ANNUAL ADMINISTRATIVE REPORT (FY2004) AND WORK PLAN (FY 2005) FOR INVENTORIES AND VITAL SIGNS MONITORING

FY2004-FY2005

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's Birthplace National Monument (GEWA), Sagamore Hill National Historic Site (SAHI), and Thomas Stone National Historic Site (THST)

Northeast Coastal and Barrier Network Approval Signatures

Michael B. Murray — 1-20-05

Mike Murray, Acting Superintendent, Cape Cod National Seashore, Representative-Network Board of Directors — Date

Elizabeth Johnson — 1/26/05

Elizabeth Johnson, Northeast Region Inventory and Monitoring Coordinator, — Date

Jan 26, 2005

Prepared by: Sara Stevens, Marc Albert and Bryan Milstead, Network staff, — Date

	Budget program (MS Access, aarwp_budget.mdb)
XP	Which version of Access did you use? [Enter 97 or XP for Access 97 or Access XP at the beginning of this line.]
x	The income amounts entered for Biological Inventories, Vital Signs Monitoring, Prototype $$ - Annual Transfer, Water Quality Monitoring and other sources matches the dollar amounts from the memos sent to the regions/networks by WASO (have you used the correct income amounts?).
x	In the Add/Edit Budget Records form, the amount shown for Total Expenses matches that for Total Income. (If it doesn't, enter a record under Expenses in the 7_Other category to make it balance; use an entry such as 'Unexpended funds' or 'Overspent Funds' in the Description column to explain the amount.)
x	For all Expense records, the Description field includes the name of the university, agency, company, or other vendor to help us document our outsourcing efforts. (If this expense involved a contract, cooperative agreement, interagency agreement, or other partnership, is it clear where the money went?)
x	For all Expense records, the correct item from the picklist for 'Where $$ 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).]
x	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 the budget program for FY 2000-2004 (data should be included for previous years since this is our first year of building this database). Be sure to list each park that was involved in the particular inventory.
x	Each year's budget has been exported as an .rtf file (one for FY 2004 and one for FY 2005), and both files have been inserted into MS Word at the end of the AARWP document.
x	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_FY0405_aarwp.mdb
	Annual Report and Work Plan (MS Word)
x	I have carefully read the guidance for the AARWP and followed it.
x	A header or footer with the date that the aarwp was last revised has been included.
x	I gave special attention to the 'Public Interest Highlights' and 'Major Accomplishments' sections of the report. (We need good examples of the successes, applications, and highlights of the program to help us obtain funding for all 32 networks! Your 'Major Accomplishments' section is what we'll use for the I&M Program's annual Report to Congress to justify the funding spent by your network.)
x	In the 'Status of Park Vital Signs Monitoring' table, all entries are equal to or greater than the entries in last year's report.
x	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 guidelines for submitting photographs.)
x	The aarwp file has been renamed using the network's 4-character alpha code and the years (FY0304) as in the example NCCN_ FY0405_aarwp.doc
x	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 8.)
x	I have followed my region's procedures for submitting the two files (e.g., NCCN_ FY0304_aarwp.doc and NCCN_ FY0405_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 2005 Work Plan by WASO
Yes	[Enter Yes or No]: Has the FY 2005 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'.

I. Overview and Objectives

Ecological context

The Northeast Coastal and Barrier Network (NCBN) includes eight parks stretching along the coastline of the Northeastern United States from Massachusetts to Virginia. These parks represent some of the most ecologically similar collections of lands within the 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 United States population. Without scientifically based knowledge and information on the effects of urban pressure on the health of these park ecosystems, it is uncertain that management decisions are being made that maintain or can restore ecosystem health.

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 2002-2004 and will continue over the next few years. Cooperative agreements have been established with scientists from the Wildlife Conservation Society, the College of William and Mary, Frostburg University, the University of Richmond, and the New Jersey Audubon Society to complete these baseline inventories. In addition to inventorying vertebrate species, the network has begun to review existing park invertebrate species data. Odonates (dragonflies and damselflies), considered indicators of wetland ecosystem health by scientists, and a taxonomic group of high public interest along the coast, are being inventoried in network parks through a cooperative agreement with the Rhode Island Natural History Survey (RINHS) as well as the Virginia Natural Heritage Program (VANHP). Staff from both the RINHS and VANHP are well known odonate scientists, and the network is privileged to have the opportunity to work closely with these staff in our parks. Some of the first information on migratory dragonflies is being collected in our coastal network parks. As part of the inventory program, compilation and cataloging of existing data into the three national I&M databases, NPSpecies, NatureBib and the Dataset Catalog, continues, and newly acquired I&M data and information are starting to be used in park planning processes.

Developing vegetation maps for the Network parks is well underway. The NY Natural Heritage Program is currently developing vegetation maps for GATE and SAHI. The Network is cooperating with the Virginia Division of Natural Heritage to conduct the field classification portions of the mapping for COLO and GEWA. Chris Lea, an ecologist from ASIS detailed to the Network in 2002, has completed the vegetation sampling and classification for THST. North Carolina State University is handling the GIS component for the network parks. The Network is cooperating with NatureServe to crosswalk the state classifications to the National Vegetation Classification system.

The Northeast Coastal and Barrier Network Vital Signs Monitoring Program is in its

fourth year of development. The network is working with cooperators from the University of Rhode Island, USGS, and Rutgers University to develop written protocols with detailed standard operating procedures (SOP) that will be used to implement standardized monitoring across network parks to assess estuarine nutrient inputs, visitor impacts, saltmarsh vegetation, nekton communities, and geomorphologic change. Additional components to the Network's vital signs program in development include, a contaminants inventory, seagrass mapping, and weather station data acquisition. The Network's Phase II monitoring plan was completed in October 2003. A draft of the network's final monitoring plan (draft December 2004) will include the draft monitoring protocols mentioned above.

A draft NCBN Information Management plan will be completed by December 2004 as well. This will be an appendix to the final Phase plan, but will provide guidance and standards on all aspects of managing both the network's inventory, as well as the long-term monitoring data. This plan describes how the network will collect, store, QA/QC, archive and make available the information developed by the network's I&M Program.

The Network works closely with Cape Cod National Seashore (CACO), the prototype park for the North Atlantic Coast. Some protocols are being developed with CACO. CACO as a prototype has been active since 1998 and is far along in planning, design and implementation of long term ecological monitoring so a separate report is prepared annually.

Objectives

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.

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.

II. Accomplishments (FY2004) and Scheduled Activities (FY2005)

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.

- **FY 2004 Accomplishments: (1)** A cooperative agreement was established with the University of Rhode Island for the ongoing maintenance, update and verification of the NPS NPSpecies database. Linda Fabre, a URI Research Associate was contracted to complete this work beginning in June 2003. This work entails data entry, conversion and verification as well as the training of NPS park staff and cooperators in the use of NPSpecies; coordinating the review of datasets by taxa experts and developing a system to consistently and accurately populate each park's database with new data. Ms. Fabre reviewed the NPSpecies databases for all NCBN parks to identify gaps and problems with these databases; entered and uploaded data to NPSpecies as needed; prepared GATE, FIIS Avian databases and ASIS Vascular Plant and Fungi databases for taxa expert review and certification; instructed and reviewed work by taxa experts on these databases; presented talks to NPS Natural Resource Staff on Uses of NPSpecies and the status of the NCBN park NPSpecies databases; co-wrote two documents pertaining to NPSpecies database population and management for the Northeast Region; and, attended NPSpecies Certification Training (April, 2004) and Metadata Training (July, 2004). (2) Helen Hamilton, a botanist, was contracted to certify the existing NPSpecies Vascular Plant database for ASIS. This work entails reviewing each vascular plant record, creating a Plant Species Local List and certifying the Local List. During the month of September 2004, Ms. Hamilton became familiar with using the NPSpecies database and reviewed the vascular plant data within the ASIS database to ensure that it was the most up-to-date and accurate data available to the park.

