

**ANNUAL ADMINISTRATIVE REPORT (FY2007) AND
WORK PLAN (FY 2008) FOR INVENTORIES AND VITAL SIGNS MONITORING**

FY2007-FY2008

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

George Price, Superintendent, Cape Cod National Seashore, Date
Representative-Network Board of Directors

Elizabeth Johnson, Northeast Region Inventory and Monitoring Coordinator, Date

Sara Stevens, Northeast Coastal and Barrier Network Coordinator Date

	Budget program (MS Access, aarwp_budget.mdb)
v	The income amounts entered for Biological Inventories, Vital Signs Monitoring, Prototype \$\$ - Annual Transfer, Water Quality Monitoring and other sources matches the dollar amounts from the memos sent to the regions/networks by WASO (have you used the correct income amounts?).
v	In the Add/Edit Budget Records form, the amount shown for Total Expenses matches that for Total Income. (If it doesn't, enter a record under Expenses in the 7_Other category to make it balance; use an entry such as 'Unexpended funds' or 'Overspent Funds' in the Description column to explain the amount.)
v	For all Expense records, the Description field includes the name of the university, agency, company, or other vendor to help us document our outsourcing efforts. (If this expense involved a contract, cooperative agreement, interagency agreement, or other partnership, is it clear where the money went?)
v	For all Expense records, the correct item from the picklist for 'Where \$\$ Went' has been entered. [Think about who the check was written to; e.g., enter 'Other Non-Federal' for funding that went directly to the private sector, such as for purchases (computers, supplies, etc.), travel (airlines, rental cars, hotels).]
v	On the Status of Biological Inventories form, there is one record for each inventory that is described in the text section of the AARWP or in the budget program. Be sure to list each park that was involved in the particular inventory.
v	Each year's budget has been exported as an .rtf file (one for FY 2007 and one for FY 2008), and both files have been inserted into MS Word at the end of the AARWP document.
v	The file aarwp_budget.mdb has been renamed to include the 4-character network alpha code and the years, as shown in this example: NCCN_FY0708_aarwp.mdb
	Annual Report and Work Plan (MS Word)
v	I have carefully read the guidance for the AARWP and followed it.
v	A header or footer with the date that the aarwp was last revised has been included.
v	I gave special attention to the 'Summary of Major Accomplishments' and 'Public Interest Highlights' sections of the report, following this year's guidance and example. (We need good examples of the successes, applications, and highlights of the program to help us obtain funding for all 32 networks! Your 'Summary of Major Accomplishments' section at the beginning of your annual report is what we'll use for the I&M Program's annual Report to Congress to justify the funding spent by your network.)
v	In the 'Status of Park Vital Signs Monitoring' table, all entries are equal to or greater than the entries in last year's report.
v	Photographs that might be included in one of the reports to Congress, brochures, websites, or other materials that help the program have been submitted by the network. (See the photo database and guidelines for submitting photographs.)
v	The aarwp file has been renamed using the network's 4-character alpha code and the years (FY0708) as in the example NCCN_ FY0708_aarwp.doc
v	The annual report has been approved by the appropriate individuals, per my region's procedures. (If you cannot get electronic signatures, it is okay to submit a hard copy with signatures after November 4.)
v	I have followed my region's procedures for submitting the two files (e.g., NCBN_ FY0708_aarwp.doc and NCBN_ FY0708_aarwp.mdb). (Most regions require you to submit the files through the regional office. The files may be zipped into a zip file if desired, and then submitted to Steven Fancy via either email or ftp).
	Review of FY 2007 Work Plan by WASO
No	[Enter Yes or No]: Has the FY 2008 workplan been approved by the network Board of Directors, and therefore ready for the full WASO review? (If you enter No, the WASO I&M and WRD offices will only briefly review the work plan for 'red flags'.

Executive Summary

Northeast Coastal and Barrier Network (NCBN) FY 2007 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 global warming, 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 is key to developing effective management to both maintain and restore coastal park ecosystems. The Northeast Coastal and Barrier Network 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 condition in park natural resources. The following summary provides an update for FY07, on specific inventory and monitoring projects being developed by the NCBN program.

Program overview

This year the Network received a total of \$. Vital Signs Monitoring funding to continue implementing monitoring in coastal parks, as well as, \$. from the NPS Water Resources Division to assist with the Network's estuarine water quality monitoring program.

In 2006-2007, an exciting new effort was initiated to develop a plan for inventorying marine resources in the Northeast Coastal and Barrier Network parks as well as in Acadia National Park and Boston Harbor Islands. The planning began by distributing and compiling a marine resource survey to park staff, conducting a workshop to explore marine resource inventory

needs in the region, and putting together a scope of work to develop a marine resource inventory and mapping plan. A cooperative agreement was established in FY07 with the USGS and the University of Rhode Island to complete an inventory and catalog of existing marine and estuarine mapping data, identify further data needs, and develop a detailed five-year strategic plan, including technical and logistical guidance. The Network expects this plan to be completed in FY08 and will work towards identifying potential funding sources for implementation.

In FY02, vertebrate and vascular plant inventories were implemented in the network. Cooperative agreements with scientists from institutions and organizations such as the Wildlife Conservation Society, the College of William and Mary, Frostburg State University, the University of Richmond, the University of Maryland, and the New Jersey Audubon Society were established to complete these baseline inventories. Products from these projects began to be completed in FY06 and will be published by the Network in 2007-2008 in the NPS Northeast Region Technical Report Series. In addition to inventorying vertebrate species, the Network also began to review existing park invertebrate species data, of which few data sets exist. As a result, the Network funded priority invertebrate inventories in FY06-07. Odonates (dragonflies and damselflies), considered by scientist to be excellent indicators of wetland ecosystem health and condition, and a taxonomic group of high public interest along the coast, were, and continue to be inventoried in Network parks. Technical reports on these inventories are available for six NCB N parks. As part of the inventory program, compilation and cataloging of existing data into the national I&M databases, NPSpecies and NatureBib continues. A complete verification, review and certification by taxa experts of each park's NPSpecies database has been completed. These databases will be made available to the public in FY08. In addition to vertebrate and vascular plant inventories, vegetation maps will be completed for all Network parks in 2008-2009.

The NCBN Vital Signs Monitoring plan continued to be implemented in 2007, with additional cooperative agreements being established with scientist from the Seagrass Ecology Lab, SUNY Stony Brook, and the USGS Maine Water Science Center. Data collected as part of the piloting of the Network's estuarine nutrient enrichment protocol at Gateway National Recreation Area and Assateague Island National Seashore in 2005-2006, are being analyzed and reviewed to assure data meet the objectives of assessing resource condition in these parks. In 2007, further implementation of the Network's estuarine nutrient enrichment protocol continued at Fire Island National Seashore along with the initiation of seagrass condition and distribution monitoring. This pilot will continue at Fire Island in

2008, as well as begin at Assateague Island National Seashore, George Washington Birthplace National Monument, and Colonial National Historical Park in VA.

In addition to water quality monitoring, the Network's coastal geomorphologic monitoring program continued in development. The first phase of protocol development was completed this year and beach shoreline position monitoring implemented in four of the Network's parks. A new initiative will begin in 2008 in collaboration with scientists from Rutgers University, to develop a protocol for monitoring beach and dune topography. In addition, a new cooperative agreement was established 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, Cape Cod National Seashore, Fire Island National Seashore, Gateway National Recreation Area (Sandy Hook Unit) and Assateague Island National Seashore. 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.

Program Accomplishments

Inventories

Field inventories

- Bat survey, Assateague Island National Seashore
- Secretive Water bird Survey, Gateway National Recreation Area
- Insect Inventory, Assateague Island National Seashore
- Submerged marine resources mapping pilot, Fire Island National Seashore
- Bathymetry and sediment data collection for the Virginia Coastal Bays. Assateague Island National Seashore, partnered with the Maryland Geological Survey (MGS)

Inventory products:

- SAHI-Final Report and database: An Inventory of Terrestrial Mammals at National Parks in the Northeast Temperate Network and Sagamore Hill NHS. By USGS

cooperators: Andrew T. Gilbert, Allan F. O'Connell, Jr., Elizabeth M. Annand, Neil W. Talancy, John R. Sauer, and James D. Nichols.

- GEWA-Final report and database: George Washington Birthplace National Monument Avian Inventory. Cooperator: College of William and Mary, Dr. Dana Bradshaw.
- ASIS-Draft Report: Bat Inventory of Assateague Island National Seashore. Cooperator: Dr. Ed Gates and Josh Johnson, Appalachian Laboratory University of Maryland Center for Environmental Science (UMCES)
- ASIS-Annual Progress Report for the 2006 Field Season on the Baseline Survey of Selected Insect Groups of Assateague Island National Seashore
- COLO-Inventory of Mammals (Excluding Bats) of Colonial National Historical Park, Dr. Ron Barry, Frostburg State University.
- GATE-Edinger, G. J., A L. Feldmann, T. G. Howard, J. J. Schmid, E. Eastman, E. Largay, and L. A. Sneddon. 2007. Vegetation Classification and Mapping of Vegetation at Gateway National Recreation Area. Draft Technical Report
- GEWA-Patterson, K. D. 2007. Vegetation Classification and Mapping at George Washington Birthplace National Monument, Virginia. Technical Report

Vital Signs Monitoring

Protocol Implementation and Development:

- Shoreline position was monitored both fall and spring FY07 at FIIS, GATE, ASIS and CACO, following the Network's *NCBN Geomorphological Monitoring Protocol-Phase I Shoreline Position*. This protocol is complete and will be peer reviewed in FY08.
- Estuarine nutrient enrichment monitoring and sea grass condition monitoring was implemented for the first time at Fire Island National Seashore under cooperative agreement with Dr. Brad Peterson, Seagrass Ecology Lab, SUNY Stony Brook.
- The NCBN Salt Marsh Vegetation monitoring protocol sampling design was revised

in cooperation with Dr. Penelope Pooler, VA Tech and Dr. MJ James-Piri, University of RI. New sites were chosen for all parks and designs rewritten for each. Implementation using the new design will begin in FY08 at ASIS and GEWA.

- Salt marsh elevation monitoring continued at GATE and FIIS. Dr. Don Cahoon, USGS cooperator collected data at all sites 2 times during the year. Data collected via NRPP and NCBN funding were analyzed and reported on by Dr. Charles T. Roman, et. al. (see products section)
- USGS/NASA EARL LiDAR was collected following a storm event in April 2007 at FIIS and GATE. Data products continued to be submitted to the Network by John Brock, USGS, for the 2004-2005 surveys conducted park-wide at all Network parks. ASIS and GEWA will be surveyed again in the spring of 2008.
- A new cooperative agreement was established with the University of Rhode Island Geosciences Department, USGS, and the Network to develop baseline historic topographic models for FIIS, GATE, ASIS and CACO. These models will allow the Network to analyze topographic change within these parks over decades and assist in assessing the effects of global warming on these coastal systems.

Monitoring products:

- FIIS-Roman, C.T., J.W. King, D.R. Cahoon, J.C. Lynch, and P.G. Appleby. July 2007. Evaluation of marsh development processes at Fire Island National Seashore (New York): recent and historic perspectives. Technical Report NPS/NER/NRTR – 2007/089. National Park Service, Boston, MA.
- NCBN Parks-Kopp, Blaine S. and Hilary A. Neckles.2007. A Protocol for Monitoring Estuarine Nutrient Enrichment in Coastal Parks of the National Park Service Northeast Region. Natural Resource Report NPS/NCBN/NRR—200x/xxx. National Park Service, Fort Collins, Colorado.
- NCBN Parks-Psuty, N. P., M. Duffy, J. F. Pace, D. E. Skidds, and S. Stevens. August 2007. Northeast Coastal and Barrier Network Geomorphological Monitoring Protocol: Part I—Ocean Shoreline Position. Natural Resource Report NPS/NCBN/NRR—200X/xxx. National Park Service, Fort Collins, Colorado.

