NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT NY0503

Port of New York and New Jersey

Introduction

Coastal Mapping Program (CMP) Project NY0503 provides highly accurate digital shoreline data for key areas of change within the Port of New York and New Jersey. The Geographic Cell (GC) may be used in support of the NOAA Nautical Charting Program (NCP) as well as geographic information systems (GIS) for coastal zone management applications.

Project Design

The design of Project NY0503 was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for timely updates to NOAA's Electronic Navigational Chart 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. Refer to the Port of New York and New Jersey CSCAP Analysis memo for details regarding the chart comparison process.

Field Operations

Field operations consisted of the collection of static GPS data as a means of enhancing the geopositioning of one out of nine satellite images for which field control was necessary. The GPS data was collected by Navigation Response Team 5 of the Navigational Services Division, Office of Coast Survey. Twenty-five well-distributed ground control points were surveyed using current GPS surveying methods throughout IKONOS image NY0503_ik_0030002 covering the Staten Island, NY area. These twenty-five points were based on preferred point location information provided by the Applications Branch. Please refer to the Staten Island GCP Descriptive Report for details regarding control point collection methods and accuracy.

Georeferencing

All nine satellite images were georeferenced by a member of the Applications Branch (AB) using ERDAS Imagine software version 9.0. An accuracy assessment was also performed by a member of AB. The Circular Error (CE) of the residuals for each image was tripled to yield a conservative predictor of the accuracy of well defined points measured during compilation. The horizontal accuracy at the 95% confidence level of the reference source data was also added to the tripled CE value to arrive at a final figure for the shoreline accuracy statement. All positional data is referenced to the North American Datum of 1983. Please refer to the NY0503 Georeferencing Report for more details.

Image NY0503_ik_0030002 was georeferenced using 5 GPS control points collected by the field and the remaining 20 points for the accuracy assessment. The RMS of the residuals for each check point was used to compute a predicted horizontal circular error (CE) of 1.1 meters based on a 95% confidence level. The shoreline accuracy statement value was 3.7 meters.

Four of the nine IKONOS satellite images were georeferenced using Digital Orthorectified Quarter Quads from the State of New Jersey as sources of control. The resolution of these DOQQ's is equal to one foot or 0.30 meters. The horizontal accuracy of the DOQQ imagery at the 95% confidence level is +/- 4.0 feet or 1.2 meters. Control and check points were measured between the source data and the satellite imagery for the accuracy assessment. The RMS of the residuals for each check point was used to compute a predicted horizontal circular error (CE) at the 95% confidence level for each image:

Image Name	Circular Error	Shoreline Accuracy Statement
ny0503_ik_0030000	0.50 m	2.7 m
ny0503_ik_0010002	0.42 m	2.4 m
ny0503_ik_0030003	0.37 m	2.3 m
ny0503_ik_0040000	1.88 m	6.8 m

Three IKONOS images were georeferenced using previously aerotriangulated imagery from an earlier RSD acquisition project: NY9904. Control points used in the Georeferencing process were selected in a well-distributed arrangement from the highly accurate aerial photography. The horizontal accuracy at the 95% confidence level for this imagery is 0.90 meters (see the NY9904 and Aerotriangulation Report for AT methods and results). Independent check points were then measured between the source data and the satellite imagery for the accuracy assessment. The RMS of the residuals for each check point was used to compute a predicted horizontal circular error (CE) at the 95% confidence level for each image:

Image Name	Circular Error	Shoreline Accuracy Statement
ny0503_ik_0000000	0.85 m	3.5 m
ny0503_ik_0020000	1.06 m	4.1 m
ny0503_ik_0010000	1.28 m	4.8 m

The last satellite image ny0503_ik_0010001 was georeferenced from aerial photography acquired under the NY9904 coastal mapping project but the photography covering the area of the satellite image was aerotriangulated during the course of this project using Socet Set v. 5.2, MST module. Control points used in the Georeferencing process were selected in a well-distributed arrangement from the highly accurate aerial photography. The horizontal accuracy at the 95% confidence level for the imagery is 2.90 meters. Independent check points were then measured between the source data and the satellite imagery for the accuracy assessment. The RMS of the residuals for each check point was used to compute a predicted horizontal circular error (CE) at the 95% confidence level giving a value of 1.09 meters. The shoreline statement accuracy value is 6.2 meters. Please refer to the NY9904 Control AT Report for more detailed methodology.