- **FY 2005 Scheduled activities and products**: (1) The cooperator, Linda Fabre, will maintain, update and verify the NPSpecies database for the Coastal and Barrier Network and other Northeast Region parks as needed; ensure that changes to the database are noted and entered into the database tracking system; prepare and review the databases for taxa expert certification; coordinate the certification of datasets by taxa experts; provide training to NPS personnel and Cooperators regarding the use of NPSpecies as needed. (2) Helen Hamilton will continue to review the ASIS vascular plant database on a species by species basis. Information will be added to each species Park-Name Profile as needed. In addition, the species associated evidence will be

reviewed for accuracy and a Local List will be developed. The database will then be certified on a species by species basis to ensure the accuracy of the data. Fields such as Park Status, Nativity, Cultivation and Residency will be completed. The Sensitivity of each species and its Management Priority will be assigned. Upon completion of the certification process, a QA Certification form will be completed and submitted to the NPSpecies Coastal and Barrier Network Point-of-Contact along with the completed database.

Task 1.2 – The NatureBib Database.

- **FY 2004 Accomplishments:** Four NCBN parks, CACO, COLO, GEWA, and THST, were visited by Scott Tiffney, a research associate hired through a cooperative agreement with Penn State University (PSU) for assessment of the status of each park's NatureBib databases and onsite collections. New records were added for CACO (952 new records), COLO (150), GEWA (71), and THST (127). All park NatureBib database records were edited for duplication, spelling, authority control and data comprehensiveness for CACO (478 records edited), COLO (84), GEWA (32), and THST (73). Editing of records for other NCBN parks not visited was also initiated. Scott also completed a draft Northeast Region NatureBib Data Management Plan and a draft Northeast Region NatureBib Data Entry Manual that are currently under review by the network data manager.
- **Scheduled FY 2005 Activities and Products:** NatureBib database updating and editing will continue at ASIS, CACO, COLO, FIIS, GATE, GEWA, SAHI, and THST as needed. Quarterly progress reports will be completed for November 2004, March 2005, and July 2005.

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

Task 2.1 – Mammal inventories (COLO, THST, GEWA, SAHI)

- **FY 2004 Accomplishments:** (1) (a) Surveys of mammals (except bats) by a Frostburg State University (FSU) graduate assistant were completed at GEWA and THST. UTM coordinates were obtained by GPS at each sampling location, and measurements of habitat variables were completed. Data were compiled in MS Access format. Four additional species were confirmed for GEWA in FY 2004. In total, we have confirmed 17 of the 20 species of non-chiropteran mammals that had been recorded for GEWA before we began our work, and **found 6 new species**. At THST 1 additional species was recorded in FY 2004, making 13 species of mammals now confirmed, **all new records for the park**. (b) Surveys of mammals (except bats) by 2 FSU graduate assistants were completed at COLO. UTM coordinates were obtained by GPS at each sampling location, and measurements of habitat variables were completed. Data were compiled in MS Access format. Twenty-nine of the 41 species of non-chiropteran mammals previously recorded for COLO have been confirmed, including an additional 3 species in FY 2004. (c) A progress report on inventorying activities at GEWA/THST and COLO was submitted in March 2004. (2) USGS cooperator Allan O'Connell, conducted mammalian surveys at SAHI during the 2004 field season. (3) A proposal to inventory bats on ASIS was submitted by

Edward Gates from the Appalachian Lab, University of Maryland, Center for Environmental Science.

- **FY 2005 Scheduled Activities and Products:** (1) (a) Data from THST/GEWA will be compiled and analyzed, and Tressa Dolbeare's FSU M.S. thesis on the habitat-specific species diversity of small mammals and demography of *Peromyscus leucopus* in GEWA will be prepared. (b) Data from COLO will be compiled, and analysis will begin in October 2004. Heather Warchalowski's FSU M.S. thesis on small mammal response to Japanese stilt grass (*Microstegium vimineum*) in mixed deciduous-coniferous forests of COLO, and Dana Strang's FSU M.S. thesis on the effects on small mammals of hurricane-created canopy gaps in forests of COLO, will be prepared. (c) We will begin summarizing within-park species distributions, relative abundances, and species-diversity measures for the 3 parks. (d) We will continue preparation of the species electronic data sets and the GPS data for sampling locations and observation sites for the 3 parks that ultimately will constitute final products for the project. (e) A progress report will be prepared from November 2004 – January 2005. (2) A final report on mammalian surveys at SAHI will be provided to the network in 2005 by USGS cooperator, Allan O'Connell. (3) A cooperative agreement will be developed to inventory bats on ASIS. This survey will include both resident and migratory bat surveys.

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

- **FY 2004 Accomplishments: (1) (a)** New Jersey Audubon Society (NJAS) has, completed and submitted a review of avian species records in the NPSpecies database for Gateway National Recreation Area (GATE). These data were provided for specific units of the park, i.e., Jamaica Bay/Breezy Point, Staten Island, and Sandy Hook. This effort provides an improved and more effective treatment of the available information that allows review of unit-specific information. (b) Nearly completed a review and update of avian species records in NPSpecies for Fire Island National Seashore (FIIS). Submission of the finished product is expected by the end of October. (c) Reviewed all existing avian species data for GATE and submitted a draft report to the network identifying inventory gaps. A final version of this report is expected by the end of October. NJAS is also currently working on a similar report for FIIS, a draft of which is expected sometime in November. (d) Based on the review described in (c) above, the cooperative agreement instituted between the NCBN and the New Jersey Audubon Society was revised to include avian inventories of breeding passerines and secretive marsh birds at GATE. A final proposal is expected by 30 November 2004, with inventories to commence in spring 2005. **(2) (a)** Dana Bradshaw, College of William and Mary, completed field work in the winter of 2003/04, bringing to a close some 15 months of data collection towards a year-round inventory of birds at COLO, GEWA and THST. A team of 4 field technicians was used to conduct repeated rounds of sampling. Surveys were conducted from a matrix of fixed sampling points covering all habitat types within each park. Additional information was gleaned from Breeding Bird Survey data, Christmas Bird count data, and other standardized counts where available toward creating a comprehensive bird profile for each park. Data compilation and analysis was underway throughout the

remainder of FY 2004 with draft final reports nearing completion for the first of the parks. Field work in the fall and winter of 2003 was hampered at COLO by significant forest damage from Hurricane Isabel which struck the region on September 18, 2003. (b) For ASIS, Bradshaw focused on data mining and compilation to generate a literature profile of bird distribution and diversity. This will then be used to assess species gaps and project strategies toward resolving a complete bird profile for ASIS. Work during FY 2004 uncovered copious information spanning over a hundred years. Most notable among the information sources were data confirming changes in species ranges over time as illustrated in brown pelicans, double-crested cormorants, roseate terns, and others; as well as dramatic declines in other species populations. (**3)** Since a cooperative agreement (FY02) was established with the Theodore Roosevelt Sanctuary (TRS) and Audubon Center to inventory avian species at SAHI, TRS has completed all of the field work and submitted a draft final report and data. The final products will be submitted in the fall of 2004.

- **Scheduled FY 2005 Activities and Products: (1)** NJAS will (a) complete and submit a final update of the GATE and FIIS NPSpecies databases. (b) Submit final reports to the network identifying avian inventory gaps for GATE and FIIS. (c) Submit a study plan regarding avian inventory work at GATE. (d) Conduct inventory surveys at GATE in spring 2005 for breeding passerines and secretive marsh birds. **(2)** The College of William and Mary staff will (a) complete draft and final reports for avian survey efforts in the Northeast Coastal and Barrier Network (NCBN) parks. Reports will include habitat and bird inventory data for all units of each park, in addition to historical data where available. Data will span all seasons and include aerial image maps of point locations and nomenclature. Long-term monitoring recommendations and management suggestions where appropriate will be presented for each park. Additional work will be carried out toward updating the NPSpecies database for each park and certifying data already entered. (b) ASIS work will include a digital database as well as recommendations for additional sampling work needed to complete a comprehensive avian inventory. (c) The Theodore Roosevelt Sanctuary (TRS) and Audubon Center will submit final products for the avian inventory conducted at SAHI.

