

**ANNUAL ADMINISTRATIVE REPORT FOR INVENTORIES AND VITAL
SIGNS MONITORING**

FY2009

NORTHEAST COASTAL AND BARRIER NETWORK (NCBN)

Assateague Island National Seashore (ASIS), Cape Cod National Seashore (CACO), Colonial National Historical Park (COLO), Fire Island National Seashore (FIIS), Gateway National Recreation Area (GATE), George Washington Birthplace National Monument (GEWA), Sagamore Hill National Historic Site (SAHI), and Thomas Stone National Historic Site (THST)

Northeast Coastal and Barrier Network Approval Signatures

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Executive Summary

Northeast Coastal and Barrier Network (NCBN) FY 2009 Annual Administrative Report

The Northeast Coastal and Barrier Network (NCBN) includes eight parks located along the Atlantic coast from Massachusetts to Virginia. These parks represent some of the most ecologically similar collections of lands within the National Park Service. They consist of critical coastal habitat for many rare and endangered species, as well as migratory corridors for birds, sea turtles, and marine mammals. They also protect vital coastal wetlands, essential to water quality, fisheries, and the biological diversity of coastal, near shore, and terrestrial environments. These parks represent islands of protected lands within the urban sprawl of the Northeast. Census estimates indicate that populations residing within this zone are growing three times the rate of the total U.S. population. Pressures such as urban encroachment, pollution, and sea level rise and other effects of climate change make these coastal parks vulnerable to extreme ecosystem degradation, creating a unique management challenge. Scientifically-based data and information on the condition of these park natural resources are key to developing effective management to both maintain and restore coastal park ecosystems. The NCBN Inventory and Monitoring Program has been developed to assist and provide parks with credible, defensible scientific information that can be used in a management context to predict both natural- and human-induced changes to conditions of park natural resources. The following summary provides an update for FY09 on specific inventory and monitoring projects being developed, implemented, and completed by the NCBN program.

This year the Network received a total of \$792,100 in Vital Signs Monitoring funding to continue implementing monitoring in the coastal parks, \$86,500 from the NPS Water Resources Division to assist with the Network's estuarine water quality monitoring program, \$16,048 from the Vegetation Mapping Program, and \$17,000 from the Regional I&M Coordinator funds, following the vacancy of that position.

Reports from the Network's inventories continued to be formatted and published in the NPS Northeast Region Technical Report Series. Nine new reports were completed this year and are available on the NER Science website (<http://www.nps.gov/nero/science/>) as well as the NCBN website (<http://science.nature.nps.gov/im/units/ncbn/>). All associated data

products have been uploaded and are available to parks on the NPS Data Store (<http://science.nature.nps.gov/nrdata/index.cfm>). Because over 30 reports have been generated as part of the NCBN inventory program, the Network continues to format, publish, and upload the backlog of reports as time permits.

Five of the 8 vegetation maps are complete and available on the USGS Vegetation Characterization Program website (<http://biology.usgs.gov/npsveg/products/parkname.html>): COLO, GEWA, SAHI, GATE and FIIS. The CACO map and products have been delivered to the park and Network and are currently in review. ASIS and THST will continue to be worked on in FY10 by NatureServe with field accuracy assessments and map completion. Contaminants inventories were completed this year for each of the Network parks by Rutgers's cooperators.

NCBN Vital Signs Monitoring continued in FY09 with cooperative agreements being established with scientists from the University of Rhode Island (URI), Virginia Institute of Marine Science (VIMS), and the Seagrass Ecology Lab at SUNY Stony Brook in New York. Four interagency agreements were also implemented with USGS scientists from the Patuxent Wildlife Research Center and the Center for Coastal Studies in St. Petersburg, FL. Estuarine nutrient enrichment monitoring (water quality) continued at FIIS and GEWA. A third year of seagrass monitoring was completed at FIIS with the assistance of Dr. Brad Peterson from SUNY Stony Brook, and monitoring was conducted for the first year at ASIS by Ken Moore, VIMS. This year the Network's Ocean Shoreline Position protocol, along with a prototype annual report completed for FIIS, was submitted for external peer review. Once reviewers have submitted all comments, the authors will respond and modify the protocol and annual report format as needed, and the protocol will be published. Ocean shoreline position monitoring data continue to be collected twice a year in four of the Network's parks (CACO, FIIS, ASIS, GATE). In late 2008, in collaboration with scientists from Rutgers University, the second phase of protocol development for monitoring coastal topography – beach and dune topography – was initiated. As part of this initiative the Network will be developing a prototype trend report of beach and dune topography monitoring data from ASIS. The first draft of the topography protocol is due to NCBN in late fall, 2009. Collaboration has also continued with the URI Geosciences Department and the USGS to develop baseline historical topography that can be utilized in long-term topographic change analyses in four Network parks: CACO, FIIS, GATE (Sandy Hook Unit), and ASIS. These data will be exceptionally useful to the Network and parks for

enhanced understanding of how the elevation and volume of the beach and dune system has changed over a long (half-century) time period. The data will be used to help predict and manage for the effects of global warming, such as sea-level rise and increased storm intensity, by comparing these historic data sets to those currently being collected by the Network. These products are due to be delivered to the Network in late fall, 2009. Another important part of the Network's coastal geomorphological monitoring program is the collection of LiDAR data on a biennial cycle. The NCBN and staff from the USGS Florida Integrated Science Center collaborated on collecting and processing EAARL LiDAR for both FIIS and GATE.