- FIIS-Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Patterson, J., USGS-NPS-NASA Bare-Earth Topography - Fire Island National Seashore, USGS Open File Report 2006-1244 (On DVD).
- FIIS-Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Patterson, J., USGS-NPS-NASA First-Return Topography - Fire Island National Seashore, USGS Open File Report 2007-1007 (On DVD).
- ASIS-Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Patterson, J., Travers, L., USGS-NPS-NASA Topography- Assateague Island National Seashore, USGS Open File Report 2007-1176 (On DVD).
- GEWA-Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Patterson, J., USGS-NPS-NASA Topography - George Washington Birthplace National Monument, USGS Open File Report 2007-1179 (On DVD).
- THST-Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Patterson, J., USGS-NPS-NASA Topography- Thomas Stone National Historic Site, USGS Open File Report 2007-1177 (On DVD).
- GATE-Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Patterson, J., USGS-NPS-NASA Topography - Gateway National Recreation Area, USGS Open File Report 2007-1178 (On DVD).
- CACO-Brock, J.C., Wright, C.W., Nayegandhi, A., and Travers, L., USGS-NPS-NASA Topography- Cape Cod National Seashore, USGS Open File Report 2007-XXXX (On DVD). Submitted to internal review for Director's approval

Data management and information transfer to park management and the public.

- The Network held a two day workshop on collecting, processing and use of LiDAR data. Park and regional GIS staff attended the workshop at the University of Rhode Island in March 2007, along with staff from the regional technical support centers, NC State University and the University of Rhode Island. The USGS Center for Coastal Geology staff demonstrated software used to process NASA EAARL lidar collected in Network parks.

- Network Website: A new NCBN website was completed and submitted to WASO for conversion to asp.net. URI cooperators and NCBN staff continue to update pages and information on the site.
- NPSpecies certifications and data uploads were completed for vertebrate lists for all NCBN parks. NCBN staff continues to update the NPS Data Store, NatureBib, and NPSpecies national databases as inventory products become available.
- Resource Briefs to be hosted on the web, as well as printed hardcopy, are in development for all Network monitoring initiatives, salt marsh vegetation monitoring, nekton monitoring, estuarine nutrient enrichment and shoreline change.
- Northeast Coastal and Barrier Network FIIS Biotic Resource Synthesis Report was initiated in FY07 and will be available in draft by December 2007.
- Network data and web-development servers were brought on line. NCBN GIS data holdings are being converted to ArcSDE to facilitate sharing via the Network LAN and future web applications.
- Network staff are currently participating in the development of the National I&M Program's Vital Signs Internet Mapping Services (VSIMS), enhancing the ability to serve spatially-referenced monitoring data via the network websites.
- Network staff continue 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.
- FIIS-NCBN Data Manager and Rutgers cooperator, provided training to park staff in GPS data collection, processing, and management in conjunction with the development of the NCBN Shoreline Position Monitoring Protocol.
- GATE-Psuty, N. P., and Love, A., 2007. Monitoring Shoreline Change at the Sandy Hook Unit 2005-2006, Gateway National Recreation Area, Annual Report. Submitted to the Sandy Hook Unit, Gateway National Recreation Area, 30 p.

Water Quality Monitoring

- USGS cooperators completed and submitted their reply to peer review comment's on the Network's nutrient enrichment protocol. The final draft of the protocol was submitted to the Network in August 2007. Currently the document is being formatted for publication in the National Natural Resource technical reporting series.
- Through a cooperative agreement with the Seagrass Ecology Lab at SUNY Stony Brook, the Network's estuarine nutrient monitoring protocol was implemented at Fire Island National Seashore. The Networks seagrass monitoring component of this protocol was also piloted at Fire Island.
- The Network hired a bio-tech in cooperation with Cape Cod National Seashore, to assist in their water quality lab. Water samples collected at other Network parks, GATE, ASIS and FIIS are analyzed in the CACO lab.
- An interagency agreement was established with the USGS Maine Water Science Center in FY07. The work plan for this project includes compiling and analyzing both Network data collected following the Network's Estuarine Nutrient enrichment protocol, and park-based estuarine water quality monitoring data. Comparisons on how well or accurate these datasets are at assessing estuarine water quality condition is being made.

Public Interest Highlights

Inventory and Mapping of Marine Resources Piloted in the Northeast Region

The NCBN and the Northeast Region are moving forward with enhanced stewardship of our ocean/marine resources. The Northeast Region science program is interested in inventorying the submerged natural and cultural resources that are within our park boundaries. In 2007, a brief pilot project at Fire Island National Seashore was funded through the I&M Program, to test a variety of acoustic techniques that could be used to characterize submerged resources such as sediments and submerged habitats. Fire Island was selected as a study area because subtidal habitats within the bay portion of the park boundary are shallow and the waters highly turbid, features that are typical of parks in the Northeast and elsewhere along the Atlantic coast. These conditions in these shallow coastal areas create a challenge for

collecting submerged data. This project was initiated to begin addressing these challenges based on the use of a variety of techniques and acoustic equipment. This project was a collaborative effort among the University of Rhode Island, the NPS Submerged Resources Center, NPS GPS Program, the Northeast Coastal and Barrier Network, the North Atlantic Coast CESU, and Fire Island National Seashore.

Mapping of Submerged Resources within the Virginia Coastal Bay portion of Assateague Island National Seashore

Assateague Island National Seashore and the Northeast Coastal and Barrier Network partnered with the Maryland Geological Survey (MGS) to collect bathymetry and sediment data for the Virginia Coastal Bays. The state of Maryland collected these data on the Maryland side of the park in 2005. This project will enable Assateague to manage and protect all of its estuarine waters holistically, across state lines, by providing the missing information on the National Seashore's estuarine resources in Virginia. The information will be integrated into ongoing research efforts to address several specific management concerns. Already, ASIS is receiving a steady stream of requests for these data from various government agencies and academic institutions who want to incorporate the data into research on SAV habitat, hydrodynamic circulation models, and water quality trends.

Development of Historical Topographic Models of the Beach/Dune System in Northeast Coastal and Barrier Network Parks

The USGS Patuxent Wildlife Research Center Coastal Field Station, located at the University of Rhode Island, in collaboration with the Northeast Coastal and Barrier Network of the National Park Service, is conducting a study to develop a baseline of historical topography that can be utilized in long-term topographic change analyses in four NCBN parks. These data will be exceptionally useful to the 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. These data will be used to help predict and manage for climatic changes such as sea-level rise and increased storm intensity by assessing how these factors have affected the parks over the past half-century. Additionally, accurately quantifying volumetric changes provides an understanding of the sediment budget of the islands and how this budget has responded not only to changing conditions (climatic, increased development, etc.), but to changes in land use and resource management of the parks. In order to better understand longer-term (30-50yr) geomorphic change in the NCBN coastal parks, every effort will be made to acquire the oldest appropriate photography available to provide the longest time record for analyses. In some cases, the oldest photography may date to the early

1960s, providing a baseline to examine change over a 40+ year time frame.

I. Overview and Objectives

Ecological context

The Northeast Coastal and Barrier Network (NCBN) includes eight parks from Massachusetts to Virginia, representing 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.

Program overview

In December 2001, the Northeast Coastal and Barrier Network (NCBN) Inventory Study Plan was submitted to WASO. Vertebrate and vascular plant inventories were implemented in the network in FY2002. Most inventories were completed in 2007, with a few to be completed in 2008. In addition to inventorying vertebrate species, the Network began to review existing park invertebrate species data, of which little exists. In FY05, the Network initiated a number of projects to inventory Odonates (dragonflies and damselflies), and other insects in the Network parks. Products from these inventories will be completed in 2008. Draft vegetation maps and reports are being reviewed for GATE and GEWA, and COLO, THST and ASIS will be completed in 2008-2009. As part of the inventory program, compilation and cataloging of existing data into the national I&M databases, NPSpecies and NatureBib continues, and newly acquired I&M data and information continues to be used in park GMP planning processes and Watershed Condition Assessment projects that began in the Network in FY06.

The Northeast Coastal and Barrier Network Vital Signs Monitoring plan continues to be implemented. Working with scientists from the University of Rhode Island, USGS, Rutgers University and SUNY Stony Brook, the Network is implementing monitoring

protocols to assess estuarine nutrient enrichment, seagrass condition and distribution, nitrogen inputs to park estuaries, salt marsh ecosystem dynamics (vegetation and nekton), salt marsh elevation, visitor use and impacts, and geomorphologic change. The Network also continues to work closely with Cape Cod National Seashore (CACO), a prototype monitoring program for the North Atlantic Coast and also part of the Northeast Coastal and Barrier Network. Park and Network staff continue to collaborate on protocol development and review, as well as data management projects.

Objectives for Biological Inventories

1. Locate, catalog and archive park natural resource documents, data sets, and spatial information and ensure such information is accurate, in useable formats and readily available.
2. Conduct inventories targeted at vertebrate and vascular plant species in the network parks and conduct quality assurance and review of all inventory products.
3. Conduct investigations on species and species assemblages that are of special concern to network parks and conduct quality assurance and review of all inventory products.
4. Conduct other baseline inventories identified as important to network parks and the Network Vital Signs program and conduct quality assurance and review of all inventory products.

Objectives for Vital Signs Monitoring

5. Hire and retain professional staff and provide a safe, healthy, and productive work environment.
6. Develop and maintain working and decision-making processes that engage the network board of directors, technical staff, cooperators and managers of network parks.
7. Develop, implement, and maintain a network data management program. (Note: this objective is placed under Vital Signs monitoring, however, it is equally important and integrated with the Biological Inventories portion of the program.).
8. Identify and prioritize Network Vital Signs, develop protocols and implement programs to monitor these vital signs in network parks.
9. Integrate water quality monitoring into the Network Vital Signs monitoring plan.
10. Develop and maintain strategies to share information with network parks, scientists, and others interested in the network's I&M program.

II. Accomplishments (FY2007) and Scheduled Activities (FY2008)

A. Biological Inventories

Objective 1: Locate, catalog and archive park natural resource documents, data sets, and spatial information and ensure such information is accurate, in useable formats and readily available. (all parks).

Task 1.1. The NPSpecies Database

- FY2007 Accomplishments: (1) (All parks) A modification to the existing cooperative agreement with the University of Rhode Island was completed for the ongoing maintenance, update and verification of the NPSpecies database. The following tasks were completed. Ms. Fabre imported data as needed, reviewed all data and taxonomy, certified and submitted the following databases for upload to NPSpecies: ASIS-- Amphibians, Reptiles, Birds, Fish, Mammals; COLO--Birds, Fish, Mammals; Amphibians, Reptiles, Birds, Fish, Mammals, Vascular Plants; GATE--Amphibians, Reptiles , Fish, Mammals, Vascular Plants; GEWA-- Birds, Mammals; SAHI--

Amphibians, Reptiles, Birds, Fish, Mammals, Vascular Plants; and THST--Fish, Mammals. (2) As a member of the NPSpecies I&M Program User Board representing the Northeast Region, Ms. Fabre participated in several User Board teleconferences. In addition, she attended a workshop regarding redesigning the NPSpecies database. This workshop involved a select group of NPSpecies users who provided feedback on functional uses that need to be included in the new database. (3) A sole source contract was developed with Dr. Eric Lamont, a well known botanist from the New York Botanical Garden. Dr. Lamont will review the NPSpecies plant lists and taxonomy for GATE, SAHI and FIIS, as well as enter and certify data he has been collecting on Jamestown Island, COLO.