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

- **FY 2004 Accomplishments: (1)** Through a cooperative agreement with Dr. Joseph Mitchell, University of Richmond, herpetological inventories at COLO, GEWA, and THST began in October 2001 and continued through July 2004. (a) A total of 26 species of amphibians and 27 reptiles have been documented for COLO, 10 and 11 respectively, for GEWA, and 13 and 8, respectively, for THST. New county records and range extensions for several species, mostly frogs and salamanders, have been documented. (b) Field work has been completed for the three parks in this I&M project. (c) All data have been entered and a copy sent to the Network data manager for evaluation. Final evaluation of the data has been completed and the site maps completed for the final reports. (d) A draft of the complete final report for COLO, to be used as a template for the other reports, was submitted for review. **(2)** (a) Work

continues with the Wildlife Conservation Society (WCS) to complete draft final reports for herpetological inventories conducted at GATE, FIIS and SAHI. Data review has begun by the network. (b) A modification to the existing cooperative agreement with WCS was established to conduct herpetological inventories at ASIS. Prior to the field season, visits to the park were conducted, a study of the literature was performed, and a detailed work plan was created describing the nature of the work to be preformed and the areas of interest. In addition to inventory surveys, a population of spotted turtles (*Clemmys guttata*) on ASIS was intensively trapped, and 5 individuals were tracked using radio-telemetry in an effort to determine population size, habitat usage, hibernacula sites, seasonal movements and habits. Major findings at ASIS in 2004 included 5 uncommon species rarely seen or previously unconfirmed or unknown to occur in the park. These include grey treefrog (*Hyla versicolor*), northern water snake (*Nerodia sipedon*), eastern garter snake (*Thamnophis sirtalis*), rough green snake (*Opheodrys aestivus*), red-bellied turtle (*Pseudemys rubriventris*). **(3)** Through an agreement with the University of Rhode Island NPS Field Technical Support Center (URI FTSC), Dennis Skidds, a research associate with the lab continued to develop and implement QA/QC procedures for all herpetological data submitted to NCBN by cooperators.

- **Scheduled FY 2005 Activities and Products: (1)** A no-cost extension for Dr. Mitchell to complete data file and report products for this project has been granted until August 2005. Final review of the Access data file, maps, and final reports will be produced during this FY to complete the project. The final report for COLO has gone through several reviews and revisions and is now in the last review before final production. **(2)** (a) The population of spotted turtles at ASIS will continue to be tracked by David Brotherton (WCS biologist) using radio-telemetry from October 2004 through spring 2005. Draft reports will be revised and preparation of final reports will be conducted (David Brotherton-WCS) for the remaining parks (MORR, WEFA, SAGA, SAIR, SARA, MIMA, FIIS, WIFL, SAHI, GATE, ASIS) where inventory surveys have already been conducted. (b) Regional I&M Program staff and the WCS will hold a meeting at the University of Rhode Island to discuss products and deliverables for all parks involved in the WCS herpetological inventories. A schedule will be developed for final product submission for all parks.

Task 2.4 – Vascular Plant inventories (COLO)

- **FY 2004 Accomplishments: (1)** No vascular plant inventories were conducted this year in NCBN parks. **(2)** A proposal submitted to COLO by the New York Botanical Garden to survey vascular plants on Jamestown Island was reviewed by network staff. This proposal is being considered for FY05 funding at this time.

- **Scheduled FY 2005 Activities and Products:** Vegetation mapping plots data will be acquired, reviewed and entered into NPSpecies.

Task 2.5 – Estuarine and freshwater fish inventories (CACO, THST, GEWA)

- **FY 2004 Accomplishments: (1)** Fish inventory data collected from THST and GEWA during 2003 were summarized and submitted to the NCBN Data Manager for

entry into NPSpecies. Park specific databases and an annual progress report for 2003 were also prepared and submitted to both the Chief of Natural and Cultural Resources at GEWA and the NCBN staff. During 2004, continued inventory efforts at GEWA were completed following a total of five visits to the park. The primary effort was associated with two, three-day visits, one during late May and one in late August. In addition to participation from the fisheries biologist and crew from Shenandoah National Park, a significant component of the inventory during these visits was accomplished through the assistance of equipment and personnel from the U.S. Fish and Wildlife Service per an interagency agreement. A number of additional sites were added within Pope's Creek from the original 2003 sites and the addition of fyke nets during 2004, produced the largest fish sample sizes from the combination of sampling techniques employed. From late August through late September, three additional visits were made to the park involving one to three of the Shenandoah fisheries staff during which intensive angling surveys were focused along the stream channel at the confluence of Pope's Creek and the Potomac River. All associated data entry and verification were completed for the 2004 field season during September.

- **Scheduled FY 2005 Activities and Products: (1)** A revised database specific to GEWA will be prepared and submitted by Shenandoah National Park staff, and the most recent data resulting from the 2004 field season will be submitted for entry into NPSpecies. Additionally, an annual progress report including data summaries and maps of sampling locations for 2004 will be completed.

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.

- **FY2004 Accomplishments: (1)** 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 completed site reconnaissance during the fall of 2003 and conducted monthly field surveys from May through September 2004. Approximately 65 sites were visited within all three parks (FIIS, GATE, SAHI). Over 35 species were documented and more than 350 voucher specimens were collected. Work continued with I&M staff to complete database development. **(2)** In Fy04 a modification to the existing RINHS agreement was completed to inventory Odonate and Butterfly species on ASIS. **(3)** Through a cooperative agreement established in FY03 with the Virginia Department of Conservation and Recreation, Division of Natural Heritage (DCR-DNH) to inventory Odonata (dragonflies and damselflies) species and diurnal Lepidoptera (butterflies and skippers) species at COLO and GEWA, DCR-DNH have compiled and reviewed existing species data for both parks, conducted field work to survey for species of Odonata and diurnal Lepidoptera, entered location, habitat, and species information into an Access database, and made management recommendations for rare and endangered species encountered. For FY 2004, field surveys have been conducted in each park from March to September 2004 (typically two visits per month for each

park). For each field visit, detailed notes were taken on area surveyed (including GPS points), time of survey, species seen/vouchered, habitats and relative abundance of species. In addition, voucher specimens are being curated for future reference.

- **Scheduled FY 2005 Activities and Products: (1)** The RINHS will complete voucher specimen preparation, enter data for 2004 field season, and write and submit progress report by December 2004. Field surveys will continue from May-September 2005, and will document habitat characteristics, and follow-up on rare species records and migration events. **(2)** RINHS, through a contract with Dr. Richard Orr, will begin compiling existing odonate and butterfly data for ASIS, develop a study plan, and begin field surveys. **(3)** In FY 2005 DCR-DNH will complete fieldwork at both parks by the end of October 2004. Between October 2004 and April 2005, DCR-DNH will assist NPS with developing the Access database for this project and enter information from completed fieldwork. Data will be entered into the database and ArcView shapefiles associated with the data will also be completed. In addition, DCR-DNH will compile species records from literature and known collections. Finally, a final report will be written and delivered to NPS detailing the findings and conclusions.

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

Task 4.1 – Integrate newly collected plot data into the National Vegetation Classification and to ensure adherence to the NPS Vegetation Mapping Program standards.(GATE, SAHI, GEWA, COLO)

- **FY 2004 Accomplishments: (1) (a)** GATE, SAHI: NatureServe (NS) ecologist Lesley Sneddon made two field visits to Gateway (including Sandy Hook) with New York Natural Heritage Program (NYNHP) ecologist Aissa Feldman and New Jersey Natural Heritage Program (NJNHP) ecologist Kathleen Strakosch-Walz in October 2003. There was insufficient time to visit SAHI on this field trip. Discussions regarding classification and mapping issues at GATE and SAHI were held with the ecologists during field visits and in subsequent communications. All occurrences of major community types, including the rare holly forest on Sandy Hook were visited. (There are only two known occurrences of this community type, and both occur on NPS lands. The other is on Fire Island). **(b)** COLO: Lesley Sneddon made one field visit with VADCR ecologists Karen Patterson and Gary Fleming to COLO in September 2004. All major community types were visited and there was extensive discussion of appropriate NVC types as well as mapping issues. **(c)** GEWA: no field visit by Lesley Sneddon; discussed NVC types in conjunction with COLO field visit noted above.

- **FY 2005 Scheduled activities and products: (1) (a)** GATE, SAHI: NS will work with NYNHP and NJNHP to finalize the NVC associations; will complete global descriptions and integrate park-specific descriptions generated by both heritage programs into a draft classification report, and will produce keys to GATE and SAHI. **(b)** COLO: NS will work with VA-DCR to complete global descriptions and produce a key for COLO. **(c)** GEWA: if classification issues are identified, NatureServe will make field visit with VA-DCR in field season 2005.