I. Program Accomplishments

Inventories

Inventory accomplishments:

- Products from the Network's inventories continue to be formatted and published in the NPS Northeast Region Technical Report Series. Nine new reports were completed this year and are available on the NER Science website (<http://www.nps.gov/nero/science/>) as well as the NCBN website (<http://science.nature.nps.gov/im/units/ncbn/>). All associated data products have been uploaded and are available to parks on the NPS Data Store (<http://science.nature.nps.gov/nrdata/index.cfm>).
- Five of the 8 vegetation maps are complete and available on the USGS NVC website (<http://biology.usgs.gov/npsveg/products/parkname.html>): COLO, GEWA, SAHI, GATE, and FIIS. The CACO map and products have been delivered to the park and Network, and are currently in review. ASIS and THST will continue to be worked on in FY10 by NatureServe. Field accuracy assessment work was completed for ASIS in Sept-Oct 2009.
- A new aerial photo archive for NCBN was established with the USGS Earth Resources Observation and Science (EROS) Center in Sioux Falls, SD. Data for three of the five completed parks are now available to parks and the public via the USGS EarthExplorer search / download tool, and data for the remaining two parks have been delivered to EROS for posting.
- NCBN staff worked with Northeast Temperate Network (NETN), North Carolina State University (NCSU), and NY Natural Heritage Program staff to develop an

SOP for including digital photos of sampling and accuracy assessment areas in the NPS-PLOTS 2.0 Database, thus allowing users to easily search images associated with NPS I&M vegetation mapping projects.

- Contaminant inventories for each of the Network parks were completed this year. Eight reports have been submitted to the Network along with a detailed protocol for how the information was gathered. These reports have been reviewed and are currently being formatted and will soon be published in the NER Technical Report Series.
- Compilation and cataloging of existing data into NPSpecies continued. Verification, review, and certification by taxa experts of park NPSpecies databases were completed for FIIS (plants), ASIS (birds), and GEWA (bioblitz data), and were started for GATE (plants) and SAHI (plants). Linda Fabre, a cooperator from the University of Rhode Island is developing individual reports for each park that document how the database was populated, providing information on all data sources used.
- Compilation and cataloging of existing data into NatureBib continued for existing I&M products. Assistance was provided to park staff to update records, identify duplicates, and identify any sensitive information prior to the recent implementation of the NPS Citation Management Service.
- Bioblitz participation: Linda Fabre, NCBN cooperator, traveled this year to take part in two GEWA Bioblitzes. Linda beta-tested the National Bioblitz database and on return also entered all documented species into NPSpecies and provided species lists back to the park as results.
- The insect inventory initiated in 2006 was completed for ASIS in 2008, with 625 arthropod species identified in the park. Additional funds were provided jointly by NCBN and ASIS to produce an Assateague Island Arthropod Photo Guide. The purpose of this guide is to provide the park staff and visitors with a tool to identify the more conspicuous arthropods found on the island.
- The submerged marine resources mapping pilot project report was completed and submitted
- Bathymetry and sediment data collection for the Virginia Coastal Bays was completed and reviewed and all products were submitted to ASIS who partnered with NCBN and the Maryland Geological Survey (MGS) to conduct this work.
- The first draft of the Network's marine inventory and mapping plan was submitted to the Network in Sept 2009 by USGS cooperators. The network is waiting for a more complete version before sending it out for review.

Inventory products:

- FIIS- FIIS Biotic Synthesis final report received Sept 2009-will be reviewed and formatted for publication. Cooperator Carol Trocki, URI.
- GATE- Breeding Bird Survey Report completed, reviewed, and ready for formatting and publication. Cooperators, NJ Audubon Society.
- COLO- Vegetation Classification and Mapping at Colonial National Historical Park. All products posted to: <http://biology.usgs.gov/npsveg/colo/index.html>
- GEWA- Vegetation Classification and Mapping at George Washington Birthplace National Monument. All products posted to: <http://biology.usgs.gov/npsveg/gewa/index.html>
- SAHI- Vegetation Classification and Mapping at Sagamore Hill National Historic Site. All products posted to: <http://biology.usgs.gov/npsveg/sahi/index.html>
- CACO- Sneddon, L.A., Zaremba, Z.E., and M. Adams. In Draft. Vegetation Classification and Mapping at Cape Cod National Seashore. Technical Report NPS/NER/NRTR—xxxx/xxxx. National Park Service. Philadelphia, PA. Draft report in review with NPS.
- Inventory and Acquisition Strategy for Priority Data on Marine and Estuarine Resources: National Park Service Northeast Region. Draft Report (Sept 2009) Kopp, B.S. and H.A. Neckles. Reviewed; waiting on final version and completion.
- GATE-Plumb Beach Benchmark Locations Booklet. Psuty, N. and Tanya Silveira. Rutgers Cooperators.
- GATE-Kingman Mills Benchmark Locations Booklet, Dennehy, Peter. GeoCorp Volunteer Program. NCBN.
- GATE-Great Kills Park Benchmark Locations Booklet, Psuty, N. and Tanya Silveira. Rutgers Cooperators.
- CACO- Cooper, K. R. and Borjan, M. February 2008. Northeast Coastal and Barrier Network Assessment of Contaminant Threats at Cape Cod National Seashore. Technical Report NPS/NER/NRTR—2009/XXX (are you planning to publish all these in 2009?). National Park Service. Philadelphia, PA. Reviewed, accepted, being formatted for publication.
- COLO- Cooper, K. R. and Borjan, M. February 2008. Northeast Coastal and Barrier Network Assessment of Contaminant Threats at Colonial National Historical Park. Technical Report NPS/NER/NRTR—2009/XXX. National Park Service. Philadelphia, PA. Reviewed, accepted, being formatted for publication.