- Scheduled FY2008 activities and products: (1) (all parks) The cooperator will continue to maintain, update and verify the NPSpecies database for the Northeast Coastal and Barrier Network as needed; ensure that changes to the database are noted and entered into the database tracking system; coordinate the certification of the following datasets for taxa expert certification: SAHI, FIIS and GATE (Vascular Plants) and ASIS (Birds); ensure NPS personnel and Cooperators are trained regarding the use of NPSpecies as needed. (2) The contractor Dr. Eric Lamont will complete his review of the NPSpecies database of plants for FIIS, GATE and SAHI, as well as complete data entry and review of COLO data.

Task 1.2. The NatureBib Database

- FY2007 Accomplishments: (1) Scott Tiffney, a Penn State Research Associate hired by the NE Region I&M program to manage NatureBib completed the following tasks in FY07 up until his departure from the program in December 2006: Scott received and fulfilled NatureBib data requests from park personnel in the Network. He assessed the overall status of NCBN NatureBib databases and continued detailed editing of each park database. NCBN NatureBib database records were assessed and edited for duplication, spelling, authority control, data integrity and data comprehensiveness. (2) University of Rhode Island cooperator, Linda Fabre, met with Scott to learn about the management and maintenance of the database in order to continue Scott's work of cleaning up existing records and entering new citations.

- Scheduled FY 2008 Activities and Products: (1) NCBN will review and assess the status and usage of the NatureBib database by the Network's parks. A protocol will be developed for the Network/park relationship in maintaining this important database.

Task 1.3 Natural Resource Inventory Database and Spatial Data Review (All NCBN Parks)

- FY2007 Accomplishments: An amendment to the existing cooperative agreement with NCSU Field Technical Support Center (FTSC) was funded by all 4 networks in the region. This task involves evaluating and completing natural resource biological inventory data sets submitted to the Northeast Region Inventory and Monitoring Program by other cooperators and contractors. Specifically, for each inventory project NCSU: Reviews tabular and spatial data for completeness, internal consistency, and consistency with the final report and other spatial data available for the park(s); creates Federal Geographic Data Committee (FGDC) compliant biological metadata for the tabular data; as needed, contacts the Network Data Manager and/or investigator(s) to resolve discrepancies and/or obtain missing data and correct errors and omissions in the tabular and/or spatial data; as needed, converts tabular data to MS Access, create look-up tables, and write table and field definitions for each table; and as needed, corrects or creates georeferenced spatial data and accompanying FGDC compliant metadata. During FY2007, NCSU completed reviews of the following biological inventory studies for NCBN:
 - (GATE, FIIS, SAHI) Inventory of Odonata (Dragonflies and Damselflies) at Gateway National Recreation Area, Sagamore Hill National Historic Site, and Fire Island National Seashore (Principal Investigator: Nina Briggs, Rhode Island Natural History Survey);
 - (GATE) Preliminary Assessment of Diamondback Terrapins (*Malaclemys terrapin*) Nesting Ecology at Sandy Hook, NJ, Gateway National Recreation Area: July – September 2002 (Principal Investigator: Sylwia Ner, Hofstra University);
 - (COLO, GEWA, THST) Inventory of Amphibians and Reptiles of Colonial National Historical Park, George Washington Birthplace National Monument, and Thomas

Stone National Historic Site (Principal Investigator: Joseph C. Mitchell, University of Richmond);

- (THST, COLO) Inventory of Mammals (Excluding Bats) of Thomas Stone National Historic Site, George Washington Birthplace National Monument, and Colonial National Historical Park (Principal Investigator: Ron Barry, Frostburg State University);
- (GATE) Avian Inventory and Monitoring Needs for Gateway National Recreation Area: A Review of Available Literature and Data (Principal Investigator: David Mizrahi, New Jersey Audubon Society);
- (SAHI) Avian Inventory of Sagamore Hill National Historical Site (Principal Investigator: Howard Barton, Theodore Roosevelt Sanctuary). (2).The document describing data review and metadata development procedures was revised and circulated to Network Data Managers in April 2007. (3) A web application for tracking the status of all projects was developed to allow both NPS and NC State personnel to add and remove project entries and edit or update project status information. Updates and modifications to the database occur in real time so that the information displayed online is always the most current. The web application, completed in May 2007, can be accessed at: http://web.ceo.ncsu.edu/nps_inventory/.
- Scheduled FY 2008 Activities and Products: (1) Trained students will continue to directly assist Northeast Region I&M cooperators with the development of FGDC compliant metadata for all projects. (2) As data becomes available from other NCBN cooperators, NCSU will continue to provide technical support to review biological inventory data and create biological metadata for reviewed projects.

Objective 2: Conduct inventories targeted at vertebrate and vascular plants in the Network parks and conduct quality assurance and review of all inventory products.

Task 2.1. Mammal inventories (COLO, THST, GEWA, SAHI, ASIS)

- FY2007 Accomplishments: (1) (GEWA, THST, COLO) Final reports for GEWA, THST, and COLO were reviewed by Network staff and revised and submitted to the NCBN by cooperator, Ron Barry from Frostburg State University. Data and reports

were submitted to NCSU for metadata development and archiving.

- Scheduled FY2008 Activities and Products: (1) (GEWA, THST, COLO) These three reports will be formatted to meet the NER technical report series guidelines and submitted for publication in the series. Once finalized, the reports will be made available on the NCBN and NER science websites.

Task 2.2. Avian inventories (COLO, THST, GEWA, ASIS, SAHI, FIIS, GATE)

- FY2007 Accomplishments: (1) (FIIS) (1) In August, New Jersey Audubon Society submitted a draft version of its report detailing the results of our review of avian information for Fire Island National Seashore (FIIS) in the National Park Service's NPSpecies and NatureBib databases. Our review of the latter also includes a comprehensive review of reports, published and unpublished that allow us to evaluate inventory and monitoring information gaps. In many instances, these reports are not contained in NatureBib. Initial review of the report by NPS staff was favorable and we are working to address external and internal comments for submission of the final report early in FY08. (2) (GATE) NJAS staff conducted and completed avian inventory surveys at Jamaica Bay/Breezy Point unit of Gateway National Recreation Area (GATE) in spring/summer 2007. Surveys used point count methodology for breeding passerines and call/playback methodology for secretive waterbirds (e.g., rails, bitterns) to improve detection. This effort was undertaken to complete surveys originally begun for GATE in 2005 and completed at the Staten Island and Sandy Hook units. (3) (COLO, THST, GEWA) Cooperator's from the College of William and Mary are delayed in completing the Network's three avian inventory reports for Colonial, Thomas Stone and George Washington Birthplace. A draft report for GEWA was submitted to the Network in July, it was reviewed and comments sent to the cooperator. A final report was completed and submitted in August. No other reports were submitted and the network continues to seek completion of this project. (4) (ASIS) A contract was developed between the Network and private contractor, Mark Hoffman, an ornithologist with many years of experience and knowledge of the birds of Assateague, to assist the Network in developing and completing an avian species record database for the park. Mark is a uniquely qualified expert on the birds of Assateague Island National Seashore (ASIS). Under this agreement, he will

identify, compile, and evaluate existing data pertaining to avian resources at ASIS and synthesize findings into a final report with recommendations for further study and management action. The contractor will also perform quality assurance certification of the NPSpecies avian database for ASIS. The contractor has engaged in discussions with Network staff describing the additional data he will provide.

- Scheduled FY2008 Activities and Products: (1) (FIIS) New Jersey Audubon will make corrections and address comments to the draft FIIS report and deliver a final product. (2) (GATE) New Jersey Audubon will complete data entry and QA/QC of data collected at GATE-Jamaica Bay/Breezy Point Unit, and begin and complete analyses of avian inventory data collected during spring/summer 2005 at GATE-Sandy Hook and Staten Island Units and at GATE-Jamaica Bay/Breezy Point Unit in 2007. The cooperators will also complete and submit a report for the GATE avian inventory project. (3) (COLO, GEWA, THST) The College of William and Mary staff will complete draft and final reports for avian inventories conducted at COLO, and THST. The Network will handle formatting and publishing these reports in the NER technical report series as well as distributing them on the Network and NER science website (4) (ASIS) The contract will be completed with Mark Hoffman to compile and review the existing avian species records for ASIS, and submit a final database and report.

Task 2.3. Herpetological inventories (COLO, THST, GEWA, GATE, SAHI, FIIS, ASIS)

- FY 2007 Accomplishments: (1) (COLO, GEWA, THST) The final report by Dr. Joseph Mitchell, University of Richmond for COLO was formatted and published in the NER Technical Report Series. (2) (GATE, FIIS, ASIS, SAHI) Work continued with the Wildlife Conservation Society (WCS) and NPS herpetologist Dr. Robert Cook to complete draft final reports for herpetological inventories conducted at ASIS, GATE, FIIS and SAHI.
- Scheduled FY 2008 Activities and Products: (1) Final reports by Dr. Joseph Mitchell for GEWA and THST will be formatted and published in the NER Technical Report Series. (2) Network staff will continue to work with Dr. Robert Cook at CACO in finalizing herpetological inventory reports for ASIS, GATE, FIIS, WIFL (William Floyd Estate, part of FIIS) and SAHI.

Objective 3: Conduct investigations on species and species assemblages that are of special concern to network parks.

Task 3.1. Conduct Odonate and Lepidoptera Inventories in Network parks.

- **FY2007 Accomplishments:** (1) (GATE, FIIS, SAHI) A cooperative agreement with the Rhode Island Natural History Survey (RINHS) to conduct odonate (dragonflies and damselflies) inventories at GATE, FIIS and SAHI was established in 2003. RINHS has submitted draft final reports for all three parks along with all data products. (2) (ASIS) The 2007 field season is the final year of the three year project with the Rhode Island Natural History Program (Richard Orr, PI). By the end of October 2007 (end of the field season) all of the field work for the project will have been completed. All aspects of the project were enhanced during the 2007 field season, but the main focus was to fill in those areas of the contract where the remaining gaps existed from the previous two field seasons (2005-2006). These include, but were not limited to, continued survey work on the native bees, macro-wasps, and leaf beetles and to enhance the photographic record of the more conspicuous species of insects on the island. These taxa will be added to the already completed surveys of the dragonflies/damselflies, butterflies, macro-moths, grasshoppers, katydids, and crickets. A more comprehensive arthropod (all taxa) survey of ASIS freshwater ponds and salt marshes (terrestrial) was completed during the 2005-2006 field seasons. A number of new Maryland State records were added in 2007 along with hundreds of high quality photographs of insects and spiders. In addition to the field work conducted by Dr. Orr, specialists in the field of bees, ants, wasps, leaf beetles and moths helped during this field season as did a wildlife photographer, MD-DNR scientists, along with selected staff and volunteers from the park. (3) (GEWA, COLO) The odonate and butterfly reports for George Washington Birthplace and Colonial NHP were formatted and published in the NER Technical Report Series.
- **Scheduled FY 2008 Activities and Products:** (1) (GATE, FIIS, SAHI) Odonate reports for these three parks will be formatted and published by the Network in the

NER Technical Report Series. (2) (ASIS) The final field visit to ASIS will take place in mid October by Dr. Richard Orr, the wildlife photographer and the leaf-beetle expert. However, the main goal in FY 2008 is to update the database, write the final report, prepare an insect and other conspicuous arthropod photographic guide for the NPS' Visitor Center, and provide the staff at the park and Network with a presentation of the findings from the three-year project.

Objective 4: Conduct other baseline biological inventories identified as important to Network parks and the Network Vital Signs program.