Task 4.2: 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.
Parks Involved: (ASIS), (THST),

- **FY 2004 Accomplishments**: NatureServe (Lesley Sneddon) submitted a proposal to fund the assemblage of all final classification, map products, and metadata for the ASIS and THST vegetation maps. NatureServe will 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 metadada that meet all VMP standards. A cooperative agreement was developed and completed in FY04 for this work.

- **FY 2005 Scheduled activities and products:** NatureServe will assemble all existing products for ASIS and THST vegetation maps and begin to assess information needs for each park.

Task 4.3: Work with NatureServe contractor Robert Zaremba and with park staff to integrate newly collected plot data into the National Vegetation Classification and to ensure adherence to the NPS Vegetation Mapping Program standards; begin process of accuracy assessment (AA). (CACO)

- **FY 2004 Accomplishment**: NatureServe (Lesley Sneddon and Bob Zaremba) finalized the classification report and draft PLOTS database and submitted both products to the park. NS (Lesley Sneddon) wrote a proposal for AA field work. The proposal was funded, and most AA field work was completed.

- **FY 2005 Scheduled activities and products:** AA plot work is scheduled for completion in fall 2004. Plots data entry for field plots will be completed and submitted. AA plots data entry will be started, and AA data analysis and report are scheduled for completion at end of calendar 2005.

Task 4.4: Prepare and deliver seminars on application of NVC in coastal systems
Parks Involved: CACO, FINS, ASIS, GATE, SAHI, BOHA, SAIR

- **FY 2004 Accomplishments**: NS (Lesley Sneddon) prepared and delivered a seminar on the application of the NVC to management of coastal systems at the University of Rhode Island.

- **FY 2005 Scheduled activities and products:** NatureServe ecologist Lesley Sneddon will attend a seminar by USGS Coastal and Marine Geology scientist John Brock and also participate in discussions regarding vegetation mapping and monitoring using LIDAR and other remote sensing data. Discussion will begin with Assateague Island National Seashore.

Task 4.5 – Vegetation mapping-GATE, SAHI

- **FY 2004 Accomplishments: (1)** Through a cooperative agreement with the NY Natural Heritage Program, vegetation cover data were collected from 24 observation

points at Gateway NRA (GATE). Aissa Feldmann (NYNHP Ecologist) attended a Torrey Botanical Society fieldtrip to GATE's Jamaica Bay National Wildlife Refuge on June 19, 2004 led by Richard Stalter (St. John's University) who has published numerous floristic studies of Gateway (e.g., Stalter and Lamont 2002). Ms. Feldman also attended the Society for Conservation Biology's meeting in NYC: Conservation in an Urbanizing World (July 30 – Aug 2, 2004), which included a field trip co-led by Aissa to GATE's Jamaica Bay. **(2)** NCSU cooperators created digital orthophoto mosaics for GATE and SAHI, assessed their positional accuracy, created metadata for both mosaics, and distributed copies of the mosaics and metadata to Aissa Feldman.

- **Scheduled FY 2005 Activities and Products: (1)** Aissa Feldmann (NYNHP Ecologist) will be returning for a final round of sampling at GATE in early October, 2004. Ms. Feldman will deliver a preliminary vegetation map to SAHI for one of their planning meetings by late October. **(2)** NCSU will prepare and submit final reports and distribute final data CDs/DVDs for both the GATE and SAHI mosaics.

Task 4.6 – Vegetation mapping-COLO, THST and GEWA

- **FY 2004 Accomplishments:** (1) NCSU cooperators assessed positional accuracy of the COLO mosaic, created metadata for the COLO and GEWA mosaics; and distributed copies of the mosaics and metadata to Karen Patterson. The THST mosaic, accuracy assessment, and metadata were delivered in FY 2003. **(2)** Virginia Division of Natural Heritage Ecologists **(2a)** entered data collected during the 2003 field season into plots databases; **(2b)** completed edits to the photo interpretation line work for GEWA and tagged all polygons to units in the United States National Vegetation Classification; **(2c)** completed vegetation sampling and qualitative evaluation of mapping line work in COLO where an additional 15 quantitative plots were sampled and an additional 114 observation points were collected. **(2d)** An amendment was added to the core agreement that provides for additional funding and an extension of the project until Dec. 31, 2007.

- **FY 2005 Scheduled activities and products**: **(1)** NCSU will prepare and submit final reports and distribute final data CDs/DVDs for both the COLO and GEWA mosaics. Upon receipt of the final THST alliance level vegetation map from Chris Lea, they will plot copies as requested, and prepare and submit the final report and distribute final data. **(2)** Between October 2004 and April 2005 VDNH will prepare a progress report for Philadelphia Support Office by December 2004. Data collected in 2004 will be entered into the NatureServe PLOTS database. Editing of the photo interpretation line work for COLO will be completed and polygons will be attributed with vegetation classifications where possible. Local vegetation descriptions will be completed for GEWA and COLO and a key to the COLO vegetation will be developed for use in the map Accuracy Assessment. May 2005 – October 2005 An accuracy assessment for the draft vegetation map of COLO will be completed. Any fieldwork needed to fill data gaps in COLO will be conducted.

Task 4.7 Inventory of Contaminant Sources in Network Parks (All parks)

- **FY 2004 Accomplishments: (1)** (a) Cooperators from Rutgers University completed a first draft of the FIIS park specific report that includes a baseline inventory of current xenobiotics in the environment based on the historical data and current information gathered by the cooperators in 2003. A complete contaminants risk assessment was included in this report. (b) Network and park staff reviewed this report. Network and CACO staff met with Rutgers cooperators in 2004 to discuss further plans for the project as well as scheduling the completion of the final park reports.

- **Scheduled FY 2005 Activities and Products: (1)** All other network park reports will be completed and submitted to the network by February 2005. These reports will be based upon the FIIS report template.

B. Vital Signs Monitoring

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

- **FY2004 Accomplishments: (1)** Three NPS biotechs were hired to conduct pilot work on nekton and saltmarsh vegetation monitoring in network parks during the 2004 field season. (**2)** Marc Albert, who transferred to the Boston Office from Golden Gate Park, and was hired as a part-time GS-11 Term Biologist in 2003 was hired as a full time term employee in FY04 to assist the Network Coordinator and Data Manager in preparing the Phase 3 document, data management plan and monitoring protocols. **(3)** Support was continued for Arthur Rodriguez, a graduate student at the University of Rhode Island jointly supported by the Network and the CESU to develop a GIS based toolbox to help managers interpret shoreline change data. Mr. Rodriguez was accepted into the SCEP program and duty stationed at Assateague Island N.S. for 12 weeks. **(4)** Susan Huse continued with the network as database developer and programmer. **(5)** A cooperative agreement was developed with the Rocky Mountain Biological Lab to assist the network with technical writing and editing. Gary Entsminger has been working with the network on development and editing of the Phase 3 and Data Management Plans.

- **Scheduled FY 2005 Activities and Products: (1)** NPS biotechs will be hired again in 2005 to assist with protocol implementation in network parks. (2) Arthur Rodriguez will complete his MS thesis and be hired by ASIS as a permanent employee.

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

- **FY2004 Accomplishments: (1)** A board of director's meeting was held via conference call in January 2004. Discussions entailed review of the FY03 administrative report and FY04 work plan. The FY04 plan was accepted by the board of directors at that time. **(2)** Meetings were held at both SAHI and ASIS this year and

included all network park staff and superintendents. Both meetings presented an overview of the Network's I&M Program to date and invited further discussion on the development of the program.

- **Scheduled FY 2005 Activities and Products: (1)** A Technical Steering Committee meeting will be held to review and discuss the work being conducted on the Network's Phase 3 plan including protocol development and possible network staffing scenarios. This meeting will be held in November 2004 at the University of Rhode Island. **(2)** A board of directors meeting will be held by the end of January 2005 to review the FY 04 report and FY05 work plan.