- THST- Cooper, K. R. and Borjan, M. February 2008. Northeast Coastal and Barrier Network Assessment of Contaminant Threats at Thomas Stone National Historic Park. Technical Report NPS/NER/NRTR—2009/XXX. National Park Service. Philadelphia, PA. Reviewed, accepted, being formatted for publication.
- GEWA- Cooper, K. R. and Borjan, M. February 2008. Northeast Coastal and Barrier Network Assessment of Contaminant Threats at George Washington Birthplace National Monument. Technical Report NPS/NER/NRTR—2009/XXX. National Park Service. Philadelphia, PA. Reviewed, accepted, being formatted for publication.
- ASIS- Cooper, K. R. Borjan, M. February 2008. Northeast Coastal and Barrier Network Assessment of Contaminant Threats at Assateague Island National Seashore. Technical Report NPS/NER/NRTR—2009/XXX. National Park Service. Philadelphia, PA. Reviewed, accepted, being formatted for publication.
- GATE- Cooper, K. R. and Borjan, M. February 2008. Northeast Coastal and Barrier Network Assessment of Contaminant Threats at Gateway National Recreation Area. Technical Report NPS/NER/NRTR—2009/XXX. National Park Service. Philadelphia, PA. Reviewed, accepted, being formatted for publication.
- FIIS- Cooper, K. R. and Borjan, M. February 2008. Northeast Coastal and Barrier Network Assessment of Contaminant Threats at Fire Island National Seashore. Technical Report NPS/NER/NRTR—2009/XXX. National Park Service. Philadelphia, PA. Reviewed, accepted, being formatted for publication.
- SAHI- Cooper, K. R. and Borjan, M. February 2008. Northeast Coastal and Barrier Network Assessment of Contaminant Threats at Sagamore Hill National Historic Site. Technical Report NPS/NER/NRTR—2009/XXX. National Park Service. Philadelphia, PA. Reviewed, accepted, being formatted for publication.
- ASIS-NPSpecies Database Background and Data Source Information for Assateague Island National Seashore. Linda Fabre, URI
- COLO- NPSpecies Database Background and Data Source Information for Colonial National Historical Park. Linda Fabre, URI
- SAHI- NPSpecies Database Background and Data Source Information for Sagamore Hill National Historic Park. Linda Fabre, URI
- THST- NPSpecies Database Background and Data Source Information for Thomas Stone National Historic Site. Linda Fabre, URI
- GEWA- NPSpecies Database Background and Data Source Information for George Washington Birthplace National Monument. Linda Fabre, URI
- FIIS- NPSpecies Database Background and Data Source Information for Fire Island National Seashore. Linda Fabre, URI

Inventory Reports Published in NER Technical Report Series in FY09:

- Atkinson, James B. March 2008. Fish Inventories of Mid-Atlantic and Northeast Coastal and Barrier Network Parks with Virginia, Maryland and Pennsylvania. Technical Report NPS/NER/NRTR—2008/113. National Park Service. Philadelphia, PA.
- Mitchell, J. C. March 2008 . Inventory of Amphibians and Reptiles of Thomas Stone National Historic Site. Natural Resources Report NPS/NER/NRTR-2008/111. National Park Service. Philadelphia, PA.
- Barton, H. April 2005. Avian Inventory of Sagamore Hill National Historical Site. Natural Resources Report NPS/NER/NRTR--2008/119. National Park Service. Philadelphia, PA.
- Mitchell, J. C. March 2008. Inventory of Amphibians and Reptiles of George Washington Birthplace National Monument. Natural Resources Report NPS/NER/NRTR-2008/110. National Park Service. Philadelphia, PA.
- Bradshaw, D. March 2008. George Washington Birthplace National Monument Avian Inventory. Technical Report NPS/NER/NRTR—2008/112. National Park Service. Philadelphia, PA.
- Edinger, G. J., A. L. Feldmann, T. G. Howard, J. J. Schmid, E. Eastman, E. Largay, and L. A. Sneddon. 2008. Vegetation Classification and Mapping at Gateway National Recreation Area. Technical Report NPS/NER/NRTR—2008/107. National Park Service. Philadelphia, PA.
- Edinger, G. J., A. L. Feldmann, T. G. Howard, J. J. Schmid, E. Eastman, E. Largay, and L. A. Sneddon. 2008. Vegetation Classification and Mapping at Sagamore Hill National Historic Site, New York. Technical Report NPS/NER/NRTR—2008/124. National Park Service. Philadelphia, PA.
- Patterson, K. D. 2008. Vegetation Classification and Mapping at Colonial National Historical Park, Virginia. Technical Report NPS/NER/NRTR—2008/129. National Park Service. Philadelphia, PA.
- Patterson, Karen D. 2008. Vegetation Classification and Mapping at George Washington Birthplace National Monument, Virginia. Technical Report NPS/NER/NRTR—2008/099. National Park Service. Philadelphia, PA.