Task 4.1. Assemble all final classification, map products, and metadata. Work with NPS staff to integrate new information and revise NVC units and maps as appropriate; produce a single set of classification, map deliverables and metadata that meet all VMP standards.

- FY 2007 Accomplishments: (1) (GATE, SAHI) NCSU completed the final report for the GATE and SAHI aerial photo mosaics (leaf-off and leaf-on). (2) Draft final classifications, map and report were completed and delivered to the NPS for GATE on 6/30/07. The draft final classification for SAHI is complete and will be delivered with the final report in November 2007. (3) (GEWA) Draft final products were submitted by the VA Division of Natural Heritage (VA DNH), Karen Patterson, ecologist, for GEWA. Keys and map will be reviewed tested in the park in FY08. NPS staff reviewed and commented on the draft final report.
- Scheduled FY 2008 activities and products: (1) (GATE, SAHI) Draft final products for GATE will be reviewed by NPS and revised by NY Natural Heritage Program cooperators. Final products will be completed. (2) (GEWA, COLO) Final products will be completed for GEWA. Draft final products will be submitted for COLO, reviewed by NPS Staff and revised and completed for final submission by VA DNH (Karen Patterson). (3) (CACO) Tasks remaining on the CACO project include creation of metadata and compiling photos of vegetation types and final report preparations. Draft final products for CACO will be peer reviewed early in 2008. (3) (ASIS) Accuracy assessment will be completed for ASIS. Following accuracy

assessment, a final report and deliverables will be compiled to complete ASIS in FY10. (4) (THST) Field work is complete at THST and map products, metadata and report will be drafted in FY08.

Task 4.2. Inventory of Contaminant Sources in Network Parks (All parks)

- **FY2007 Accomplishments:** (1) (GEWA, THST, FIIS, ASIS, COLO, GATE, SAHI) Cooperators from Rutgers University completed draft reports for each of the parks. These park specific reports include a baseline inventory of current xenobiotics in the environment based on historical data and current information gathered by the cooperators. A complete contaminants risk assessment was included in each report. The reports are currently being reviewed. FIIS and GATE review is complete and comments returned to the Rutgers University cooperators.
- **Scheduled FY2008 Activities and Products:** (1) (GEWA, THST, FIIS, ASIS, GATE, SAHI, COLO) All reports will be reviewed, revised and completed by the Rutgers cooperators.

Task 4.3. Inventory of Marine Resources in Network Coastal Parks

- **FY2007 Accomplishments:** (1) (NCBN and NETN coastal parks) Efforts to inventory marine resources was initiated in FY06 in the Northeast Region coastal parks by the Northeast Coastal and Barrier Network and the North Atlantic Coast Cooperative Ecosystems Study Unit (CESU). The purpose of this initiative was to develop a detailed strategy for the inventory and mapping of submerged natural resources associated with coastal parks within the Northeast Coastal and Barrier Network and two parks in the Northeast Temperate Network. A cooperative agreement was established in FY07 with the USGS and the University of Rhode Island (URI) to: prepare an inventory and catalog of existing mapping data on these priority marine and estuarine natural resources; identify information gaps in the inventory; and develop a detailed five-year strategic plan, including technical and logistical guidance, that NPS can use as a guide to addressing data deficiencies. For reporting purposes within this annual report, this project is divided into three distinct progress summaries. **Marine data inventory and catalog**--In FY07, the project was initiated

by developing a draft catalog of relevant geographically explicit marine resource data. Data were identified by communicating with GIS personnel at each of the NER parks, by searching the NPS Data Store application, and by adding other datasets known to, or discovered by, the project investigators. The draft catalog has been hypertext formatted and is available online via URI EDC servers <NPS Submerged Resources Data List>. In addition to the hypertext catalog, a Microsoft Access database was created with additional fields and record visualization tools that will assist in evaluating the utility of data toward meeting NPS submerged resources management objectives. To facilitate park review, the cooperators have organized the catalog into units relevant to each park and uploaded each file as a Google Spreadsheet document. By using Google Spreadsheets, collaborators will be able to review and make real time edits within a shared work environment. Once an internal check of the Google Spreadsheets had been completed, the catalog will be distributed to NCBN park resource managers with a request that reviews be completed by December 2007.

Adoption of a uniform marine habitat classification system-- The bulk of investigator effort for this part of the project during FY 07 was spent considering how the priority data needs articulated by the NER Ocean Stewardship Task Force might be fit together within the context of a cohesive mapping initiative. The USGS cooperator is in the process of conducting a review of existing marine habitat classification systems and has started to write up this review along with specific recommendations on classification systems for the NPS/Northeast Region initiative.

Evaluation of mapping technologies, scales and resolution--The third major component of effort during FY 2007 by the USGS cooperators focused on reviewing mapping technologies. The expectation was that specific technologies could be adopted for each of the inventory components and prescribed for use across the NER. Consequently, the cooperators have arrived at the conclusion that a range of technologies are appropriate for populating the NCBN/NETN marine data inventory, and that map quality and consistency should be addressed through adoption of uniform map scales, resolutions, and minimum mapping units (rather than prescribed technologies). These recommendations will be made available through the inventory and mapping study plan being developed by the USGS cooperators to be completed

in 2008. (2) (ASIS) Assateague Island National Seashore has partnered with the Maryland Geological Survey (MGS) to collect bathymetry and sediment data for the Virginia Coastal Bays. Funding for the project was provided to the Network from the National I&M Program to begin piloting marine resource inventories. This project will enable ASIS to manage and protect all of its estuarine waters equally as one holistic system by providing the missing information on the National Seashore's estuarine resources in Virginia. All planned fieldwork is complete, and data processing and analysis has begun. In October and November 2006, ASIS staff collected bottom grab samples (top 10 cm) in locations based on a 500 by 500 meter spacing. By May 2007, the 261 surficial sediment samples were analyzed by MGS for physical properties including water content, bulk density, grain size (sand, silt, clay content). Chemical analysis, including total and organic carbon, total nitrogen, total phosphorus and total sulfur, and metal (including Cd, Co, Cu, Fe, Mn, Ni, Pb, and Zn), is in process. Sediment data will be used to map the spatial characteristics of the bay bottom surface. Between June and September 2007, MGS completed hydrographic surveys in navigable portions of the Virginia Coastal Bays. Survey transects across the bays (generally east-west) were 400 meters apart. Additional transects were collected at a spacing of 2000 meters to tie in east-west lines, and parallel to the creek and bay shorelines to define boundary conditions.

Approximately 400 kilometers of track lines were collected to cover the proposed survey area. Areas with water depths less than 0.5 meters were not surveyed. A dual-frequency survey-grade echosounder and a differential GPS system ensured that the data have sub-centimeter vertical accuracy and sub-meter horizontal accuracy. A series of water level recorders were in operation throughout the field study to collect accurate water level data that will be used to adjust depth soundings for tidal offsets; their elevations and positions were surveyed by ASIS staff using RTK GPS. (3)

(FIIS) Using Fire Island NS as a study area, a brief pilot effort was conducted to test various acoustic techniques available for characterizing submerged resources (e.g., sediments, biological habitats, cultural features). Funding for the project was provided to the Network from the Geologic Resources Division and National I&M Program to begin piloting marine resource inventories. Fire Island was selected as a

study area because sub tidal habitats within the Bay portion of the park boundary are shallow and the waters are highly turbid, features that are typical of parks in the northeast and elsewhere along the Atlantic and Gulf coasts. This project was collaboration between the NCBN, North Atlantic CESU, URI-GSO, NPS Submerged Resources Center, NPS GPS Program, and Fire Island NS. Data were collected over a 5-day period with the objective to use the data to assist with the design of more comprehensive submerged resource inventories and mapping efforts at Fire Island, and other NPS units with shallow waters.

- Scheduled FY2008 Activities and Products: (NCBN and NETN coastal parks)
Marine data inventory and catalog-- The marine resource data catalog created in FY07 will be distributed to each of the parks so that they can review the current contents and suggest any missing datasets that would make meaningful contributions to the project objectives. Revisions will then be incorporated into a final data catalog by the end of the first quarter of FY 08. After revisions have been checked and edited, the cooperators will concatenate the files and update the Microsoft Access version of the catalog, and URI EDC collaborators will update the HTML version of the catalog and install (make active) the hot links between the web catalog and online data and metadata. **Adoption of a uniform marine habitat classification system--** Current service-wide efforts are examining the relative merits of a suite of habitat mapping schemes. From a national perspective, this evaluation is complicated by the fact that various NPS parks or regions are already vested in classification standards that are unlikely to prove functional at a national scale. The NPS I&M program is planning a workshop in February to discuss mapping schemes and standards. The NCBN cooperators will participate in that workshop in February 2008. **Evaluation of mapping technologies, scales and resolution--** In preparation for the NPS Water Resources workshop in February 2008, the USGS cooperators will draft proposed standards addressing the issues of scale, resolution, interpolation, and size requirement for minimum mappable units. While these standards may be unique for each inventory type, the minimum standards would be applicable to that inventory regardless of the technology in use. Many of the participants at the NPS I&M workshop have expertise in the various technologies and can provide feedback on the

technical viability of the proposed standards as well as their suitability to meet resource management objectives. NER mapping standards will be revised based upon outcomes from the workshop. Whether captured by the classification system or not, each priority data type will be related to a common list of inventory types, and each inventory type will be cross-referenced against mapping technologies that may be applied toward data collection. Collectively, this information will allow NER parks to acquire resource maps and information that meet data quality objectives, but that allow contractors or collaborators to employ methods they feel are most cost effective or most closely match park-specific circumstances. **Final Inventory and Mapping Study Plan--** Based on the data-mining effort and recommended mapping standards, USGS cooperators will develop a strategy for NPS to acquire the marine and estuarine natural resource data identified as “priority data” by the NER. This mapping strategy will include: a description of existing data sets that will make a relevant contribution to enhancing the fundamental inventory of park submerged natural resources; a detailed description of the data required to fill gaps in the marine resource inventory; and methodologies necessary for collection of fundamental data, including literature citations to support use of specific field, laboratory, and data processing procedures, and details on the required products of each inventory (e.g., maps, scale, resolution). (2) (ASIS) The bathymetric data processing is currently underway. The bathymetric data will be referenced to the North American Vertical Datum (NAVD88) to provide a digital surface model of the bay bottom and bathymetric maps. Already, ASIS is receiving a steady stream of requests for these data from various government agencies and academic institutions who want to incorporate the data into research on SAV habitat, hydrodynamic circulation models, and water quality trends. Deliverables will include a final report and maps in addition to valuable geospatial datasets, which will be used in multiple ongoing research and management efforts by both the Seashore and park partners, including other Federal agencies, State and local groups. (3) (FIIS) A final report on the pilot to map and text equipment in shallow estuarine habitats will be completed in FY08.

B. Vital Signs Monitoring

Objective 5: Hire and retain professional staff and provide a safe, healthy, and productive work environment.

- FY2007 Accomplishments: (1) (CACO) The Network assisted in the hiring of one NPS biotech to assist with the Network's estuarine water quality monitoring program. This technician was stationed at CACO to assist park staff in setting up and running a water quality lab where chlorophyll samples will be sent for analysis collected as part of the NCBN estuarine nutrient loading monitoring program. (2) The Network hired a new Data Manager who is stationed at the University of Rhode Island, along with the Network Coordinator. (3) A position description and crediting plan were developed to refill the Network's Ecologist position, also to be stationed at the University of Rhode Island.
- Scheduled FY2008 Activities and Products: (1) The Network plans to fill the Ecologist position this fiscal year. (2) A position description and crediting plan will be developed for a new position, Coastal Geomorphologist that will potentially be stationed at Gateway-Sandy Hook Unit with cooperator, Dr. Norb Psuty from Rutgers. This position will be advertised and potentially filled next fiscal year. (3) Four biotechs (1-GS07 and 3-GS05) will be hired for the 2008 field season (6 months) to conduct salt marsh vegetation monitoring at ASIS, GEWA and possibly COLO if time permits. Duty station for these technicians has yet to be determined.