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

Task 7.1 – Web page development for the Network
Parks Involved: ASIS, CACO, GATE, SHEN, NCBN parks in general

- **FY 2004 Accomplishments: (1)** (a) The National Park Service (NPS) recently established a cooperative agreement with the Environmental Data Center (EDC) at the University of Rhode Island to develop and enhance new and existing websites to more effectively present natural resources inventory and monitoring information on the internet. These sites were created to act as multi-functioning resources for both the public and Park Service resource managers. These pages may contain general overviews and summaries of a network's various inventory and monitoring programs and initiatives, present photo galleries introducing visitors to the natural resources within a given park, or serve as clearinghouses for the distribution scientific data and reports. Specific web-related accomplishments for FY04 include. **(b)** Developed text for and published a Natural Resource Profile for ASIS. **(c)** Completed updates to CACO's Prototype Long-term Ecosystem Monitoring website. **(d)** Published Gateway National Recreation Area's Jamaica Bay Institute website. **(e)** Continuing updates to NCBN website. Added new pages to access materials from 2004 Protocol Development meeting; March highlights; password-protected page to serve park planning documents; converted MS Powerpoint conference posters to HTML format and posted in the 'Reports' sections of I&M pages; created and published a PowerPoint presentation summarizing sampling-scheme generation for estuarine monitoring; created and posted several webforms for various NCBN initiatives.

- **FY 2005 Scheduled Activities and Products:** (1) Websites for the Northeast Coastal and Barrier Network (NCBN) and GATE's Jamaica Bay Institute will continue to be maintained and enhanced over the coming fiscal year. Updates to other previously-created sites will be completed as requested.

Task 7.2 Creation and compilation of digital boundary and orthophotography base layers for NCBN parks. (All parks)

- **FY2004 Accomplishments: (1)** Through a cooperative agreement with the University of Rhode Island Field Technical Support Center, Julia Brownlee a research associate, compiled base GIS datasets for CACO, FIIS, GATE, and SAHI.

The sources of GIS data were the National Park Service Clearinghouse (http://www.nps.gov/gis/data_info/clearinghouse.html), the National Park Service ftp site (http://science.nature.nps.gov/nrftp) and the Environmental Data Center at the University of Rhode Island. **(2)** NCSU delivered CDs containing base GIS data for ASIS, GEWA, COLO, and THST.

- **Scheduled FY 2005 Activities and Products:** This project is complete. Data will continue to be maintained by both URI and NCSU cooperators.

Task 7.3 – Develop an NCBN Database Template based on the NPS Natural Resource Database Template and develop individual monitoring databases for all network protocols.

- **FY2004 Accomplishments: (1) (a)** The NCBN created the new database design for all subsequent monitoring databases. The design is a collaborative effort between the NCBN and CACO staff. It builds upon the I&M NR Database Template, as well as the many databases already in existence at CACO and other parks nationally. By creating a unified database structure, the NCBN is able to create an easy-to-use, menu driven interface to help the researchers and staff that are not familiar or comfortable with Microsoft Access. This new NCBN Database Template includes SOPs for how to use the database, and an SOP for how to convert the template for any monitoring project in any network. This new NCBN Database Template is being made available to all networks in the park service. **(b)** The new NCBN Database Template has already been implemented to create three new databases, Nekton Monitoring, Coastal Geomorphology, Estuarine nutrients and Odonate Inventories. The SOPs are already available for all users and for inclusion in the management plan. **(c)** Two data managers from the NCBN, Susan Huse and Velma Potash, have joined the Natural Resource Database Template – Database Structure Revision Team to update the I&M program database standards. This committee is learning from the experiences of the I&M Program over the past several years servicewide to improve the database tables and data relationships structure to be more adaptable to all inventory and monitoring databases. The experiences of our NCBN staff in developing the NCBN Database Template and it representation on Revision Team will provide a synergy between the two products that will benefit all.

- **Scheduled FY 2005 Activities and Products: (1) (a)** Susan Huse will upgrade the NCBN Database Template to incorporate new I&M database design standards currently under development by the NRDT Database Structure Revision Team. Once completed, the NCBN Template will meet the newly revised national database standards, and can be used in all networks, and will meet servicewide standards. **(b)** Work on additional data management SOPs begun in FY04 will be completed in FY05. These SOPs are part of the data management plan for NCBN. Susan Huse will continue to develop databases and additional SOPs for the network that can be easily adapted for use by all networks in the Northeast Region.

Task 7.4 GIS and Database Efforts in Support of Inventory & Monitoring Projects in Northeastern National Parks (ACAD, ASIS, BOHA, CACO, COLO, FIIS, GATE, GEWA,

SAHI, THST)

- **FY 2004 Accomplishments:** The National Park Service (NPS) has contracted with the Environmental Data Center (EDC) at the University of Rhode Island to provide GIS and database-management support for Inventory and Monitoring efforts underway by park personnel and cooperators. Projects in FY04 ranged from creation of Access databases for a multi-park herpetological inventory to using GIS to generate spatial sampling schemes for long-term estuarine monitoring. Specific accomplishments for FY '04 include: **(1) (a)** Performed QA/QC and created species-abundance and sampling-location maps from raw GPS data collected during herpetological inventories conducted at COLO, GEWA, and THST. Final deliverables produced in ArcInfo coverage format with appropriate metadata. Developed an accompanying MS Access database and transferred all data collected for the above inventory from Excel spreadsheet format. **(b)**Continued to edit species-abundance and sampling-location maps for joint Wildlife Conservation Society / NPS herpetological inventory project as new data became available from WCS personnel. **(c)** Collected and post-processed GPS data using Trimble ProXR to assess the accuracy of vegetation maps at GATE and SAHI, as well as avian inventory survey site and boundary marker locations at SAHI. **(d)** Produced field maps, assembled Garmin-V GPS unit with differential correction beacon for use by RI Natural History Survey personnel in conducting odonate surveys of FIIS and SAHI. Wrote SOP: Collecting GPS Data using the Garmin V and DGPS Beacon. **(e)** Reviewed and compiled geo-referenced aerial photo images for FIIS produced at Virginia Polytechnic Institute. Created an index map in ArcView 3.3 and established file naming conventions. **(f)** Developed spatial sampling schemes for National Coastal Assessment monitoring projects at coastal NPS sites in collaboration with USGS personnel. Assembled GIS base data, constructed hexagonal sampling grids, and generated random sampling points for multiple estuarine systems. Created an MS Access database for collected estuarine monitoring data. **(g)** Contributed to 'Data Documentation' and 'Websites/repositories' sections of the Network Data Management Plan.

- **FY 2005 Scheduled Activities and Products:** (1) (a) Amphibian and reptile species abundance and distribution maps will continue to be updated as corrected data become available for remaining parks. Database creation / management for estuarine monitoring, odonate, and other NCBN projects will be completed as assigned. Currently preparing a Natural Resources report to be used in the development of SAHI's General Management Plan, including maps summarizing avian, herpetological, and plant species distribution and biodiversity within the park. (b) A scope of work and proposal will be submitted to the network by the URI Field Technical Support Center, to assist in the backup and archiving of data and information developed by the Network and Regional I&M staff stationed at URI.

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 protocol 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)

- **FY2004 Accomplishments: (1)** (a) Study sites were selected at BOHA, CACO, SAHI, and SAIR by the cooperator, URI, M.J. James-Pirri and NPS collaborator, Dr. Charles Roman. **(b)** Four field technicians were hired to carry out field sampling. Sampling for nekton and vegetation was completed for BOHA, SAHI, and SAIR Parks. Nekton were sampled twice (once in June and once in August) and vegetation was sampled once (July) at each of these three parks. Nekton were also sampled at CACO (vegetation data are currently being collected by Park staff). Additionally, nekton were sampled Big Egg Marshes (GATE) (vegetation data are currently being collected by Park staff) in conjunction with restoration (spray) efforts. Raw data will be entered into databases later this year. **(c)** Study sites at ASIS were selected and sampling at ASIS will begin in 2005. **(d)** The existing protocols (nekton and salt marsh vegetation) developed as part of prototype monitoring program at CACO, are currently being standardized to meet I&M program protocol format, to be submitted as part of the Phase III network monitoring plan. **(e)** A report on nekton and salt marsh vegetation at SAIR will be submitted to Charles Roman as part of the pre-assessment for restoration of the Turning Basin at SAIR. **(f)** M.J. James-Pirri worked closely with the network staff to refine data entry steps of the salt marsh protocol database in Access.