Compilation

The compilation of cartographic feature data for this project was accomplished by a member of the Applications Branch of RSD in September 2006. Digital feature data was compiled in ESRI shapefile format from imagery using ESRI's ArcGIS 9.1 desktop GIS software. Feature attributes were established using the C-COAST specification file, which provides the definition and attribution scheme for the full range of cartographic features pertinent to the CMP.

Cartographic features were compiled to meet the horizontal accuracy at the 95% confidence level for each image. This predicted accuracy of well-defined points is based on a minimum of twenty (20) check points that were compared to an independent source of higher accuracy.

Image #	Image Source	Source ID	AB File Name	Acquisition Date/Time (GMT)	Tide Stage
1	IKONOS	2005092815561450000011614640	ny0503_ik_0000000.tif	2005-09-28 / 15:56	0.55
2	IKONOS	2005092815564820000011614641	ny0503_ik_0020000.tif	2005-09-28 / 15:56	0.54
3	IKONOS	2005092815563090000011614642	ny0503_ik_0010000.tif	2005-09-28 / 15:56	0.54
4	IKONOS	2005092815563090000011614642	ny0503_ik_0030000.tif	2005-09-28 / 15:57	0.54
5	IKONOS	2005092815563090000011614642	ny0503_ik_0010001.tif	2005-09-28 / 15:56	0.54
6	IKONOS	2005092815570840000011614643	ny0503_ik_0030002.tif	2005-09-28 / 15:57	0.54
7	IKONOS	2005092815570840000011614643	ny0503_ik_0030003.tif	2005-09-28 / 15:57	0.55
8	IKONOS	2005092815572470000011614644	ny0503_ik_0040000.tif	2005-09-28 / 15:57	0.54
9	IKONOS	2005092815563090000011614642	ny0503_ik_0010002.tif	2005-09-28 / 15:56	0.55

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS gauges at The Battery, New York Harbor, Bergen Point West Reach, Kill Van Kull and Sandy Hook at the time of photography. No substations were used. The elevation of MHW at The Battery, New York Harbor is 1.4 meters above MLLW. The elevation of MHW at Bergen Point West Reach, Kill Van Kull is 1.6 meters above MLLW. The elevation of MHW at Sandy Hook is 1.5 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of the Applications Branch of RSD. The final QC review was completed in September 2006. The review process included analysis of the georeferencing results and assessment of the identification and attribution of cartographic features 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 9.1. The entire suite of project products was evaluated for compliance to CMP requirements.

Comparisons of the largest scale NOAA Electronic Navigational Charts (ENCs) with satellite imagery and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following ENCs were used in the comparison process:

ENC Cell	ENC Ed.	ENC Correction Date	Chart No.	ENC Download Date
US5NJ11M	2	18-AUG-2005	12331	21-OCT-2005
US5NJ12M	2	07-JUL-2005	12332	21-OCT-2005
US5NJ13M	5	25-AUG-2005	12333	21-OCT-2005
US5NY1CM	3	26-AUG-2005	12334	24-OCT-2005
US5NY1DM	3	26-AUG-2005	12335	21-OCT-2005
US5NJ14M	2	17-JUN-2005	12337	21-OCT-2005
US5NY11M	3	25-JUL-2005	12338	21-OCT-2005
US5NY12M	3	18-JUL-2005	12339	21-OCT-2005
US5NY1EM	2	01-JUL-2005	12341	02-NOV-2005
US5NY18M	4	05-JUL-2005	12401	21-OCT-2005
US5NY19M	2	17-JUN-2005	12402	21-OCT-2005

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 Project Completion Report (PCR)
- Page size graphic plot of GC10629 file contents, attached to PCR
- CSCAP evaluation memorandum