Vital Signs Monitoring

Protocol Implementation and Development:

- **Forest health monitoring** was conducted for the second consecutive year at GEWA and THST, and for the first year at SAHI in collaboration with the Northeast Temperate Network and the Mid-Atlantic Network. The three Networks shared biological technicians to collect data and will continue to do so annually in these three Network parks.
- **Ocean shoreline position monitoring** continued during both the fall and spring at FIIS, GATE, ASIS and CACO, following the Network's *NCBN Geomorphological Monitoring Protocol-Phase I Shoreline Position*. This protocol was submitted for external peer review, along with a prototype annual report completed for FIIS. Once reviewers have submitted all comments, the authors will respond and modify the protocol and annual report format as needed, and the protocol and report will be published.
- A new geodatabase was developed for the NCBN Shoreline Position Change monitoring protocol to facilitate data analysis and the generation of annual / trend reports.
- **Coastal topography monitoring** collaboration began with scientists from Rutgers University to develop the second phase of protocols for monitoring shoreline, beach and dune topography. As part of this initiative the Network will be developing a prototype trend report for shoreline monitoring at ASIS. The first draft of the topography protocol is due to NCBN late fall, 2009.
- As a component of the coastal topography monitoring program, Geodetic Benchmarks were established this year at a number of sites at GATE, and booklets were created to identify attributes of each of the sites. These benchmarks will be used as part of the park and NCBN coastal change monitoring program.
- **Estuarine nutrient enrichment monitoring** was conducted at FIIS under a cooperative agreement with Dr. Brad Peterson, Seagrass Ecology Lab, SUNY Stony Brook.
- **Estuarine nutrient enrichment monitoring** was conducted at GEWA under cooperative agreement with Dr. Ken Moore, Virginia Institute of Marine Science (VIMS). The monitoring index period at GEWA occurred during the four week period of July 21 through August 12, 2009. A continuous water quality monitoring station (LS), using a NPS-owned YSI 6600 Multi-Parameter Water Quality Logger upgraded with two wiped LiCor PAR sensors, was deployed and maintained by VIMS staff during this index period. Chlorophyll samples were sent to CACO North

Atlantic Coast Laboratory for analyses. Results have been returned to VIMS. Data reduction has now begun for all monitoring conducted by VIMS.

- Data collected as part of the piloting of the ***estuarine nutrient enrichment monitoring*** protocol collected in 2005-2006 at COLO, GATE, and ASIS were analyzed and reviewed to assure data meet the objectives of assessing resource condition in these parks. A final report has been completed and peer reviewed and will be published in FY10.
- Updates were completed by the NCBN Data Manager to the NCBN Estuarine Nutrient Enrichment Water Quality database and user guide to facilitate data uploads to STORET.
- ***Seagrass monitoring***-NPS cooperators (Blaine Kopp and Hilary Neckles) traveled to ASIS in June of 2009 to train Virginia Institute of Marine Science staff on NCBN SeagrassNet protocols and establish permanent transects. Transects were established on June 9, 2009. TidbiT temperature loggers were deployed at this time. A continuous water quality monitoring station was also deployed and maintained by the ASIS staff during this survey period. VIMS personnel traveled back to ASIS and successfully performed the summer SeagrassNet survey on June 24, 2009. Biomass samples were collected and processed. Sediment and voucher specimens were also collected. VIMS personnel conducted the fall SeagrassNet survey on October 6, 2009.
- Dr. Peterson (SUNY Stony Brook) collected the third year of pilot monitoring data on seagrass condition at FIIS.
- ***Salt marsh vegetation and nekton monitoring*** was implemented at FIIS and SAHI this year adding a number of new marsh sites. Six marshes on FIIS and three marshes the William Floyd Estate Unit were sampled for the first time. Eel Creek marsh was sampled at SAHI. A research associate from the University of Rhode Island assisting on the project – along with two NCBN seasonal biological technicians and one URI student hired through the Student Temporary Employment Program (STEP) – were stationed at FIIS and completed the sampling. All data for the 2009 field season are entered and currently undergoing quality control procedures. FIIS provided housing and boat transportation for all staff.
- ***Salt marsh elevation monitoring*** continued with data being collected at CACO, GATE, and FIIS. Dr. Don Cahoon, USGS cooperator, collected data at all sites 2 times during the year. Installation of 16 SETs at four marshes was completed at ASIS during June 2009. All of the SETs installed at ASIS are collocated with the permanent salt marsh vegetation and nekton monitoring sites. Monitoring data will

- begin to be collected at ASIS during the fall of 2009 by USGS cooperators.
- The NCBN Data Manager began collaboration with the National Capital Region Network data manager and USGS cooperators to begin development of a common Salt Marsh Sediment Elevation Monitoring database.
 - The USGS Coastal and Marine Geology (CMG) Program in collaboration with NCBN conducted airborne LiDAR surveys in April-June 2009 at FIIS and GATE. The survey, which was co-funded by USGS and NPS, took 3 survey days to complete and resulted in the acquisition of 48 Gigabytes of raw laser and digital photography (RGB and CIR) data. These data were processed to create Digital Elevation Models of canopy and bare Earth topography in FY09. The first surface and bare earth elevation data products will be delivered to NPS in FY10. These products will also be published as a USGS Data Series Report.
 - CIR photography acquired during recent LiDAR surveys at ASIS, GATE, FIIS, and GEWA were geo-referenced and delivered to NCBN.
 - **Historic topographic model development** continued through a cooperative agreement with the University of Rhode Island Geosciences department and USGS for FIIS, GATE, ASIS and CACO. These models will allow the Network to analyze topographic change within these parks over decades and will assist in assessing the effects of climate change on these coastal systems. This project is due to be completed in FY10.