Objective 6: Develop and maintain working and decision-making processes that engage the network board of directors, technical staff and managers of network parks.

Task 6.1. Informational meetings, technical meetings and training

- FY2007 Accomplishments: (1) A board of director's meeting was held via conference call in January 2007, in which the FY06 administrative report and FY07 work plan was reviewed and accepted by the board. (2) No Technical Steering Committee

meetings were held this fiscal year. (3) In cooperation with the University of Rhode Island's Environmental Data Center, the Network held a 2-day workshop on LiDAR data collection, processing and uses. The first day of the program included a session on a variety of topics relating to LiDAR by representatives from EarthData and ESRI. Following this, park staff from GATE, ASIS, CACO and FIIS attending the workshop, as well as representatives from NCSU, URI, USGS and the NPS Northeast Region, met with Amar Nayeghandi from USGS to discuss Network park data collection needs and to learn and better understand the ALPS software system developed by USGS for processing EARRL data used by our Network parks. This was a very successful meeting and we got a tremendous amount of feedback from park staff on their needs and uses of LiDAR data.

- Scheduled FY2008 Activities and Products: (1) A board of directors meeting will be held again by the end of January 2008 to review the FY 07 report and FY08 work plan. (2) Network staff will travel to GEWA in November 2007 to update park staff on park specific monitoring and projects. The Network staff will also participate in the start-up meeting for the GEWA Watershed Condition Assessment project/Shoreline Change meeting. As part of this same trip, staff will travel to ASIS for a 2-day meeting to update park staff on monitoring and other Network projects, as well as plan salt marsh data collection and SET establishment in the park. Additional park visits and updates will be made to SAHI, GATE and FIIS in 2008. (3) A day long GPS shoreline training focusing on data collection and processing will be developed and conducted by Network data manager, Dennis Skidds and Rutgers cooperator Norb Psuty in October 2007. This training will involve both park natural resource and ranger staff who will learn how to collect GPS data following the Northeast Coastal and Barrier Network's Ocean Shoreline Change protocol. This training will help to enable park staff to collect data on shoreline change immediately following storm events.

Task 6.2 –Information dissemination

- FY2007 Accomplishments: (1) A cooperative agreement was developed between the Network and the Environmental Data Center at URI to assist the Network in

enhancing the NCBN website as well as meet the new content standards and recommendations put forth by the WASO for both the Network intranet and internet sites. In May 2007, Marisa Thompson of the University of Rhode Island Environmental Data Center began the task of updating and enhancing the Network's internet presence. The Network's websites and web applications are the primary means of sharing data, reports, and general program information with the public, park resource managers, and other I&M staff. (a) Web Server Configuration – The EDC lab recently obtained a Dell PowerEdge 1950 server for the purpose of developing, testing, and hosting websites and web applications based on Network data assets. This hardware was configured to support the development of websites using ASP.NET 2.0 technology based on Microsoft .NET Framework, and was used to develop both the Network's revised internet site and new intranet site. (b) Network Internet Website Revision – The NCBN internet website was updated to reflect changes in the status of the Network's inventory and monitoring projects, as well as new data products and reports that had become available since the initial site was launched in 2004. The site was migrated from its original ColdFusion framework to ASP.NET 2.0 in order to bring it into line with the direction of the national I&M Program's future web-development strategy, as well as to take advantage of the application-development capabilities of the ASP.NET technology. The website was brought into compliance with national I&M Program security and formatting policies, and the content was updated in collaboration with Network and national I&M staff. (c) Network Intranet Website Development – In FY2007, all I&M networks were charged with development of a protected intranet website for the sharing of sensitive data and draft versions of documents. The NCBN intranet site was developed using ASP.NET 2.0 technology with content provided by Network staff. Initial formatting guidance provided by WASO. The site has since been successfully tested and deployed. This project will continue through 2008. The final Network website will host all inventory and monitoring project information including protocols, databases and general information pages for all vital signs.

- Scheduled FY2008 Activities and Products: (1) Marisa Thompson of the URI Environmental Data Center will work with NCBN staff to develop a variety of web

applications using the aforementioned ASP.NET 2.0 development framework. This will involve working closely with IT specialists at WASO to develop effective implementation strategies for said applications. One planned project will result in the development of dynamic server pages to be hosted within the NCBN internet site, which will allow users to query a modified NPSpecies database by park, taxa group, status, and other parameters. A similar application geared toward park resource managers will summarize and link to available data from Network inventories and monitoring programs based on the park(s) of interest, resource type(s), etc. indicated by the user. Anticipated activities also include the researching and development of interactive web forms using ASP.NET, as well as ongoing maintenance and enhancement of the Network internet and intranet sites. (2) As reports and protocols are completed, students will continue to assist the Network in publishing, printing and providing these reports to parks. (4) A communication plan will be developed by URI cooperator, Linda Fabre and the NCBN coordinator. This will include an annual schedule for newsletters, brochure updates, resource briefs and other informative material as needed. Linda Fabre will work cooperatively with the Network staff to develop these materials in a publishable format using the desktop publishing software, InDesign. (5) As time permits, the Network would like to begin developing park-specific conceptual models following examples produced by the University of Maryland Integration and Application Network (IAN). These models will be developed with assistance from both natural resource and interpretation staff and provided to parks in a number of formats for use in visitor centers and general park use. (6) Network staff will begin developing technical working groups for each vital sign monitoring project. These more subject oriented work groups will replace the Network's Technical Steering Committee.

Task 6.3 - Contribute to General Management Planning

- FY2007 Accomplishments: (1) The Network established a cooperative agreement with the University of Rhode Island in FY06 to assist the Network in combining inventory products into park specific vertebrate and vascular plant synthesis reports that can assist parks with species and habitat protection and planning. These reports

- will not only combine inventory results, but include park specific guidance and suggestions for the management and conservation of species and habitats by taxonomic experts familiar with each park. In January 2007, cooperator Carol Trocki, began development of a Synthesis Report of the Biotic Resources of Fire Island National Seashore (FIIS). The purpose of this project is to provide an accessible, synthetic description of existing biotic resource information and management issues at FIIS so that this information can be incorporated into the general management planning process to ensure appropriate stewardship into the future.
- (a) Review of Existing Data – Readily available data from NCBN staff, park and regional websites, NatureBIB references, and NPSpecies were compiled and reviewed.
- (b) Project Outline Creation – A project outline was created that described the purpose, methods, and proposed schedule. This outline also identified broad categories for report content and a list of unresolved issues that required more input. This outline was distributed to Network and Park Natural Resources staff for input.
- (c) Additional Information / Input - A meeting with park natural resource staff took place in July 2007 to gather additional information for the report. Other cooperators and subject experts were contacted and additional information on park biotic resources was further researched from park references and the scientific literature.
- Scheduled FY2008 Activities and Products: (1) During FY08, a Synthesis Report of the Biotic Resources of Fire Island National Seashore (FIIS) will be completed. (a) A draft report of the information gathered during FY07 will be created by the end of calendar year 2007. This draft report will be internally reviewed and revised, then sent out for peer review before finalization. Following completion of the FIIS report, a second Network park synthesis will be initiated. The specific park has yet to be determined.

Objective 7: Develop, implement, and maintain a Network data management program.

Task 7.1. Develop an NCBN Database Template based on the NPS Natural Resource Database Template and develop individual monitoring databases for all network

protocols.

- FY2007 Accomplishments: (1) CACO data manager, Velma Decker worked cooperatively with both the Network Coordinator and Data Manager to complete the NCBN Salt Marsh monitoring database. Conference calls and review sessions were held monthly from September 2006-January 2007 between Velma Decker and NCBN staff to review changes and updates to the database. The final product was completed in January 2007. (2) As part of the cooperative agreement that the Network holds with the URI EDC lab, development began on the Network's Estuarine Nutrient Enrichment monitoring database in cooperation with the Network Data Manager and USGS cooperators.
- Scheduled FY2008 Activities and Products: (1) The Estuarine Nutrient Enrichment database and Seagrass monitoring database will be completed by URI cooperator Eric Endrulat of the URI EDC lab.

Task 7.2. Develop an NCBN Database Storage, Backup and Management System for all NCBN products and working document.

- FY2007 Accomplishments: (1) In June of 2007, the URI EDC lab obtained two servers to support its data storage and archiving activities for the NCBN, as well as the development of internet-based applications. Greg Bonyng of the University of Rhode Island Environmental Data Center (EDC) was tasked with developing the specifications for the new hardware, its initial setup, the establishment of a Local Area Network (LAN) for the use of NCBN staff, and assisting with the development of the Network's database. (a) Data Server Setup – The file server, a Dell PowerEdge 2950 was configured with a hard drive space in a RAID-5 configuration for redundant data storage in case of drive failure. It was also configured to act as a Microsoft SQL and ESRI ArcSDE server, with the capacity to eventually host a document management system. (b) Web Server Setup – The second server, a Dell PowerEdge 1950 in a RAID-1 configuration, was developed to function as a platform separate from the file server that could be used for internet-based application development, including Microsoft ASP-driven websites and ESRI ArcGIS Server applications. Both servers were simply configured so that hard drives could be added as needed to

expand data storage capacity, and, if required, easily configured to take advantage of future server additions. (c) Data Backup – A backup storage cycle (incremental backups daily, followed by full monthly backups) was initiated using a 320gb SDLT backup system. (d) Local Area Network – a Local Area Network was established allowing all NCBN staff computers (stationed at URI) to access the data and web servers. (c) Data Migration – Following the development and adoption of a Network Directory Structure, all data associated with network inventory and monitoring projects were migrated to this data server. Spatial data are currently being incorporated into ArcSDE and made available to GIS users on the LAN. (3) In addition, a new cooperative agreement was developed between the Natural Resource Sciences department at URI to provide opportunity for students to work with I&M projects. As a result, both graduate and undergraduate students are actively working on editing and formatting NCBN inventory reports and protocols to be published in the Northeast Region and National reporting series.

- Scheduled FY2008 Activities and Products: (1) Greg Bonyng of the URI Environmental Data Center will continue to work with NCBN staff to complete the migration and cataloging of Network datasets and will work to develop ESRI ArcGIS Server web applications for at least one of the NCBN's monitoring programs. The remaining GIS base data and spatial data associated with Network inventories and monitoring projects will continue to be incorporated into ESRI ArcSDE on the data server, and a metadata catalog will be developed to ensure proper documentation and aid staff in data retrieval. Document and photo management software solutions will also be investigated. Formal documentation will be produced concerning server specifications and configuration, network configuration, data storage and backup procedures, and other topics for inclusion in future revisions of the NCBN Information Management Plan. Finally, a prototype web application will be developed in support of the NCBN Shoreline Change Monitoring Protocol, allowing users to upload and view spatial data that has been collected in the field.

Objective 8: Identify and prioritize Network Vital Signs, develop protocols and implement programs to monitor these Vital Signs in Network parks.

