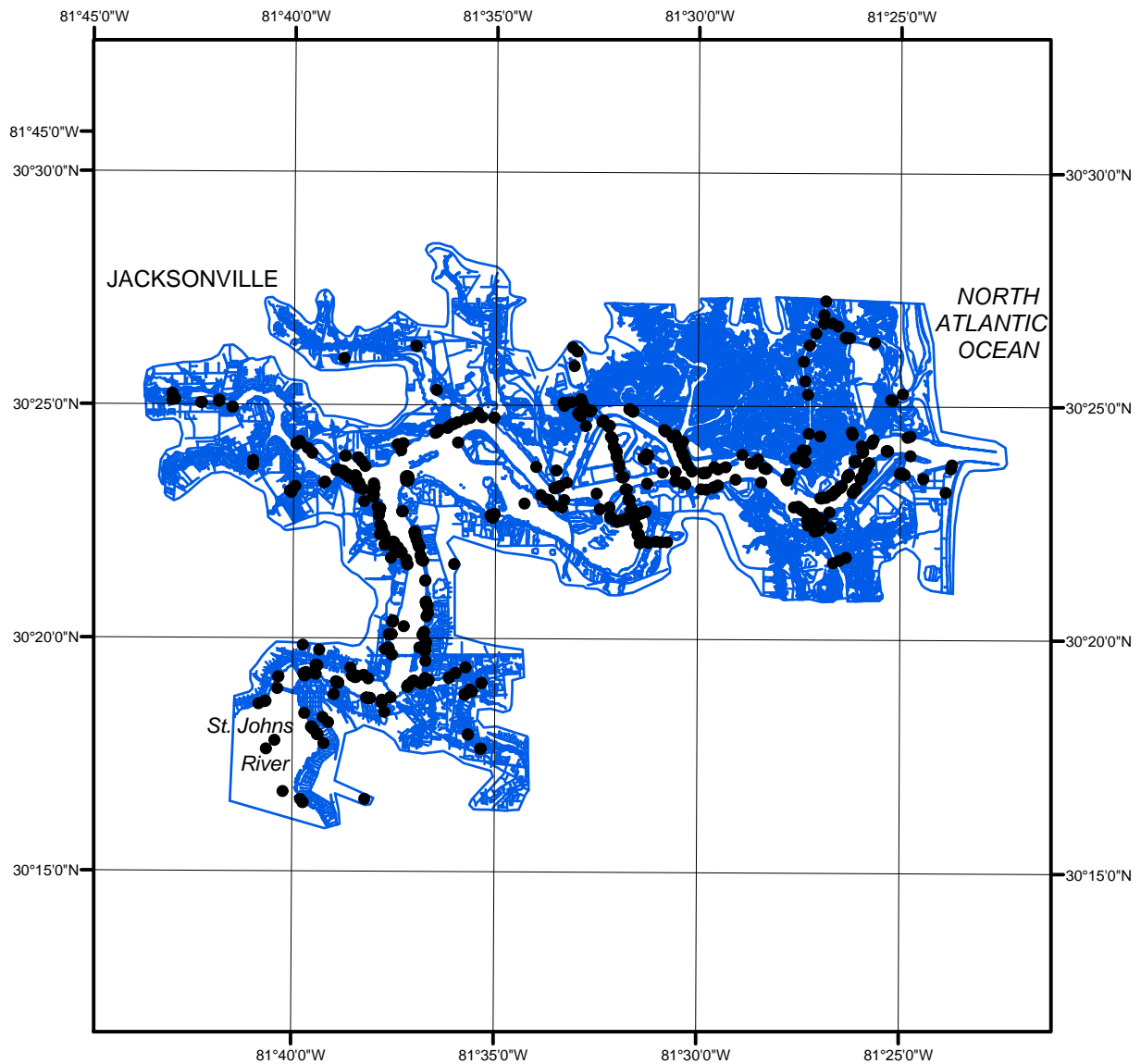
NOAA Shoreline Data Explorer

- Digital copy of Feature Database in ESRI Shapefile Format.
- Metadata file for GC10534
- Digital copy of the PCR in Adobe Acrobat PDF format

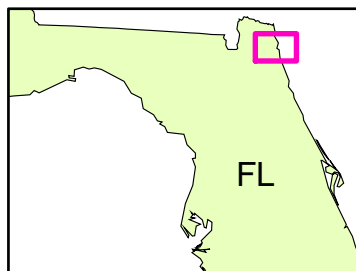
End of Report

ST. JOHNS RIVER, ATLANTIC OCEAN TO JACKSONVILLE

JACKSONVILLE, FLORIDA



Overview



FL0101

GC 10534