- **Scheduled FY 2005 Activities and Products: (1) (a)** Additional study sites will be selected by April of 2005. **(b)** Field technicians will be hired to carry out field sampling. Nekton and vegetation sampling will take place from June through August of 2005. Nekton will be sampled twice and vegetation will be sampled once. **(c)** A Coastal Fellow, Sarah Maier, at the University of Rhode Island, hired as a field technician in 2004 will present a poster on the 2004 field sampling effort at the Coastal Fellows annual Fall semester seminar at URI.

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

- **FY 2004 Accomplishments:** (1) (a) Through a cooperative agreement with Rutgers University, a draft protocol for monitoring ocean shoreline change was created. Network staff coordinated with Rutgers scientists to create draft narrative and SOP sections for the protocol. The product received an initial review at the Network level and returned to the project team for revision. (b) An Inter-Agency agreement with USGS Center for Coastal and Watershed Studies (USGS CCWS) and NASA Wallops Flight Facility (NASA WFF) was extended to FY2005. LIDAR survey data collected in 2002 for ASIS, CACO, FIIS, and GATE were processed, delivered to the NCBN, and distributed to the parks and park cooperators for use, review, and comment. Initial standards for data format, metadata, and the creation of derived feature products have been created. A NASA airborne survey was conducted at NPS ASIS in August 2004. This marked the first use of NASA's newly acquired multi-spectral digital imaging system on an operational (non-test) flight in the NCBN. The camera collects high resolution (~20cm pixels) multi-band imagery and was added to the

NASA airborne platform primarily to address coastal park needs for large-scale, high quality photography. NCBN and ASIS staff operated a geodetic GPS unit (see item 3) in support of the aerial survey. USGS and NPS NCBN established direct digital connectivity between NPS ASIS and USGS CCWS to improve NPS participation in LIDAR flight planning activity. This will allow the NPS a higher level of specificity in detailing which sections of network parks will be included in aerial surveys. (c) Geodetic (survey grade) GPS equipment was acquired through a joint purchase by the NCBN and ASIS. The equipment is capable of high precision (~2 cm), three dimensional, real-time measurements. The Network sponsored a three day technical training workshop at ASIS to instruct ten park, network, cooperators, and other NPS staff in the operation of the equipment. The equipment has been used on a variety of projects at ASIS, CACO, FIIS, and GATE as well as on WASO level projects in other regions (USAR, THRO), and in a joint NPS/USDA project in Texas. In a demonstration of the improved efficiency provided by this equipment, topographic surveys at Assateague Island that required 160 person hours using optical survey equipment have been completed in 40 person hours with the geodetic GPS unit. (d) A GIS toolbox for the display and analysis of geomorphologic data including linear shoreline features and topographic surface analysis is in its final testing stage. When completed, it will be delivered to parks along with shoreline position and LIDAR survey data. (e) Network staff organized and chaired a geomorphologic monitoring session at the NPS GIS conference (Spatial Odyssey II) in Orlando, FL. The session covered a wide range of topics including the use of partnerships to perform complex and highly technical aerial data collection, coastal applications of remote sensing technology, using LIDAR for coastal feature creation, and managing coastal geomorphology data in a GIS. Presenters included NCBN staff, NPS Geologic Resources staff, USGS and academic cooperators, and graduate students working on NPS sponsored projects. Network cooperator Dr. Norbert Psuty (Rutgers University) presented a paper outlining the monitoring program in the NPS NCBN at an international coastal conference in Aberdeen, Scotland (see section d).

- **FY 2005 Scheduled activities and products*:* (1) (a)** In cooperation with Rutgers University Institute for Marine and Coastal Studies (Rutgers IMCS), the Network will complete and test ocean shoreline protocol for geomorphological monitoring program. The geomorphology project team will revise the narrative and SOP sections of the ocean shoreline protocol and submit to network for internal and peer review. The Rutgers IMCS group will perform field tests at various tide stages to determine the optimal shoreline feature for use in the shoreline protocol. Protocol will be revised as needed in preparation for implementation in fall 2005. **(b)** The Network geomorphology team will draft the ocean beach and dune topography protocols, submit the protocols for internal review, revise for additional internal and peer review, and field test and revise the protocols as needed to prepare for implementation in fall 2005. **(c)** Airborne LIDAR surveys will be conducted at CACO, COLO, FIIS, GATE, GEWA, THST, and SAHI. Originally, these surveys were scheduled for FY2004 but extreme tropical activity required NASA partners to reschedule for FY2005. Planning will be in cooperation with NASA and USGS by defining aerial extent of surveys and providing ground support by operating a

geodetic grade global positioning system (GPS base station). Network staff will participate in post-survey data processing with USGS and NASA to continue the development of base topographic data and various value added or derived products including high-resolution digital imagery. NASA has added a high-resolution multi-spectral digital imaging system to its airborne platform. This system will be used on a network-wide basis for the first time in the FY2005 park surveys. (d) Initial LIDAR data products from 2004 NASA surveys will be received from USGS and reviewed and distributed to parks and other cooperators for review and comment. The EAARL (Experimental Advanced Airborne Research Lidar) LIDAR is an experimental technology and development of final products involves an iterative process of review and revision. The Network and parks play an active role in the partnership by testing deliverables and providing feedback to NASA and USGS; and by performing quality and accuracy checks on developmental products. **(e)** Revised GPS shoreline databases that comply with Network data standards will be completed for CACO, ASIS, FIIS, and GATE and distributed to the parks. Database structure and data will be modified following comment and feedback from park staff and researchers. (f) The Network will work with Rutgers IMCS and NPS ASIS to develop training for the field data components of the shoreline and beach topography protocols. This will include training in the proper identification of the shoreline feature and operation of the Trimble ProXR GPS equipment. In addition the Network will work with NPS ASIS to integrate the NPS Beach Geomorphology GIS toolbox into the ESRI ArcGIS 9 software and to develop a basic training module for use of the toolbox with park data.

Task 8.3 Test variables and develop protocol and for assessing and monitoring visitor impacts in Network parks. (CACO, FIIS, GATE, ASIS, COLO, GEWA, THST, SAHI)

- **FY 2004 Accomplishments: (1) (a)** The second of two scoping reports was reviewed and a summary of the scoping report was written. **(b)** The project's draft goals and proposed vital signs were reviewed and discussed at meetings of the New York–area and Chesapeake Bay–area parks. **(c)** A web-form survey of Network park superintendents and natural resource managers was conducted to assess support for the project's draft goals and proposed vital signs, and a report of the survey results was completed. **(d)** A workshop to finalize the goals and objectives for the project has been scheduled for January 2005 and workshop planning has begun.

- **FY 2005 Scheduled activities and products**: **(1) (a)** The goals and objectives for this project will be finalized through a workshop to be held on January 10-11, 2005. The workshop will bring together experts in visitor impact monitoring, the sociology of recreational park use, and statistics for ecological applications, along with park and Network staff, to clarify the benefits and challenges of project alternatives. **(b)** Based on a scope of work that will be developed from the results of the workshop, a cooperator will be selected to complete the protocol for this project. **(c)** A substantial portion of the draft protocol for this project will be completed by the selected cooperator, including the identification of and justification for all vital signs and their measures, the development of a sampling design, and the completion of all supplemental literature reviews and analysis (above and beyond that completed through the existing scoping reports). **(d)** The

development of novel approaches to visitor use and impacts monitoring will likely be part of the protocol, pending the final determination of project vital signs and measures. These include the development of a probabilistic sampling design that would encompass all park use throughout each park, and the use of remote sensing methodologies for the assessment of visitor impacts through the creation of social trails or disturbed sites. Development, testing, and reporting of these elements will be part of the protocol development process. **(e)** As the project and protocol development progresses, completed project elements will be made available through the Network website, NPS reports, professional presentations and in scientific journals. Presentations will include a session at the 2005 George Wright Society meeting to be co-chaired by Dr. Christopher Monz and Dr. Bryan Milstead.