Task 8.1. Test existing protocols for assessing and monitoring salt marsh ecosystems in Network parks. (CACO, FIIS, GATE, ASIS, COLO, GEWA, and two Northeast Temperate Network (NETN) Parks, ACAD and BOHA)

- FY2007 Accomplishments: (1) Revisions to the Vital Signs Monitoring Protocols for salt marsh vegetation and salt marsh nekton continued in close consultation with cooperators and assistance from statistician (Penelope Pooler). Specific revisions included integrating a more robust randomization procedure for: sample site selection; transect placement location for vegetation monitoring; and vegetation plot placement along transects. Modifications were also made to data sheets for both protocols to assist with Access database entry. Revised versions of the salt marsh vegetation and nekton protocols were delivered to the Network in March of 2007. The URI cooperators also published a paper on power analyses for replicate sample size that was present in the original and revised versions of the salt marsh vegetation monitoring protocol. (2)
- Scheduled FY2008 Activities and Products: (1) Revisions to both the NCBN salt marsh vegetation and salt marsh nekton protocols will be prepared and sent out for external review. Following the review the authors will address comments and make changes to the protocol as needed. (2) Sampling will begin at ASIS and GEWA in the summer of 2008. Technicians will be hired and stationed at the park to complete the work. Depending upon the number of staff hired and time permitting, the nekton sampling may or may not begin this fiscal year at these parks.

Task 8.2. Test variables and develop protocols for assessing and monitoring geomorphologic change in Network parks. (CACO, FIIS, GATE, ASIS, COLO, GEWA, THST, SAHI)

- FY2007 Accomplishments: (1) (ASIS, CACO, GATE, FIIS) Focus this year has been directed towards completion of the protocol for 1-D shoreline monitoring using a sub-meter GPS unit. A major change to the protocol was the incorporation of the USGS Digital Shoreline Analysis System (DSAS) as the means to enter, compare and analyze shoreline position. The Digital Shoreline Analysis System (DSAS) is

computer software that computes rate-of-change statistics from multiple historic shoreline positions residing in a GIS. It is also useful for computing rates of change for just about any other boundary change problem that incorporates a clearly-identified feature position at discrete times. With the incorporation of this software for analyses, a complete rewriting of the analysis SOP was completed. This took extensive time with both cooperators, Dr. Pooler and Dr. Psuty, learning the software and working jointly on rewriting the SOP. The final draft version of the Shoreline Monitoring Protocol was submitted in August 2007 to the Network. (2) Application of the shoreline monitoring protocol was conducted at Sandy Hook in the fall of 2006 and in the spring of 2007 by Dr. Psuty and Kathy Mellander, GATE GIS coordinator. Shoreline data was collected at FIIS by NCBN Data Manager, Dennis Skidds, both fall and spring. Dennis also traveled to FIIS in May 2007 following a storm event to collect a storm reference shoreline. (3) A new cooperative agreement was established with the URI Geosciences Department, USGS and the NCBN to develop a baseline of historical topography that can be utilized in long-term topographic change analyses in four Network ocean parks, CACO, FIIS, GATE (Sandy Hook Unit) and ASIS. These data will be exceptionally useful to the 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 can be used to help predict and manage for climatic changes such as sea-level rise and increased storm intensity by assessing how these factors have affected the parks over the past half-century. Additionally, accurately quantifying volumetric changes provides an understanding of the sediment budget of the islands and how this budget has responded not only to changing conditions (climatic, increased development, etc.) but to changes in land use and resource management of the parks. (4) Network staff reviewed and formatted the NCBN Geomorphological Monitoring Protocol-Part I Shoreline Position following the National Natural Resource Reporting Series guidelines. This draft version of the protocol was submitted to the National Monitoring Coordinator, Steve Fancy for inclusion in the NPS protocol monitoring database.

- FY2008 Scheduled activities and products: (1) The NCBN Shoreline Position protocol will be peer reviewed and Rutgers cooperator, Norb Psuty, will address reviewers comments and make changes to the protocol as needed. Following this review process the protocol will be submitted for final printing and incorporation in the NPS Protocol database. (2) A modification to the existing Rutgers agreement will be developed with the following tasks to begin in January 2008. Annual Reports will be produced for the Sandy Hook Unit of Gateway and for Fire Island National

Seashore following the format described in the Protocol. A second phase of coastal modeling will be initiated to develop a second protocol that will apply to data collection of 2-D and 3-D changes in the beach-dune system. Trend reports for shoreline change for the Sandy Hook Unit of Gateway and for Fire Island National Seashore will be developed, and benchmarks and monuments will be installed in the coastal portions of Gateway National Recreation Area to provide ready reference locations for subsequent monitoring of the beach-dune system. As part of the modification with Rutgers, a research associate (Tanya Silveira, a coastal geomorphologist) will be brought onto the project to assist Dr. Psuty with accomplishing these tasks. (3) Work will continue throughout the year on development of the coastal park historic digital terrain models by USGS and URI cooperators.

Task 8.3. Collect NASA EARL System LiDAR data in coastal parks and assess ways to use these data to enhance monitoring of shoreline and topographic change in the parks, along with other variables such as vegetation and habitat change. (CACO, FIIS, GATE, ASIS, COLO, GEWA, THST, SAHI)

- FY2007 Accomplishments: (1) The USGS Coastal and Marine Geology (CMG) Program in collaboration with NASA Wallops Flight Facility and NBCN, conducted an airborne LiDAR survey in May 2007 at Fire Island National Seashore (FIIS) and Sandy Hook portion of Gateway National Recreation Area (GATE). The survey, which was co-funded by USGS and NPS, took five survey days to complete and resulted in the acquisition of 104 Gigabytes of raw laser and digital photography (RGB and CIR) data. These data will be processed to create Digital Elevation Models of canopy and bare Earth topography in FY08. (2) Lidar data acquired over the seven Parks (ASIS, GATE, CACO, COLO, THST, GEWA, FIIS) within NBCN in 2004 and 2005 were processed to create “less filtered” ascii (x,y,z) products for first and last return topography. The “less filtered” products were generated using automated methods to remove outliers in the data. However, no additional manual or automated filtering steps were conducted to remove vegetation noise or create filtered bare Earth data products. These data products will provide the NBCN with the opportunity to produce custom DEMs for specific applications. (3) Digital Color Infrared (CIR) imagery acquired during the 2004 and 2005 surveys over the 7 NBCN Parks (ASIS,

GATE, CACO, COLO, THST, GEWA, FIIS) were geo-referenced using custom methods developed by the USGS CMG program. Image world files were created for each CIR image acquired during the survey using post-processed differential GPS and Inertial Navigation System (INS) data. The 2004 and 2005 NCBN surveys resulted in the collection of over 130,000 CIR images. These images and ancillary georeferencing data can be visualized in any GIS software and image mosaics can be generated for larger spatial regions. (4)USGS Coastal and Marine Geology staff conducted a presentation and lidar processing software demonstration to Network and Park staff at URI on March 1, 2007. The live demonstration included processing, filtering, QA/QC, and analysis of lidar data acquired by the NASA EAARL system. The presentation also provided a better understanding of lidar technology, and the various types and formats of lidar data. The meeting also addressed some of the major questions from park staff members about their prior use of lidar data. (5)An important monitoring goal of NCBN is to improve the understanding of and provide information to park managers on the dynamic nature of coastlines and the temporal variability in dune / beach topography. In the last decade, NPS-NCBN has collaborated with USGS and NASA to acquire dense lidar topographic data along the beach face of the four ocean parks (FIIS, CACO, ASIS, GATE). Recently, these surveys were extended to map the aerial topographic features within the entire park boundary. In order to determine the temporal variability of coastlines and dune/beach topography from repeat lidar surveys, it is necessary to first understand the variability and error budget in the positioning and vertical accuracy of the data acquired by a lidar system. Often, these errors are dependent upon the GPS satellite configuration during the survey. Accordingly, data acquired at FIIS and GATE (Sandy Hook) from 2003, 2005, and 2007 surveys were compared on a point to point scale as well as using a neighborhood of points over static targets such as parking lots, building roofs, etc. to determine system variability. Further, locations were identified in the data sets that reflected natural change. A system error budget was developed to determine the variability in elevation measurements over dunes and beach faces. A method was developed for temporal variability with “error bars” determined from the error budget for those surveys. Finally, an appropriate temporal lidar survey schedule was

suggested for ocean parks based on the analysis conducted. The report for the above analysis will be completed in FY08.

- Scheduled FY2008 activities and products: (1) Recently acquired lidar data will be processed and DEM first surface and bare Earth products created for FIIS and Sandy Hook portion of GATE, xyz ascii data files will also be provided. (2) Recently acquired digital color infrared (CIR) imagery data will be processed and image world files created for FIIS and Sandy Hook portion of GATE. (3) EAARL acquisition flights will be conducted at CACO, GEWA, and ASIS in Spring FY08, and processing these products to create DEMs, xyz ascii data, and image world files as described above will be completed. (4) An open file report (OFR) will be completed by January 2008 for the analysis of the temporal variability of coastlines and dune/beach topography from repeat lidar surveys as described in Section (4) above. (5) The following NCBN lidar data products will be published as USGS Open File Reports in FY08: USGS-NPS-NASA Topography - Sagamore Hills National Historic Site, USGS Open File Report 2007-XXXX (On DVD); USGS-NASA ATM Coastal Topography – Assateague Island National Seashore, 2001. USGS Open File Report 2008-XXXX (On DVD); USGS-NASA ATM Coastal Topography – Northeast Atlantic Coast Survey, 2000. USGS Open File Report 2008-XXXX (On DVD).

Task 8.4. Test variables and develop protocol for assessing and monitoring visitor impacts in Network parks. (CACO, FIIS, GATE, ASIS, COLO, GEWA, THST, SAHI)

- FY2007 Accomplishments: (1) No additional work was completed for this vital sign in FY07.
- Scheduled FY2008 activities and products: (1) Based on available funding, the Network may develop a scope of work for the development of a visitor use protocol.

Task 8.5. Test variables and develop protocols for the use of high spatial resolution satellite remote sensing data for estuarine and terrestrial vegetation habitat mapping in NCBN parks.

- FY2007 Accomplishments: (1) (FIIS) Terrestrial vegetation mapping by digital classification of Quickbird-2 satellite image was completed by URI cooperators (Dr.

Y.Q.Wang). They developed a simple protocol that used a stratified classification to extract vegetation types under the control of GIS map layers developed by the previous NPS Vegetation Mapping project for FIIS. A manuscript based on the outcome of this project was submitted and accepted to the journal, *Marine Geodesy* 30:77-95, 2007), 5th Special Issue on Marine and Coastal Geographic Information Systems. This project is complete. All data products will be submitted to NCSU for archiving and review.

- Scheduled FY2008 Activities and Products: Follow up on this project will include putting together a small technical team to review these projects in light of expanding this work into a long-term monitoring program for all of the Network parks. This will either be accomplished in 2008 or 2009 as Network staff time permits.

Task 8.6. Salt Marsh Elevation Monitoring (GATE, FIIS, ASIS, CACO)

- FY2007 Accomplishments: (1) (FIIS, GATE) Surface elevation table – marker horizon (SET – MH) stations at Fire Island NS, Jamaica Bay Refuge (JoCo, Big Egg Restoration Project, and Black Bank) and GATE, Sandy Hook unit continued to be monitored. Data collection occurred for the three sites as follows: Fire Island NS – May 15-16, 2007 & August 16-17, 2007; Jamaica Bay Refuge – May 8-9, 2007 & August 22-23, 2007; and Sandy Hook – May 29, 2007 & August 28, 2007. Data have been quality checked and entered into spreadsheets, and preliminary data analyses conducted.
- Scheduled FY2008 activities and products: (1) (GATE, FIIS, ASIS) Salt marsh elevation data collection will be continued at FIIS and GATE. Following the revised salt marsh monitoring sampling design, the Network will fund additional SET installations at FIIS and GATE in order to co-locate protocol data collection as necessary. SETs will be installed at ASIS at existing pony monitoring sites and the Network will add additional installations in marshes collocated in relation to the new salt marsh monitoring protocol design for ASIS. Three new marshes will be added at ASIS in FY08. A meeting will be held at the park in November 2007 with park staff and cooperator, Don Cahoon from the USGS to discuss these changes and determine sites for installation. Sampling will begin in the spring 2008 at ASIS.