Monitoring Products:

- FIIS-Historical DEM from 1969 completed. Draft products include topographic point data and grids, orthophotographs and accompanying metadata. Products will be sent for peer review when products from all four parks have been received.
- CACO-Historical DEM from 1951 completed. Draft products include topographic point data and grids and orthophotographs. Metadata targeted for completion by the cooperator in Oct. 2009. Products will be sent for peer review when products from all four parks have been received.
- ASIS-Historical DEM from 1976 is currently under construction . Draft topographic point data and grids, orthophotographs and metadata targeted for completion by the cooperator in Oct. 2009. Products will be sent for peer review when products from all four parks have been received.
- GATE – Rockaway to Breezy Point -Historical photography from 1953 has been obtained. Full processing and creation of draft topographic point data and grids, orthophotographs and accompanying metadata targeted for completion by the

cooperator in Nov. 2009. Products will be sent for peer review when products from all four parks have been received. Using the historic DEM data for the 4 coastal parks, digital elevation difference maps will be created using the historical topography and recent lidar data.

- EAARL LiDAR data collected in 2008 for ASIS (bare earth and first surface topography data in GeoTIFF and ASCII x,y,z format) were submitted by USGS. The NCBN Data Manager reviewed and accepted the final products and disseminated them to park Natural Resource staff.
- EAARL LiDAR data collected in 2008 for GEWA (bare earth and first surface topography data in GeoTIFF and ASCII x,y,z format) were submitted by USGS. The NCBN data manager reviewed and accepted the final products and disseminated them to park Natural Resource staff.
- FIIS- A draft annual report for the ocean shoreline position monitoring conducted by the Network in 2007-2008 has been completed and has been sent out for peer review.
- ASIS- Draft Salt Marsh Vegetation and Nekton Community Monitoring at Assateague Island National Seashore 2008 Data Summary Report. In Review by NCBN staff.
- GEWA- Draft Salt Marsh Vegetation and Nekton Community Monitoring at George Washington Birthplace National Monument 2008 Data Summary Report. In Review by NCBN staff.
- COLO- Draft Salt Marsh Vegetation Monitoring at Colonial National Historical Park 2008 Data Summary Report. In Review by NCBN staff.
- Kopp, B. S., M. Nielsen, D. Glisic, and H. A. Neckles. 2009. Estuarine water quality in parks of the Northeast Coastal and Barrier Network: Development and early implementation of Vital Signs estuarine nutrient-enrichment monitoring, 2003-06. Natural Resource Technical Report NPS/NCBN/NRTR—2009/xxx. National Park Service, Fort Collins, Colorado. Final peer reviewed report received and accepted in Sept 2009. To be published in FY10.

Data Management, Information Transfer, and Support to Park Management and the Public:

- In cooperation with the Environmental Data Center at the University of Rhode Island, the NCBN internet and intranet websites were updated and revised. Reports, newsletters, resource briefs, monitoring protocols, and other documents can now be found on the website along with information on all of the Network's Vital Signs.

(The website can be viewed at: <http://science.nature.nps.gov/im/units/ncbn/>)

- Information on all NCBN monitoring protocols, including draft protocols and protocol summaries, were updated and uploaded to the NPS Protocol database.
- For the COLO Jamestown Island project, NCBN cooperator, Linda Fabre, developed and provided to the park an Access database that included all taxa using NPSpecies data.
- The NPSpecies database was also used to generate extensive species information for NCSU cooperators working on the GEWA and THST Park Natural Resource Condition Assessment reports.
- NCBN cooperator, Linda Fabre, assisted with BioBlitz planning for GEWA, using I&M data from bat inventories and supplying plant, herpetological, and insect data from NPSpecies. She also traveled to GEWA for the event, cataloged all species, and identified and entered them into NPSpecies for the park. Linda also provided NPSpecies training to GEWA staff and provided assistance with how to use the data for natural resource education at GEWA.
- The final draft of the NCBN FIIS Biotic Resource Synthesis Report was completed and submitted to the network in Sept. 2009. This report will be reviewed by park and NCBN staff and published in the NER NRTR series in FY10.
- Network staff continued to participate in park-sponsored public science conferences and park meetings, presenting information on the NCBN's latest inventory and monitoring projects, as well as how the collected data are organized, stored, and made publicly available through national NPS data repositories.

Water Quality Monitoring

Water Resources Division funds paid for approximately one third of the NCBN water quality monitoring effort in FY2009. Monitoring efforts and products included:

- Estuarine nutrient enrichment monitoring (water quality and clarity monitoring) was conducted at FIIS under a cooperative agreement with Dr. Brad Peterson, Seagrass Ecology Lab, SUNY Stony Brook.
- Estuarine nutrient enrichment monitoring (water quality and clarity monitoring) was conducted at GEWA under cooperative agreement with Dr. Ken Moore, Virginia Institute of Marine Science (VIMS). The monitoring index period at GEWA occurred during the four week period of July 21 through August 12, 2009. A continuous water quality monitoring station (LS), using a NPS-owned YSI 6600 Multi-Parameter Water Quality Logger upgraded with two wiped LiCor PAR sensors, was deployed and maintained by VIMS staff during this index period.

Chlorophyll samples were sent to CACO North Atlantic Coast Laboratory for analyses. Results have been returned to VIMS. Data reduction has now begun for all monitoring conducted by VIMS.

- Data collected in 2005-2006 at COLO, GATE, and ASIS as part of the piloting of the estuarine nutrient enrichment protocol were analyzed and reviewed to assure data meet the objectives of assessing resource condition in these parks. A final report has been completed and peer reviewed and will be published in FY10.
- Updates were completed by the NCBN Data Manager to the NCBN Estuarine Nutrient Enrichment Water Quality database and user guide to facilitate data uploads to STORET.

