

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT RI0301

Narragansett Bay, Rhode Island

Introduction

NOAA Coastal Mapping Program (CMP) Project RI0301 provides coastal zone mapping data for the Narragansett Bay, Rhode Island vicinity. The Geographic Cell (GC) covers the area around Narragansett Bay from Point Judith, Rhode Island to Horseneck Point at Westport Harbor, Massachusetts.

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 digital feature data of the coastal zone which compliments the 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 RI0301 project instructions following the guidelines of the Photo Mission Standard Operating Procedure Version II (7/1/93). The instructions discussed the project's purpose, geographic area of coverage, scope and priority; photographic requirements; flight line priority; 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. NOVA DIGITAL SYSTEMS, INC. created the flight maps, the input files for the aircraft's flight management system, and provided copies of the descriptions of potential geodetic control stations at the bases of operation. In addition, some second order geodetic points, as well as strategically located paneled control points, were established within the project area. A briefing was held by NGS personnel in NOVA's office to review the entire assignment including the photographic mission, the triangulation, and the mapping instructions.

Field Operations

The Sanborn Mapping Company, sub-consultant of NOVA, conducted photographic mission operations on October 31, 2003; April 30, 2004; and June 20, 2005. The aircraft was a Cessna 401B, and all the natural color photographs and tide coordinated black & white infrared photographs were acquired at the nominal scale of 1:30,000 and through the use of a Wild RC-30 camera controlled by Leica ASCOT System. In addition, all of the project photographs were acquired with Airborne GPS, using the "PVD ARP" base ground station in each photographic mission for differential correction of the real time kinematic GPS data. The GPS data was acquired as an integral part of the photographic mission operations in compliance with the Shoreline Mapping Scope Of Work (SOW)

version 12. The black & white infrared photographs were acquired within the calculated MHW and MLLW tides.

Additional information concerning the Field operations can be found in the Photo Final, Ground Control and Airborne GPS Reports.

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 static GPS datasets of the reference station and the airborne kinematic GPS datasets were executed in compliance with the Shoreline Mapping SOW. Static GPS data from CORS stations was processed using Trimble® Geomatics Office™ software and the kinematic GPS datasets were processed using Applanix POSPac™ V.3.1 software. Precise satellite ephemerides were computed and standard meteorological data were applied during the data reduction process. GPS data reduction was completed by NOVA DIGITAL SYSTEMS, Inc.

Aerotriangulation

A multi-block AT strategy was implemented based on emulsion/data type (Color, IR MHW, IR MLLW). All photographs of the project were bridged using a softcopy 3D stereo photogrammetric system to establish the network of control required for the compilation phase. The photography measurements were made using the aerotriangulation module within Z/I Imaging in a Windows XP environment, on Digital Photogrammetric Workstations. All the aerotriangulation process was completed on July 10, 2005. Some refinements to the aerotriangulation process were made during the compilation process to improve accuracy. After the final analytical adjustment was performed, the RMS of the standard deviations for each triangulated ground point was calculated using the ISDM software triangulation module. These values were then used to compute a predicted horizontal circular error of 0.5 meters, based upon a 95% confidence level. An Aerotriangulation Report was written and is on file with other project data within the RSD Applications Branch (AB) Project Archive.

The project database consists of project parameters and options, camera calibration data, interior orientation parameters, ground control parameters, adjusted exterior orientation parameters, and positional listing of all measured points. Positional data is referenced to the North American Datum of 1983 (NAD 83).

Compilation

The Compilation phase of the project was accomplished by NOVA DIGITAL SYSTEMS, INC. in February 2006. Digital mapping was accomplished using BAE SOCET SET® v4.4.0 Feature Extraction software. Feature identification and the assignment of cartographic attribution were based on information extracted from the appropriate NOAA Nautical Charts, image analysis of the 1:30,000 scale natural color and tide coordinated infrared B&W photographs, and 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 Coastal

Mapping Program.

Cartographic features were compiled to meet a horizontal accuracy of 1.0 meter at the 95% confidence level. This predicted accuracy of compiled, well defined points is derived by doubling the circular error derived from the aerotriangulation statistics.