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. (FIIS)

- **FY2004 Accomplishments**: The first portion of the project entailed the collection of image data and ground reference data. The majority of tasks during this reporting period were focused around this. Below is summary of major accomplishments. (1) (a) A field trip to the FIIS site was conducted between May 17th and May 21st of 2004. The purpose of this field work was to collect data points that could be used to ground verify the classification of the imagery being collected. At this time two contracts were out for the collection of imagery. One with Digital Globe to acquire QuickBird-2 satellite imagery and one with USGS to collect EO-1 Hyperion imagery. This field trip was scheduled to coincide with these collection windows. Michael Traber and Y.Q. Wang conducted the field work and were visited by Bryan Milstead during one day. The fieldwork concentrated on conducting submerged video transects of eelgrass and widgeon grass beds within the national park boundary in Great South Bay. This video is geo-registered by stamping a GPS position on each frame of video collected (Fig. 1). A total of 6 hours of transect video was recorded during two field days representing over 6 nautical miles (11.11km) of bottom. During the fieldwork, terrestrial vegetation communities were checked as well. A total of 286 GPS referenced field images were taken. **(b)** Three out of the 4 requested Hyperion hyperspectral images of the study area have been received. Due to excessive cloud cover in the 4th image it has been decided not to purchase that scene. USGS will only make 3 attempts to image an area. After the 3rd attempt it will cost more money to re-task the satellite to image

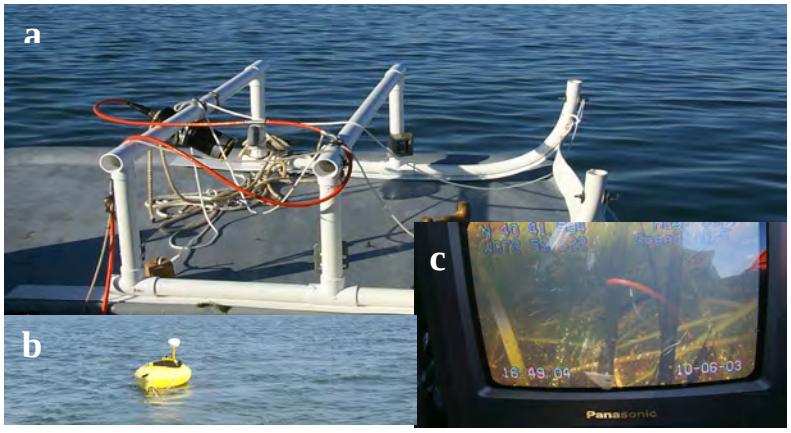


Figure 1. Towed underwater video system that will be used for creation of the VFRDB. A) underwater camera attached to benthic sled. B) Trimble Pro XR GPS unit in tethered kayak floating above the benthic sled. C) Real-time video read display.

again. **(c)** We have completed the georeferencing of the Hyperion imagery. **(d)** Currently working with the Digital Globe to acquire clear QuickBird-2 imagery of our study area. The first set of images were received in June, 2004. These images had high levels of atmospheric distortion. After lengthy consultation with both Digital Globe and NPS personnel, Digital Globe has agreed to re-image the area at no extra cost to the project. The projected time window for acquisition of this imagery was October. At the time of this report we have not received the data. We are hopeful that we will have it by the end of October. **(e)** Michael Traber has been working to process the underwater video into a data set that can be used as a reference for the classification of the Satellite imagery. This process involves the reviewing the 1 minute long segments of the video for total percent cover of each seagrass species present. The data is then converted into a GIS coverage that can be imported into the image processing software. Finally, the analog video is being converted into digital format and will be hyperlinked to the GIS coverage. **(f)** The NOAA nautical chart of the Great South Bay area has been scanned in and georeferenced. This will be used to aid in the classification of submerged aquatic habitats and was used to direct the field work. **(g)** A data set of bathymetric sounding from NOAA on-line resources have been compiled. The bathymetric point data were interpolated into a grid with a pixel size of 10 ft. This data will used to remove deep water areas from the hyperspectral imagery increasing the overall accuracy of the SAV classification. **(h)** A photo mosaic of the national park service area at Fire Island has been created using most current true color high resolution (1:5000) aerial photography collected in June, 2002. A mosaic of this imagery had not been compiled

- **Scheduled FY 2005 Activities and Products:** The next reporting period will be dedicated to the classification of the satellite imagery. The following is a summary of planned tasks that will occur during the next fiscal year. **(1) (a)** Further pre-classification image processing including: atmospheric and radiometric correction, mosaic and clip the image to include only the study area. Masking of land and water into two separate coverages. **(b)** Review and acceptance, if possible, of new QuickBird-2 satellite imagery. **(c)** Pre-processing of QuickBird-2 satellite imagery including atmospheric and radiometric correction. **(d)** Unsupervised classification followed by supervised classification of the imagery. **(e)** Hold a group meeting with National Park Service personnel to review the result of the preliminary classification. **(f)** Finalize terrestrial and SAV classifications and vegetation mapping. **(g)** Conduct accuracy assessment of both classification results. **(h)** One more field trip to Fire Island in the May 2005 will be conducted to collect ground control points that can be used for final accuracy assessment. **(i)** Produce a detailed report and data DVD that can be delivered to the National Park Service. The report will contain all data products produced from this project along with metadata for each. It will also include a detailed description of the protocol used for classification. **(j)** Presentations of the project in professional conferences and prepare publication(s).

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

- ***FY 2004 Accomplishments:*** Salt marsh elevation monitoring at GATE and FIIS began in FY02 with funding from NRPP. Funding for this project ended in the spring of FY04

and the Network agreed to support continued data collection at FIIS as this project was in danger of being abandoned. Salt Marsh sediment elevation has been chosen as a vital sign for the NCBN. Since the implementation of this program was costly, the Network decided it was advantageous to insure continuity in data collection. Total costs to the Network for FY04 work was ~; GATE was able to provide funds for continued monitoring of their sites. This Sediment Elevation Table monitoring and management was conducted by Drs. Cahoon and Lynch from USGS and has continued through FY04. Elevation monitoring at Jamaica Bay was conducted five times at the Jet-Spray Marsh Restoration Project at Big Egg Marsh (Nov 5-6, 2003; Dec 30, 2003; February 19, 2004; May 19-20, 2004; and August 24-25, 2004), and three times at JoCo and Black Bank Marshes (Nov 5-6, 2003; May 19-20, 2004; and August 24-25, 2004). At Sandy Hook Unit, elevation was monitored on December 16, 2003 and June 1, 2004. At FIIS, elevation monitoring was conducted in the salt marshes at Great Gun, Hospital Point, and Watch Hill on October 23-24, 2003; April 29-30, 2004; and July 19-20, 2004. All data have been entered into their respective databases. On March 3, 2004, the preliminary results of the 2-year elevation monitoring effort at Jamaica Bay were presented to the resource management community and the public at a Scientific Symposium and Public Forum sponsored by GATE. In the spring, a new Interagency Agreement was established between the NCBN, GATE and USGS to continue the monitoring at these parks through 2006. In addition, the new IA provides funds for salt marsh elevation monitoring at ASIS, which will commence in spring 2005.

- ***FY 2005 Scheduled activities and products (From 10/04 - 9/05)***: A protocol for Salt Marsh Elevation Monitoring will be completed for Cape Cod N.S. During FY05 this protocol will be finalized and adapted for use in NCBN parks. During FY05, elevation monitoring will be conducted at least 3 times, by USGS cooperators (spring, summer, and fall) at the GATE and FIIS stations. In the spring of 2005, new elevation monitoring stations will be established both inside and outside feral horse grazing exclosures located at Valentine, High Winds, and North End at ASIS. The data from ASIS will be used to evaluate the response of salt marsh elevation to both sea-level rise and the interaction of sea-level rise with horse grazing. Sampling will continue through 2006. All data from all sites will be entered into their respective databases. Dr. Cahoon will present preliminary results of the elevation monitoring at FIIS at the NPS-USACE Science Meeting, to be held October 20, 2004 at Stony Brook University.

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

Task 9.1 Compile and review existing freshwater quality information in network parks. (ASIS, CACO, COLO, GATE, GEWA, FIIS, SAHI, THST)

- **FY 2004 Accomplishments: (1)** A complete draft of the report Wetland and Water Quality Issues for Parks of the Northeastern US: A Scoping Report for the Coastal and Barrier Network has been completed and reviewed. This report includes a summary of water bodies and wetlands in Network parks, information on waters listed through the Clean Water Act's mandated Water Quality Reports or Impaired Waterbodies Lists, provides statistics on wetlands potentially impacted by impaired waters, identifies

outstanding resource waters, and summarizes existing water quality monitoring programs in or adjacent to park waters.