Task 8.7. Integration of the NCBN parks into bird conservation region 30 tidal marsh bird monitoring. (COLO, ASIS, GATE, FIIS, GEWA, THST, SAHI)

- FY2007 Accomplishments: (1) The Network established a cooperative agreement with the University of Delaware FY06 to explore incorporating Network parks in a region-wide marsh bird monitoring program that will be developed through extended partnerships with other agencies, states and Universities. The primary purpose of this project and cooperative agreement was for NCBN parks to be included in the development of a hierarchical sampling frame for salt marsh birds in Bird Conservation Region (BCR) 30. The design will allow implementation at various scales to detect species-specific estimates at specific sites (i.e. National Parks and National Wildlife Refuges), within states or regions, and within BCR 30. The entire breeding range of Salt marsh Sharp-tailed and Coastal Plain Swamp sparrows are within BCR 30, providing an opportunity for designing surveys to estimate abundance and detect population trends through repeated surveys within the entire breeding ranges of two priority species. To date the cooperators have acquired GIS-based data layers for BCR 30 (New England /Mid-Atlantic Coast) including; National Wetlands Inventory Data, federal and other protected lands, and roads. These data layers were compiled to generate continuous coverages within BCR 30 including NCBN parks. A Generalized Random Tessellated Stratification (GRTS) sampling approach was used to generate a probabilistic sample for tidal marsh bird in BCR30. Given the 400 x 400 m tidal marsh grid, the cooperators exported the coordinates for all points within each region and used SDraw (<http://www.west-inc.com/computer.php>) to generate a GRTS sample with 500 potential sample locations per region.
- FY2008 activities and products: (1) Monitoring objectives for each NCBN Park and groups of tidal marsh bird species will be determined. The necessary sample intensity to meet monitoring objectives will be identified and a spatially balanced, hierarchical sampling frame using the Generalized Random Tessellated Sample developed. A draft final report, including power analyses, GIS data layers, and a salt marsh bird sampling frame will be submitted for review to the Network.

Task 8.8. *Develop an overall statistical sampling design for the NCBN monitoring program, review, revise sampling design sections of existing protocols, and make recommendations for the sampling design sections of planned protocols (all Parks).*

- FY2007 Accomplishments: (1) A cooperative agreement was continued between the NCBN, the Eastern Rivers and Mountains Network and Virginia Polytechnic Institute and State University. The PI at VA Polytechnic is Penelope Pooler, a biostatistician. In FY07, Dr. Pooler continued to review and revise the sampling design and standard operating procedures (SOP) for the following NCBN monitoring protocols: salt marsh sediment elevation, salt marsh vegetation, and nekton. Protocol revisions were completed in collaboration with each protocol author. The sampling design SOP for salt marsh vegetation has been rewritten based on the revised sampling plan. Sampling for sediment elevation and nekton will follow the same design by being collocated at a portion of the vegetation sampling sites. Dr. Pooler also continued collaboration on the sampling and analysis SOPs for the Network's ocean shoreline position protocol. Protocol review during the previous year determined that the sampling SOP needed no revisions. The decision to adopt a new software package, however, required revision to the analysis SOP. This package, DSAS (Digital Shoreline Analysis System) is an add-in for ArcGIS. Dr. Pooler revised the SOP to be compatible with the newly adopted analysis software and information to the SOP text on the statistical analysis options available. Dr. Pooler also began collaborating on the development of the Seagrass monitoring protocol. Her collaboration to date has involved reviewing the current work plan and providing statistical feedback; reviewing the analyses and providing insight into how they could be improved and expanded upon; and most recently, analyzing data and summarizing statistical model results.
- Scheduled FY2008 activities and products: Dr. Penelope Pooler will continue to collaborate on the seagrass protocol, and if needed, will provide further statistical assistance on the further refinement of the ocean shoreline position protocol. As time permits, Dr. Pooler will review the Network's protocol development summaries for planned monitoring protocols (visitor use, visitor impacts, nitrogen loading, beach/dune topography, and landscape change) and develop draft sampling design SOPs for each.

She will also prepare a report following the Northeast Region Technical Report Series guidelines, detailing the results of the SOP revisions, and the development of an overall sampling design for the Network. Dr. Pooler will also travel to ASIS with Network staff in November 2007 to discuss specific park designs for salt marsh monitoring protocols.

Task 8.9. Development of ecological thresholds for vital signs monitoring protocols

- FY2007 Accomplishments: (1) In FY07, USGS and University of Rhode Island scientists received funding through the USGS Status and Trends program to identify limits of acceptable variation and develop ecological threshold values for the vital signs of vegetation and nekton community structure associated with National Park Service's salt marsh vegetation and salt marsh nekton monitoring protocols. In addition to National Park Service monitoring data sets collected in conjunction with the NPS Northeast Coastal and Barrier Network, datasets from numerous other agencies that used comparable field methods are included in this study. These cooperating agencies include the US Fish and Wildlife Service Region 5, National Estuarine Research Reserve, and Save the Bay (RI). At the start of the project, Dr. Howard Ginsberg and Dr. M.J. James-Pirri (principal investigator) attended a meeting of principal investigators at the USGS Patuxent Wildlife Research Center in January, 2007 to present an overview of the funded research project. In June 2007, URI graduate student (Master's level, Department of Computer Science and Statistics) Jeffrey Swanson was hired to begin working on merging databases into two master files (vegetation and nekton) that will be used for the thresholds analysis. As of September 30, 2007, 362 datasets (a dataset is defined as a specific salt marsh site and year of data) have been acquired, reviewed for quality assurance and quality control, and merged in master data files.
- FY2008 Scheduled Activities and Products: (1) Tasks to be accomplished in FY08 include preliminary and in depth analyses of the databases. A small scoping workshop will be held in the spring of 2008 where knowledgeable individuals in the field of salt marsh ecology, NPS inventory and monitoring staff, and others will be invited to attend. Specific tasks and schedules are as follows: finalization of master databases (by November 1, 2007); classification of each salt marsh site based on

adjacent watershed development as using land use patterns and hydrologic impacts (completed by late-winter early-spring 2008); preliminary and in depth analyses for both databases. Analyses will include the use of exploratory classification methods, randomization procedures, and multivariate permutation procedures including, but not limited to 1) comparison of impacted and reference sites, 2) ordination to assess clustering of sites based on community-level parameters, and 3) anticipated responses of community-level parameters to known environmental stressors (completed by spring 2008).

Objective 9: Integrate water quality monitoring in the Network Vital Signs monitoring plan.

Task 9.1. Test variables and develop a protocol for assessing and monitoring nitrogen inputs to estuarine ecosystems in Network parks. (CACO, FIIS, GATE, ASIS, COLO and ACAD (Northeast Temperate Network NETN Park)

- FY2007 Accomplishments: (1) Through a cooperative agreement with investigator Scott Nixon from the University of Rhode Island, an extension of the Nitrogen Loading Model (NLM-E) was completed using the most accurate and recent land use data (1992) for Network parks. This model was run for each park, including a 30-year historical analysis for ASIS with data ranging from 1980-2000. The cooperators submitted a draft final report to NCBN staff for review in FY05. Comments were provided to the cooperators by Network staff and potential peer reviewers contacted, but URI cooperator, Scott Nixon and staff have yet to complete the final report incorporating comments.
- FY2008 Scheduled Activities and Products: Continue to request final report from cooperators, and when received, send out for peer review. Identify new cooperator to expand this project into a monitoring program for the Network and develop a monitoring protocol following NPS I&M Program standards.

Task 9.2. Test variables and develop protocol for assessing and monitoring estuarine nutrient enrichment in Network parks. (CACO, FIIS, GATE, ASIS, COLO and ACAD (a

Northeast Temperate Network NETN Park)

- FY2007 Accomplishments: (1) In August 2007, the finalized NCBN Estuarine Nutrient Enrichment protocol was submitted to the Network along with responses to peer reviewers by the USGS authors, Dr. Blaine Kopp and Dr. Hilary Neckles. The protocol was then sent out along with reviewer's comments addressed to each reviewer. The protocol was also submitted to the NPS National Monitoring Coordinator, Steve Fancy, for inclusion in the NPS monitoring protocol database. (2) (FIIS) In FY07, a new cooperative agreement was developed between the Network and Dr. Brad Peterson at the Seagrass Ecology Lab at Stony Brook University's Marine Sciences Research Center to implement the NCBN ENE protocol at FIIS. The following describes the specific implementation of the protocol (a) Protocol implementation – In late June the permanent seagrass monitoring site was established with the assistance of USGS personnel (Hillary Neckles and Blaine Kopp). In July, the continuous sonde site was selected and the sonde was placed in the field. The water quality monitoring was conducted over the next four weeks and the first quarter of the SeagrassNet site was accomplished. In August, the water quality monitoring component was accomplished and the continuous sonde was retrieved. Digital copies of all data were created. No data reduction has occurred yet. In September, the Rapid Assessment Seagrass Survey was initiated. All 200 sites were visited except #169 and #198 where none of the generated points were navigable. Results of this year's seagrass survey will be presented at the Estuarine Research Federation's meeting in November 2007 in Providence, RI. (3) In FY07 a new cooperative agreement was developed between NCBN and the USGS Maine Water Science Center, Martha Nielsen, PI. The purpose of this agreement is to synthesize water quality data collected during development and early implementation phases of the ENE protocol. This effort includes creating a relational database using MS Access, organizing data, perform quality assurance and quality control checks, performing data reduction steps, and generating interpretive products as specified by the ENE monitoring protocol. For two NCBN parks with pre-existing water quality monitoring programs (ASIS and GATE), NCBN data will be compared to those of the parks in order to evaluate the relative strengths of existing park versus network

protocols, to evaluate whether the park and network monitoring programs arrive at mutually consistent assessments of condition, and to attempt to identify conditions under which inconsistent assessments of condition might emerge systematically. To accomplish this objective, Ms. Nielsen will use existing data and data products for GATE and ASIS, and conduct a year-to-year comparison with data products from the individual park monitoring programs. In FY07, the cooperators devoted their efforts to create a database structure to hold the NCBN estuarine monitoring data collected at various parks, starting with data collected in 2003. They assisted in doing QA/QC on the field data collected at Assateague, Gateway, Colonial, and Fire Island from 2003 - 2006. They populated the database with the data once it had been QC'd, wrote an outline for data report and submitted for USGS review. (4) In FY07 at CACO, the water quality component of the ENE protocol was fully implemented by park staff with support from NCBN in the form of instrumentation and technical assistance (provided by USGS under agreement with NCBN). A cost sharing arrangement was continued so that chlorophyll analyses meeting ENE data quality requirements could be performed for all NCBN parks at the CACO Atlantic Research Laboratory. (5) In FY07, USGS researchers, Blaine Kopp and Hilary Neckles, performed the ENE seagrass condition monitoring at CACO, and advanced their efforts to develop rapid assessment techniques for unbiased evaluation of seagrass condition throughout NCBN parks.