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

Date	Time (UTC)	Roll Number	Photo Numbers	Scale	Tide Level*
10-31-2003	1549-1551	0315R02	0001-0006	1:30,000	0.9 (CL)
10-31-2003	1551 - 1601	0315R02	0007 -0020	1:30,000	0.9 (NP)
10-31-2003	1624 - 1637	0315R02	0021 - 0043	1:30,000	1.2 (FR)
10-31-2003	1646 - 1650	0315R02	0044 -0053	1:30,000	1.0 (NP)
10-31-2003	1651 -1702 1726 – 1738 1804 - 1806	0315R02	0054 – 0072 0098 – 0120 0148 - 0152	1:30,000	1.3 (CL)
10-31-2003	1702 – 1725 1738 - 1803	0315R02	0073 – 0098 0121 - 0147	1:30,000	1.1 (NP)
04-30-2004	1252 - 1257	0415CN01	0001 - 0012	1:30,000	0.3 (FR)
04-30-2004	1304 - 1315	0415CN01	0013 - 0029	1:30,000	0.1 (NP)
04-30-2004	1316 - 1326	0415CN01	0030 - 0045	1:30,000	0.2 (CL)
04-30-2004	1326 -1349 1401 – 1413 1428 -1431	0415CN01	0046 – 0072 0087 – 0106 0130 - 0138	1:30,000	0.0 (NP)
04-30-2004	1349 -1400 1414 - 1427	0415CN01	0073 -0086 0107 - 0129	1:30,000	0.1 (CL)
04-30-2004	1437 - 1457	0415CN01	0139 - 0161	1:30,000	0.1 (FR)
06-20-2005	1510 - 1515	0526R02	0001 -0010	1:30,000	0.1 (NP)
06-20-2005	1516 – 1529 1712 - 1722	0526R02	0011 – 0026 0129 - 0142	1:30,000	0.1 (CL)
06-20-2005	1530 – 1555 1612 – 1625 1700 - 1712	0526R02	0027 – 0053 0076 – 0094 0118 – 0128	1:30,000	0.0 (NP)
06-20-2005	1556 – 1612 1712 – 1722	0526R02	0054 – 0075 0129 - 0142	1:30,000	0.1 (CL)
06-20-2005	1634 - 1652	0526R02	0095 - 0117	1:30,000	0.0 (FR)
06-20-2005	1723 - 1728	0526R02	0143 - 0152	1:30,000	0.1 (NP)
06-20-2005	1742 - 1743	0526R02	0153 – 0156	1:30,000	0.2 (CL)

* Tide levels are given in meters above MLLW and are based on actual observations recorded by NOS gauges at Newport (NP), Conimicut Light (CL), and Fall River (FR). The range of tide at Newport is 1.1 meters, and the range at the remaining gauges is 1.3 meters.

Quality Control / Final Review

Quality control operations of all the project phases were conducted by NOVA personnel. The final QC review was completed in December 1, 2006. The review process included analysis of aerotriangulation results and assessment of the identification and attribution of cartographic features within the GC according to image analysis and criteria defined in C-COAST.

Comparisons of the largest scale NOAA nautical charts with the natural color and black & white IR photographs and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following NOAA nautical charts were used for chart comparison:

CHART	EDITION	SCALE
13218 Martha's Vineyard to Block Island	38th Ed., Mar 10/01	Scale 1:80,000
13219 Point Judith Harbor	12th Ed., Oct 6/01	Scale 1:15,000
13221 Narragansett Bay	55th Ed., Dec 2004	Scale 1:40,000
13223 Narragansett Bay incl Newport Hbr	36th Ed., Nov 3/01	Scale 1:20,000
13224 Providence R. and Head of Narr. Bay	36th Ed., Dec 1/01	Scale 1:20,000
13225 Providence Harbor	33rd Ed., Dec 9/00	Scale 1:10,000
13226 Mount Hope Bay	6th Ed., Jan/04	Scale 1:20,000
13227 Fall River Harbor	13th Ed., May 17/97	Scale 1:10,000
13228 Westport River and Approaches	11th Ed., May 17/97	Scale 1:20,000

The quality control process concluded with an inspection of topological connectivity within the GC using PLTS Foundation for ArcGIS and ET GeoWizards ver.9.5.1 Software. All project data was evaluated for compliance to CMP requirements.