Remote Sensing Division Electronic Data Library

- GC10629 in shapefile format
- Digital copy of the PCR in Adobe PDF format
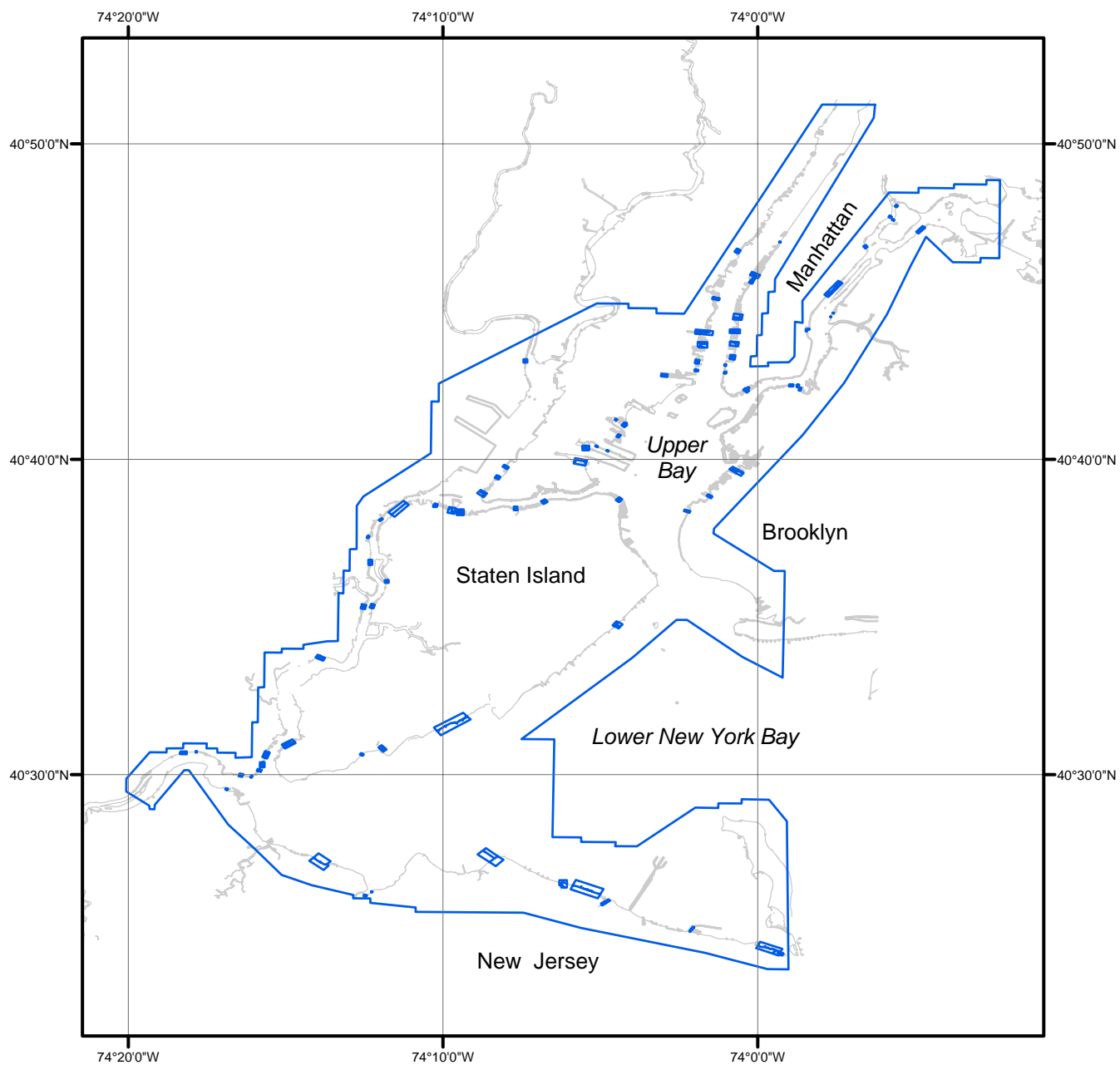- Chart Evaluation File in shapefile format

NOAA Shoreline Data Explorer

- GC10629 in shapefile format
- Metadata file for GC10629
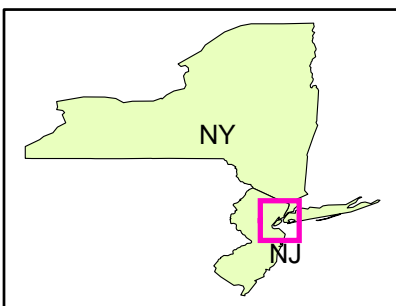- Digital copy of the PCR in Adobe PDF format

End of Report

PORT OF NEW YORK AND NEW JERSEY

NEW YORK / NEW JERSEY

74°20'0"W 74°10'0"W 74°0'0"W

40°50'0"N

Manhattan

40°40'0"N

Upper Bay

Brooklyn

Staten Island

Lower New York Bay

40°30'0"N

New Jersey

74°20'0"W 74°10'0"W 74°0'0"W

Overview

NY

NJ

NY0503

GC10629