II. Public Interest Highlights

- *NCBN and park staff contribute book chapter on remote sensing techniques used in Vital Signs Monitoring*-NCBN Manager, Sara Stevens, and ASIS Geologist, Courtney Schupp, co-authored a book chapter on the use of remote sensing techniques for ecological monitoring and management in coastal parks. *Remote Sensing of Coastal Environments*, edited by Yeqiao Wang, will be published by CRC press and released in November 2009. Two other chapters in this book, authored by NCBN cooperators, also feature NCBN specific projects using remote sensing techniques.
- *Historical topographic models developed for NCBN coastal parks will be invaluable to better understanding the effects of climate change*-Historical topographic models are being produced for the NCBN by University of Rhode Island and USGS cooperators for four of the NCBN parks: CACO, FIIS, GATE and ASIS. These historical topographic models are based on 1951, 1869, 1951 and 1976 aerial photography respectively, and will provide the ideal baseline information for incorporation into models that will further the understanding of the potential impacts of sea-level rise to the coastal parks. The most fundamental knowledge required for understanding how coastal systems may behave in the future is how they have behaved in the past. Historical shoreline change data exist for most areas, but analyses of such data are restricted to 2-dimensional assessments of a line near water level on the beach, thus providing little information on the back beach and dune areas. The photogrammetric products generated for this project

will be the only available source of historical topographic data for these parks.

- *The NCBN Ocean Shoreline position monitoring protocol is used internationally.* The Southhampton Council of southern England is testing the application of the NCBN Ocean Shoreline position protocol as a means to monitor shoreline changes. The ease and efficiency of this protocol, along with the wide availability of the GPS technology, were the key points in the consideration of its use.
- *The NCBN Coastal Topography monitoring protocol is used to assist coastal park with management and engineering project.* The Sandy Hook Unit of GATE is embarking upon a unique transfer of sand through a buried pipeline from areas of beach accumulation updrift to areas of beach erosion. This is the first application of sand back-passing technology in the U.S. to create a balanced sediment budget in the beach. The coastal topography protocol is being used to establish quantities of sand lost in the erosional area and quantities of sand gained in the depositional area as a basis for determining the duration and magnitude of the pipeline operation.
- *Hardcopy and Digital Aerial Photography Archive Established-* In 2009, the staff from the NCBN and the NCSU Center for Earth Observation began collaborating with the USGS Earth Resources Observation and Science (EROS) Center in Sioux Falls, SD to create a searchable archive for all hardcopy and digital aerial photography associated with NPS I&M Program Vegetation Mapping projects. The EROS Center is a leader in providing secure storage and access to photographic archives, thus ensuring the long-term availability of those archives to NPS and other government staff, scientific cooperators, and the public. By the end of FY09, over 320 original films and digital scans from four park-wide vegetation mapping projects have been transferred by NCSU for archiving at the EROS Center, with plans for the remainder to be posted within the coming months. In addition to secure storage, a primary advantage of archiving this aerial photography with the EROS Center is ease of data delivery. Datasets may be obtained using any of three methods: free download of medium-resolution scans via the public-facing USGS EarthExplorer website, secure web ordering of high-resolution

scans delivered on DVD, or interagency loan of hardcopy photographic prints and films. NCBN staff have completed production of a Standard Operating Procedure for archiving and accessing vegetation mapping aerial photography from the EROS Center, and it is expected to be adopted by all I&M Networks in the Northeast Region.

- *A Network of Sediment Elevation Tables*-Installation of 16 Sediment Elevation Tables (SET) at four marshes was completed at ASIS during June 2009 by NCBN, ASIS, and USGS staff. NCBN continues to create a network of SET monitoring throughout the parks from CACO to ASIS. The SETs installed at ASIS are collocated with the NCBN permanent salt marsh vegetation and nekton monitoring sites. Monitoring data will begin to be collected during the fall of 2009 by the Network's USGS cooperators.
- *GeoCorp America Program provides a unique opportunity for students to work on Vital Signs Monitoring*-As part of the GeoCorp America Program, Geoscientists in the Parks program, the Network hired Peter Dennehy who was stationed at GATE for the summer of 2008. Peter worked under the guidance of Dr. Norb Psuty, a Rutgers cooperator developing coastal geomorphologic monitoring protocols for the NCBN. Peter successfully completed a project at GATE installing and documenting geodetic benchmarks in the park that will be used for coastal geomorphologic monitoring. Peter completed his 3 month GeoCorp position and stayed on at the park as a volunteer working on NCBN monitoring protocols until February 2009.
- *Student Temporary Employment Program (STEP) Hires assist with NCBN Monitoring*-As part of the NCBN Salt Marsh Monitoring program, the Network plans to hire University of Rhode Island Students through the Student Temporary Employment Program (STEP) to assist with salt marsh vegetation and nekton data collection. In 2009, the first STEP student was hired and was stationed at FIIS for the summer with the Network's team of seasonal biotechs. As a student in the University's Natural Resources Science program, this provided a great opportunity to live and work in and experience a National Park.