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 Final Photo Mission Report
- Hardcopy of the Airborne Positioning and Orientation Report
- Hardcopy of the Ground Control Report
- Hardcopy of the Aerotriangulation Report
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot of GC10585 file contents, attached to PCR

Remote Sensing Division Electronic Data Library

- Project database
- GC10585 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

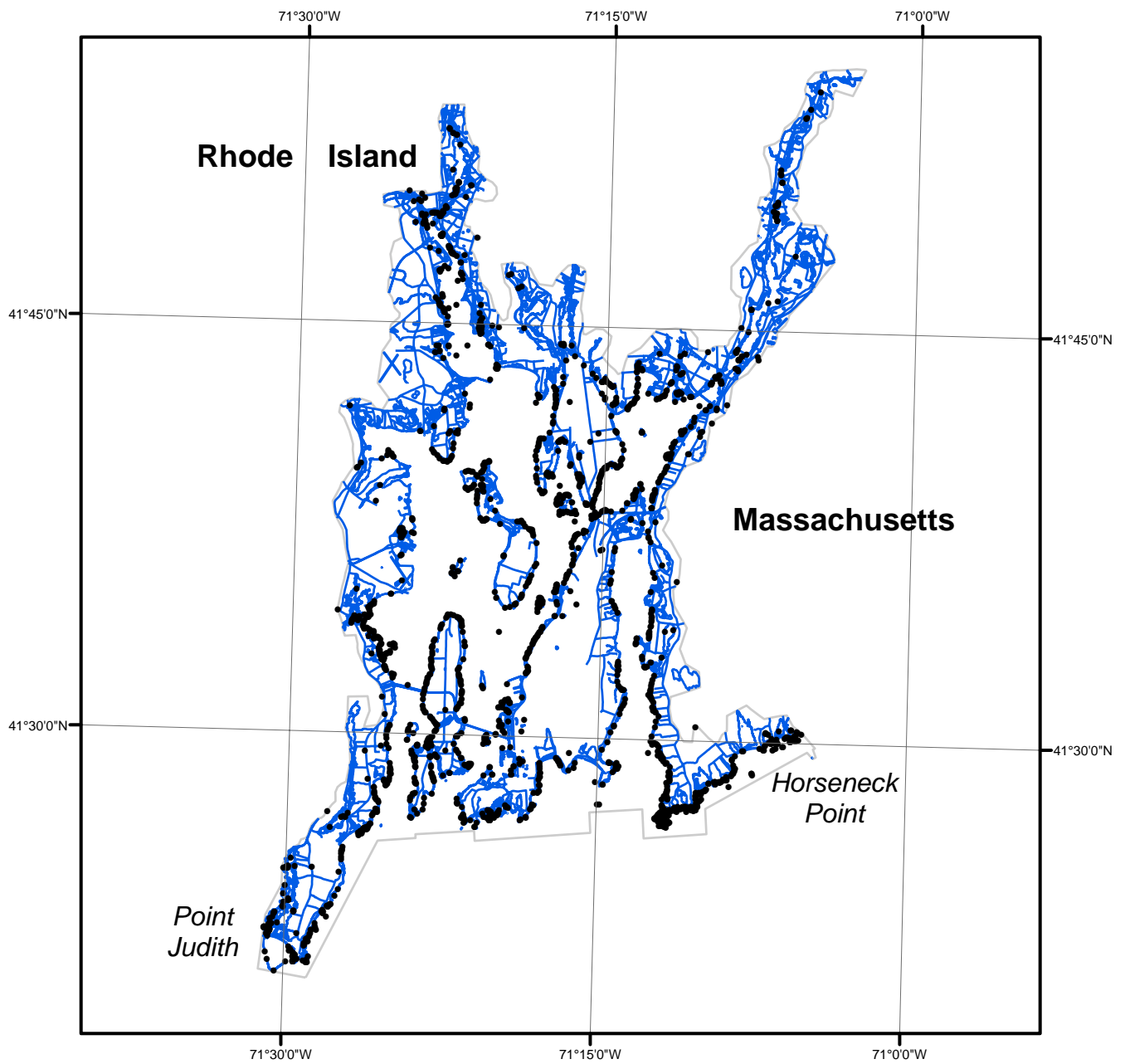
NOAA Shoreline Data Explorer

- GC10585 in shapefile format
- Metadata file for GC10585
- Digital copy of the PCR in Adobe PDF format

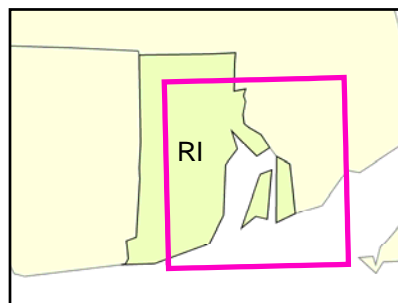
End of Report

NARRAGANSETT BAY

RHODE ISLAND



Overview



RI0301

GC10585