- Scheduled FY2008 Activities and Products: (1) The Estuarine Nutrient Enrichment protocol will be formatted by Network staff to meet the National natural resource reporting series format and submitted for final publication. The protocol will be presented in February 2008 at the NPS Water Resources Meeting in Fort Collins, CO by NCBN cooperator and author, Blaine Kopp. (2) The existing NCBN interagency agreement with USGS, Blaine Kopp and Hilary Neckles, will be continued with additional funding in FY08. Further implementation will continue this year specifically at COLO and GEWA, and monitoring will continue at GATE, FIIS and ASIS as well. NCBN will recruit a cooperator (through the North Atlantic CESU) to implement water quality monitoring at the two Virginia parks (GEWA and COLO). Blaine Kopp and Hilary Neckles will then provide training and technical assistance to

this cooperator on implementation of the ENE protocol. The cooperative agreement with SUNY Stony Brook, Brad Peterson, will also be modified to include monitoring at GATE and SAHI this year, as well as continue expanding the seagrass monitoring program at FIIS. For FIIS, all data collected during the 2007 index period by Brad Peterson, including the seagrass survey, will be subjected to quality control and data reduction analysis. The results will be compared between FIIS and other regional sites by USGS. The SeagrassNet site within FIIS will be sampled in March and May 2008. The Network and USGS cooperators will also work with ASIS staff to hire a bio-tech to assist them with collecting the water quality data for the park. Blaine Kopp will provide training and guidance on the protocol revisions since last implementation, as well as provide technical consultation on protocol implementation during the index period. (3) In FY08, USGS Maine Water Science Center cooperator, Martha Nielsen, will finish processing, tabling, and graphing the data for the NCBN, ASIS and GATE monitoring programs and produce a draft report of the analysis of condition. (4) As part of a cooperative agreement with the EDC lab at the University of Rhode Island, Eric Endrulat, a research associate in the lab, will work cooperatively with the Network and USGS cooperators to develop an MS Access database to house the Network's seagrass monitoring data. This part of the project is due to be completed by January 2008. The project will continue with the completion of an estuarine nutrient enrichment monitoring database that will also house the Network's water quality data based upon the results and efforts of the Network's cooperative agreement with the USGS Maine Water Science Center.

III. Staffing

Inventory and Monitoring Staff (NCBN)

NCBN Coordinator, Sara Stevens

NCBN Data Manager, Dennis Skidds

NCBN Technical Steering Committee

Sara Stevens, NPS-University of Rhode Island

Elizabeth Johnson, NPS-University of Rhode Island

Carl Zimmerman, NPS-ASIS
Michael Bilecki, NPS-FIIS
Allan O'Connell, USGS-Patuxent
John Sauer, USGS-Patuxent
Charles Roman, NPS-University of Rhode Island
Hilary Neckles, USGS-Augusta, ME
Howard Ginsberg, USGS-University of Rhode Island
John Karish, NPS-Penn State University
Mary Foley, NPS-BOSO
Nancy Finley, NPS-CACO (now relocated from CACO)

NCBN Board of Directors

Scott Bentley, ASIS
George Price, CACO
P. Daniel Smith, COLO
Michael Reynolds, FIIS
Barry Sullivan, GATE
Vidal Martinez, GEWA/THST
Greg Marshall, SAHI (now relocated to Edison... but maybe after Sept 30)
Sara Stevens, NCBN Coordinator
Elizabeth Johnson, I&M Regional Coordinator
Mary Foley, Chief Scientist Northeast Region
John Karish, Chief Scientist Northeast Region

NCBN Contractors and Cooperators

RI Natural History Survey, David Gregg, Virginia Carpenter Brown, Nina Briggs, Kira Stillwell, Richard Orr
NatureServe, Lesley Sneddon
College of William and Mary, Dana Bradshaw
Frostburg State University, Ron Barry
New Jersey Audubon Society, David Mizrahi

North Carolina State University, Hugh Devine
NY Natural Heritage Program, Greg Edinger and Aissa Feldman
Penn State University, Scott Tiffney
Rutgers University, Keith Cooper
Rutgers University, Norbert Psuty
USGS, Allan O'Connell
USGS, Hilary Neckles, Blaine Kopp
USGS, John Brock and Amar Nayagandhi
NASA, Wayne Wright
University of Maryland, Dr. Edward Gates, Josh Johnson
University of Rhode Island, Natural Resources Science Department (NRS), Peter Paton,
Research Associate Carol Trocki, Graduate Student Assistant, Christine Caron, Elizabeth
Donelane
University of Rhode Island, Mary-Jane James-Pirri
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. Graduate students, Marisa Thompson
VA DNR-Natural Heritage Program, Karen Patterson
Virginia Polytechnic Institute and State University, Dr. Penelope Pooler
State University of New York, Stony Brook, Dr. Brad Peterson
USGS, Maine Water Resources Division, Martha Nielsen
Mark Hoffman, Private Contractor

IV. Reports, Publications and Presentations (FY 2007)

Reports and Publications

Barry, R. 2007. Inventory of Mammals (Excluding Bats) of Colonial National Historical Park, Frostburg State University.

Bradshaw, D. 2007. George Washington Birthplace National Monument Avian Inventory. College of William and Mary.

Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Patterson, J., USGS-NPS-

NASA Bare-Earth Topography - Fire Island National Seashore, USGS Open File Report 2006-1244 (On DVD).

Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Patterson, J., USGS-NPS-NASA First-Return Topography - Fire Island National Seashore, USGS Open File Report 2007-1007 (On DVD).

Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Patterson, J., Travers, L., USGS-NPS-NASA Topography- Assateague Island National Seashore, USGS Open File Report 2007-1176 (On DVD).

Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Patterson, J., USGS-NPS-NASA Topography - George Washington Birthplace National Monument, USGS Open File Report 2007-1179 (On DVD).

Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Patterson, J., USGS-NPS-NASA Topography- Thomas Stone National Historic Site, USGS Open File Report 2007-1177 (On DVD).

Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Patterson, J., USGS-NPS-NASA Topography - Gateway National Recreation Area, USGS Open File Report 2007-1178 (On DVD).

Brock, J.C., Wright, C.W., Nayegandhi, A., and Travers, L., USGS-NPS-NASA Topography- Cape Cod National Seashore, USGS Open File Report 2007-XXXX (On DVD). Submitted to internal review for Director's approval

Edinger, G. J., A L. Feldmann, T. G. Howard, J. J. Schmid, E. Eastman, E. Largay, and L. A. Sneddon. 2007. Vegetation Classification and Mapping of Vegetation at Gateway National Recreation Area. Draft Technical Report

Gates, E. J. and J B. Johnson. 2007. Bat Inventory of Assateague Island National Seashore. Appalachian Laboratory University of Maryland Center for Environmental Science (UMCES). Draft report.

Gilbert, A. T., A. F. O'Connell, E. M. Annand, N. W. Talancy, J. R. Sauer, and J. D. Nichols. An Inventory of Terrestrial Mammals at National Parks in the Northeast Temperate Network and Sagamore Hill NHS. USGS.

James-Pirri, M.-J., C.T. Roman, J. Heltshe. 2007. Power analysis to determine sample size for monitoring vegetation change in salt marsh habitats. Wetlands Ecology and Management 15:335-345 DOI 10.1007/s11273-007-9034-x

Kopp, Blaine S. and Hilary A. Neckles. 2007. A Protocol for Monitoring Estuarine Nutrient Enrichment in Coastal Parks of the National Park Service Northeast Region.

Natural Resource Report NPS/ NCBN/NRR—200x/xxx. National Park Service, Fort Collins, Colorado.

Roman, C.T., J.W. King, D.R. Cahoon, J.C. Lynch, and P.G. Appleby. July 2007. Evaluation of marsh development processes at Fire Island National Seashore (New York): recent and historic perspectives. Technical Report NPS/NER/NRTR – 2007/089. National Park Service, Boston, MA.

Orr, R. Annual Progress Report for the 2006 Field Season on the Baseline Survey of Selected Insect Groups of Assateague Island National Seashore.

Patterson, K. D. 2007. Vegetation Classification and Mapping at George Washington Birthplace National Monument, Virginia. Technical Report

Psuty, N. P., and Love, A., 2007. Monitoring Shoreline Change at the Sandy Hook Unit 2005-2006, Gateway National Recreation Area, Annual Report. Submitted to the Sandy Hook Unit, Gateway National Recreation Area, 30 p.

Psuty, N. P., M. Duffy, J. F. Pace, D. E. Skidds, and S. Stevens. August 2007. Northeast Coastal and Barrier Network Geomorphological Monitoring Protocol: Part I—Ocean Shoreline Position. Natural Resource Report NPS/NCBN/NRR—200X/xxx. National Park Service, Fort Collins, Colorado.

Wang, Y., M. Traber, B. Milstead and S. Stevens. 2007 Terrestrial and Submerged Aquatic Vegetation Mapping in Fire Island National Seashore Using High Spatial Resolution Remote Sensing Data. *Marine Geodesy*, 30: 77-95.

Presentations

Cahoon, D. 2007. Tidal marsh restoration and sea-level rise. An overview of the Big Egg Restoration Project was included in a talk to the NOAA Restoration Center – National Retreat, at the National Aquarium in Baltimore, September 18, 2007.

Roman, C. T. 2007. Relationships of sea-level rise, barrier island processes, and salt marshes at Fire Island National Seashore. 6th Biennial Fire Island National Seashore – Planning, Science and Research Conference, May 9-10, 2007.

Psuty N. P., S. Stevens, D.E. Skidds, T. Silveira, 2007. Monitoring Shoreline Change in the Coastal National Parks, North Atlantic Region. Association of American Geographers Annual Meeting, San Francisco, CA.

Psuty, N. P., 2006. Consideration of Sea-Level Rise in Driving Changes Along Coastal New Jersey. 25th Annual International Submerged Lands Management Conference. Red Bank, New Jersey, October 16.

Psuty, N. P., 2007. Coastal Dunes: 1976-2000. 6th Biennial Fire Island National Seashore – Planning, Science, and Research Conference, SUNY-Stony Brook, May 9

Psuty, N. P., 2007. ‘Emerging Strategies for Coastal Shoreline Management in the National Parks’, Geography Graduate Program Series, Rutgers University, March 2.

Skidds, D.E., 2007. LIDAR Data and Vital Signs Monitoring: Data Management Challenges and Lessons Learned. Annual I&M Data Management Meeting, Las Cruces, NM.

Skidds, D.E., S. Stevens, and L. Fabre, 2007. Northeast Coastal & Barrier Network: Data Management Tools for Fire Island National Seashore Inventory and Monitoring Projects. Fire Island National Seashore Biennial Science Conference, Stony Brook University, Stony Brook, NY.

Stevens, S. M., Skidds, D. and L. Fabre. 2007 The National Park Service Inventory and Monitoring Program. 6th Biennial Fire Island National Seashore – Planning, Science and Research Conference, May 9-10, 2007.

V. Budget

FY2007 Annual Report Budget Narrative

In FY2007, the NCBN received \$, \$ from Vital Signs Monitoring and \$ from the Water Resource Division for water quality monitoring. Approximately 75 percent of this funding was used to develop partnerships (via cooperative agreement/contracts) between the Network, USGS and a number of Universities for the development and implementation of monitoring protocols and continued product development for biological inventory projects. Permanent NPS personnel expenses constituted approximately 18% of the budget in FY07. Travel (1%), general operations and equipment purchases and the administrative/office support (3.62%) rounded out NCBN expenditures for FY07.

In FY08, the Network anticipates the authorization of approximately \$. Approximately 61 percent of the NCBN budget will be dedicated to monitoring protocol implementation, LiDAR collection and data management support. The largest increase in expenditures this year will be in personnel. A quantitative ecologist will be hired in FY08 along with

seasonal biotechs to assist the Network in protocol implementation. NCBN FY2007 expenditure summary and FY2008 budget plan are provided below.