III. Staffing

Inventory and Monitoring Staff (NCBN)

NCBN Program Manager, Sara Stevens

NCBN Data Manager, Dennis Skidds

NCBN Quantitative Ecologist, Penelope Pooler

NCBN Biologist (Salt Marsh), Erika Patenaude

NCBN Biologist (Science Communication), Vacant

NCBN Geomorphologist/GIS Specialist, Vacant

NCBN Technical Steering Committee

Sara Stevens, NPS-NERO-University of Rhode Island

Carl Zimmerman, NPS-ASIS

Michael Bilecki, NPS-FIIS

Allan O'Connell, USGS-Patuxent

John Sauer, USGS-Patuxent

Charles Roman, NPS-NERO-University of Rhode Island CESU

Hilary Neckles, USGS-Augusta, ME

Howard Ginsberg, USGS-University of Rhode Island

John Karish, NPS-NERO-Penn State University

Mary Foley, NPS-NERO-Boston

NCBN Board of Directors

Trish Kicklighter, ASIS

George Price, CACO

P. Daniel Smith, COLO

Chris Soller, FIIS

Barry Sullivan, GATE

Lucy Lawliss, GEWA/THST

Tom Ross, SAHI

Sara Stevens, NCBN Program Manager

Mary Foley, Chief Scientist Northeast Region

John Karish, I&M Program Manager Northeast Region

NCBN Contractors and Cooperators

NatureServe, Lesley Sneddon

North Carolina State University, Hugh Devine, Center for Earth Observation

Rutgers University, Keith Cooper, Department of Environmental Sciences

Rutgers University, Norbert Psuty, Institute of Marine and Coastal Sciences

USGS, Don Cahoon, Patuxent Wildlife Research Center, Laurel, MD.

USGS, Hilary Neckles and Blaine Kopp, Patuxent Wildlife Research Center, Augusta, ME

USGS, John Brock and Amar Nayagandhi, Center for Coastal Studies

NASA, Wayne Wright, Wallops Flight Facility, Wallops Island, VA

University of Rhode Island, Natural Resources Science Department (NRS), Peter Paton and Research Associate Carol Trocki

University of Rhode Island, Mary-Jane James-Pirri, Graduate School of Oceanography

University of Rhode Island, URI Environmental Data Center, Dr. Peter August (NRS faculty), Research Associates Charles LaBash, Roland Duhaime, Linda Fabre, Eric Endrulat, and Greg Bonyng.

State University of New York, Stony Brook, Dr. Brad Peterson, School of Marine and Atmospheric Science

Virginia Institute of Marine Science-Dr. Ken Moore

Eric Lamont, Private Contractor

IV. Reports, Publications, and Presentations (FY 09)

Presentations and Posters

Adams, M., Duhaime, R., and R. Bannon. 2008. Visualizing Marindin's Profiles at Cape Cod National Seashore. Presentation.

Hehre, R., and C. Hapke, 2009. Development of Historical Topographic Models of the Beach/Dune System in Northeast Coastal Parks. George Wright Society Conference on Parks, Protected Areas, and Cultural Sites, Portland, OR.

Kopp, B., R. Bannon, M. Christiano, and R. Duhaime, 2009. Inventory and Mapping Strategies for Submerged Marine Resources in National Parks of the Northeast

- Region. George Wright Society Conference on Parks, Protected Areas, and Cultural Sites, Portland, OR.
- Neckles, H., B. Kopp, B. Peterson, P. Pooler, and S. Stevens, 2009. Seagrass Monitoring in the Northeast Coastal and Barrier Network. George Wright Society Conference on Parks, Protected Areas, and Cultural Sites, Portland, OR.
- Psuty, N. P., T. Silveira, S. Stevens, and D. E. Skidds, 2009. Monitoring Coastal Topography in the Northeast Coastal and Barrier Network. George Wright Society Conference on Parks, Protected Areas, and Cultural Sites, Portland, OR.
- Schupp, C., D. Wells, and S. Stevens, 2009. Enabling Quantitative Management of the Virginia Coastal Bays at Assateague Island National Seashore. George Wright Society Conference on Parks, Protected Areas, and Cultural Sites, Portland, OR.
- Silveira, T.M. and N.P. Psuty. Measuring geomorphological changes at Sandy Hook, Gateway NRA. Coastal GeoTools 2009. March 2-5, Myrtle Beach, SC, USA. (www.csc.noaa.gov/geotools/sessions/Thurs/H03_Sylveira.pdf)
- Skidds, D. Session Chair, NPS Inventory & Monitoring (I&M) Data Managers Workshop. George Wright Society Conference on Parks, Protected Areas, and Cultural Sites, Portland, OR. (2009)
- Skidds, D. NCBN GIS / Data Management update at annual NER GIS Coordinators Meeting, ASIS, April 30, 2009. Presentation.
- Skidds, D. URI NRS Departmental Seminar, Long-term Monitoring of Shoreline Position Change in Four Northeastern Coastal Parks, April 10, 2009. Presentation.
- Skidds, D.E., S. Stevens, N. P Psuty, T. Silveira, and A. Love, 2009. Northeast Coastal and Barrier Network: Long-term Monitoring of Shoreline Position Change in Four Northeastern Coastal Parks. George Wright Society Conference on Parks, Protected Areas, and Cultural Sites, Portland, OR.
- Stevens, S. NPS Northeast Coastal and Barrier Network Inventory and Monitoring Program. NE Airborne Lidar Workshop, Woods Hole, Ma. May 5-6, 2009. Presentation.
- Swanson, J., and M. J. James-Pirri, 2009. Developing Thresholds for Salt Marsh Fish and Vegetation for the Northeast Coastal and Barrier Network. George Wright Society Conference on Parks, Protected Areas, and Cultural Sites, Portland, OR.

Reports and Publications

- Bonisteel, J.M., Nayegandhi, A., Brock, J.C., Wright, C.W., Stevens, S., Yates, X., and Klipp, E.S., 2009, EAARL Coastal Topography-Assateague Island National Seashore 2008: Bare Earth: U.S. Geological Survey Data Series 447, [URL: <http://pubs.usgs.gov/ds/447/>].
- Bonisteel, J.M., Nayegandhi, A., Brock, J.C., Wright, C.W., Stevens, S., Yates, X., and Klipp, E.S., 2009, EAARL Coastal Topography-Assateague Island National Seashore 2008: First Surface: U.S. Geological Survey Data Series 446, [URL: <http://pubs.usgs.gov/ds/446/>].
- Bonisteel, J.M., Nayegandhi, A., Brock, J.C., Wright, C.W., 2009, Morphological Change Based on Lidar-Derived Digital Elevation Models [abs.], in GSA Abstracts with Programs, Vol. 41, No. 1. p. 49.
- Kopp, B. S., M. Nielsen, H. A. Neckles, D. Glisic. 2008. Estuarine water quality within

- parks of the Northeast Coastal and Barrier Network: data report for the development and early implementation phases of Vital Signs estuarine nutrient enrichment monitoring, 2003-2006. Natural Resource Technical Report NPS/2009/NRTR—2009/xxx. National Park Service, Fort Collins, Colorado.
- Nayegandhi, Amar; Brock, John C., 2009. Airborne Lidar Remote Sensing Applications in Inventory and Monitoring for Coastal-Resource Management Abstract submitted and paper presented at the George Wright Society Meeting, Portland, Oregon, March 3-6, 2009.
- Psuty, N. and Silveira, T. 2009. Annual report for Shoreline Position monitoring at Fire Island National Seashore, conducted by the Network in 2007-2008.
- Psuty, N. P. and T.M. Silveira. Trend in foredune crestline displacement, Fire Island National Seashore, New York, USA, 1976-2005. *Journal of Coastal Research*, SI 56: 15–19.
- Psuty, N.P. and T.M. Silveira. Objectives and techniques of shoreline monitoring: Examples from the US National Park Service and the US Geological Survey. In: Eds. K. Pye and W. Ritchie, *The Measurement of Coastal Change*. Proceedings of the St. Fergus Symposium. University of Aberdeen, UK. 2009.
- Psuty, N.P. and T.M. Silveira. Trend in foredune crestline displacement, Fire Island National Seashore, 1976-2005. In: *Proceedings of the 10th International Coastal Symposium*. April 13-18, Lisbon, Portugal, 2009. ISSN 0749-0258.
- Psuty, N.P., T.M. Silveira, and A. Love. Monitoring Shoreline Changes - Sandy Hook Unit, Gateway National Recreation Area. Annual Report submitted to Mr. David Avrin, Superintendent of Sandy Hook Unit, Gateway National Recreation Area, Sandy Hook, NJ, 32p. (2009)
- Trocki, C. 2009. Biotic Synthesis Report for Fire Island National Seashore. 2003-2006. Natural Resource Technical Report NPS NRTR—2009/xxx. National Park Service, Fort Collins, Colorado.

V. Connect the Dots – Vital Signs Supporting Table for each Park

The “Connect the Dots” effort is a strategic, long-term framework (over a period of years to decades) for coordinating the efforts of the I&M Networks, Park Natural Resource Condition Assessments, park planning (e.g., Foundation Statement, General Management Plan, Resource Stewardship Strategy), park-funded monitoring and research relevant to assessing natural resource condition, and other research and monitoring efforts. A Natural Resource Summary Table will eventually be developed for each park as part of the park’s Resource Stewardship Strategy document. The Natural Resource Summary Table framework demonstrates the connection of science to management through the planning process. See [Connect the Dots Memo](#) and the [Connect the Dots Intranet Website](#) for more information and example documents.

Links to NCBN park specific tables:

http://www1.nrintra.nps.gov/im/units/ncbn/monitor/VS_Tables/NCBN_VitalSignTable_ASIS.xls

http://www1.nrintra.nps.gov/im/units/ncbn/monitor/VS_Tables/NCBN_VitalSignTable_COLO.xls

http://www1.nrintra.nps.gov/im/units/ncbn/monitor/VS_Tables/NCBN_VitalSignTable_FIIS.xls

http://www1.nrintra.nps.gov/im/units/ncbn/monitor/VS_Tables/NCBN_VitalSignTable_GATE.xls

http://www1.nrintra.nps.gov/im/units/ncbn/monitor/VS_Tables/NCBN_VitalSignTable_GEWA.xls

http://www1.nrintra.nps.gov/im/units/ncbn/monitor/VS_Tables/NCBN_VitalSignTable_SAH1.xls

http://www1.nrintra.nps.gov/im/units/ncbn/monitor/VS_Tables/NCBN_VitalSignTable_THST.xls

VI. Budget - FY2009 Annual Report Narrative

In FY09, the NCBN received \$911,648: \$792,100 from the Vital Signs Monitoring program, \$86,500 from the Water Resource Division for water quality monitoring, \$16,048 from the Vegetation Mapping Program, and \$17,000 from Regional I&M Coordinator funding. Approximately 59% of this funding was used to develop partnerships (via cooperative agreement/contracts) among the Network, USGS, and a number of CESU universities for the development and implementation of monitoring protocols and data management support. Permanent and seasonal NPS personnel expenses constituted approximately 34% of the budget in FY09. Travel (2 %) and general operations, equipment purchases, and administrative/office support (5 %) rounded out NCBN expenditures for FY09.