- **FY 2005 Scheduled activities and products**: **(1)** The final report will be completed and submitted to the Network and to park superintendents and resource managers.

Task 9.2 Test variables and develop protocol and for assessing and monitoring nutrients inputs to estuarine ecosystems in Network parks. (CACO, FIIS, GATE, ASIS, COLO and ACAD (Northeast Temperate Network NETN Park)

- **FY 2004 Accomplishments:** Through a cooperative agreement with the University of Rhode Island, Scott Nixon, principle investigator, completed all databases listed in the proposal to the network; these include: Land Use, US Census, Agricultural, Sewage, and Atmospheric N Deposition data. An extension of the Nitrogen Loading Model (NLM-E) was completed using the most accurate and recent land use data (1992). NLM-E was run for each park, including at 30-year historical analysis for ASIS. For ASIS, Land Use data from 1980-2000 were available. Lastly, an attempt at running the MANAGE nitrogen source model resulted in the decision that the complexity of the model and time dedication required were not feasible for use in this project.

- **FY 2005 Scheduled Activities and Products:** The draft and final report will be submitted in early 2005.

Task 9.3 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)

- **FY2004 Accomplishments: (1) (a)** NCBN modified an interagency agreement with USGS to evaluate data and information collected during field tests and to develop Phase 3 monitoring protocols for estuarine nutrient enrichment. **(b)** USGS prepared draft Standard Operating Procedures (SOPs) for Spatial Sampling Design, Preparation of Logging Stations, Continuous Water Quality Monitoring, Spatial Water Quality Monitoring with YSI Sonde, Spatial Light Monitoring with LiCor PAR Meter, Chlorophyll-a Sampling and Analysis, and Water Quality Data Reduction. The SOP for Spatial Sampling Design includes probabilistic sampling designs for all North Atlantic Coastal Parks (NCBN parks plus Acadia and Boston Harbor Islands) that were developed using methodology of the USEPA National Coastal Assessment (NCA) with technical assistance of NCBN (Dennis Skidds). Thus, data from NPS Vital Signs monitoring will be compatible with NCA data, which places NPS units in a broader context and allows NPS data to contribute to regional assessments. **(c)** Pilot studies for monitoring CACO seagrass sites were conducted in October, May, and July, to determine the appropriate variables for inclusion in long-term monitoring and to provide a baseline for interpreting future annual data.

  - **Scheduled FY 2005 Activities and Products: (1) (a)** Remaining SOPs will be drafted (Field Crew Training Procedures, Field Season Preparation, SAV

Mapping, SAV Community Monitoring, Reporting and Review). **(b)** The Protocol Narrative will be drafted. **(c)** A final report on protocols for monitoring ecosystem response variables in all parks, including the Narrative and SOPs, will be submitted by November 30, 2005.

III. Staffing

Inventory and Monitoring Staff (NCBN)

Elizabeth Johnson, I&M Regional Coordinator (NPS)
Bryan Milstead, NCBN Coordinator (NPS)
Sara Stevens, NCBN Science Information Coordinator (NPS)
Mark Duffy, NCBN GIS Specialist (NPS)
Marc Albert, NCBN Term Biologist (NPS)
Susan Huse, NCBN Term Database Manager (NPS)
Arthur Rodriguez, GIS specialist, Graduate Student URI (SCEP program, ASIS)
Linda Fabre, NPSpecies Coordinator (URI Cooperator)
Dennis Skidds, Web page development/Data Management Assistance (URI cooperator)
Julia Brownlee, Data Management Assistance (GIS) (URI cooperator)
Sarah Sand-Administrative assistance (contract employee)

NCBN Technical Steering Committee

Bryan Milstead, NPS-University of Rhode Island
Sara Stevens, NPS-University of Rhode Island
Elizabeth Johnson, NPS-University of Rhode Island
Carl Zimmerman, NPS-ASIS
Charles Rafkind, NPS-COLO
Michael Bilecki, NPS-FIIS
George Frame, GATE
Allan O'Connell, USGS-Pautuxent
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
Glenn Gutenspergen, USGS
P. A. Buckley, USGS-University of Rhode Island

NCBN Board of Directors

Michael Hill, ASIS
Mike Murray (Acting for Maria Burks), CACO
Sandy Rives, COLO
Barry Sullivan, FIIS

Billy Garrett, GATE
Vidal Martinez, GEWA/THST
Gay Vietzke, SAHI
Bryan Milstead, 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, Jacqueline Sones, Virginia Carpenter Brown, Nina Briggs.
NatureServe, Lesley Sneddon
College of William and Mary, Dana Bradshaw
Frostburg State University, Ron Barry
National Park Service, Vince Santucci
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, Mark Robson
Rutgers University, Norbert Psuty
St. Lawrence University, Chris Monz
North Carolina State University, Yu-Fai Leung
Theodore Roosevelt Sanctuary
USGS, Allan O'Connell
USGS, Hilary Neckles, Blaine Kopp
USGS, John Brock
NASA, Wayne Wright
University of Rhode Island, Mary-Jane James-Pirri
University of Rhode Island, Scott Nixon, Stephen Granger, Luke Cole
University of Rhode Island, Y.Q. Wang
University of Rhode Island, URI Environmental Data Center, Peter August, Charles LaBash, Roland Duhaime, Dennis Skidds, Julia Brownlee, Linda Fabre
University of Richmond, Joe Mitchell
SHEN, James Atkinson
VA DNR-Natural Heritage Program, Chris Ludwig, Anne Chazal, Karen Patterson
Wildlife Conservation Society, John Behler, David Brotherton

IV. Reports, Publications and Presentations (FY 2004)

Reports

Albert, M. 2004. Northeast Coastal and Barrier Network Visitor Impact Monitoring Project Survey: Results Summary. (Completed April 7, 2004).

Atkinson, James B. Fish Inventories of Mid-Atlantic and Northeast Coastal and Barrier

Network Parks within Virginia, Maryland and Pennsylvania. 2003 Annual Report. Natural Resources Branch; Division of Natural and Cultural Resources; Shenandoah National Park; 2003. 43 p.

Barry, R. E. Mammal surveys at George Washington Birthplace NM, Thomas Stone NHS, Colonial NHP, Fredericksburg and Spotsylvania NMP, and Richmond NBP. Progress Report for Cooperative Agreement No. 1443DCA309701200, Task Order No. T-3097-01-300 of the Chesapeake Watershed Cooperative Ecosystem Studies Unit. January 2003.

Barry, R. E. January 2004. Mammal Surveys at George Washington Birthplace National Monument, Thomas Stone National Historic Site, Colonial National Historical Park, Richmond National Battlefield Park, and Fredericksburg and Spotsylvania County Memorial National Military Park. Progress Report for Cooperative Agreement No. 1443DCA309701200, Task Order No. T-3097-01-300 of the Chesapeake Watershed Cooperative Ecosystem Studies Unit.

Brotherton, David K., John L. Behler, Robert P. Cook. 2004. Acadia National Park Amphibian and Reptile Inventory, March to September 2001. National Park Service and Wildlife Conservation Society Cooperative Agreement #1443CA4520-98-017. Technical Report #

Conner, C. and M. Albert. 2004. Weather Station Inventory and Preliminary Needs Assessment for the Northeast Coastal and Barrier Network. Unpublished Document for the National Park Service.

Fabre, L. and J. Stingelin Keefer. 2004. NPSpecies Data Entry and Data Management Standards. Unpublished Document for the National Park Service.

Fabre, L. and J. Stingelin Keefer. 2004. Northeast Region Certification Guide. Unpublished Document for the National Park Service.

James-Pirri, MJ. 2004. Wetland and Water Quality Issues for Parks of the Northeastern US: A Scoping Report for the Coastal Barrier Network. Report submitted to USDI National Park Service, Northeast Coastal and Barrier Network (Review draft April 27, 2004).

Monz, C., Y.-F. Leung, H. Bauman and C. Ingle. 2003. National Park Service Coastal Visitor Impact Monitoring: Phase 2 Final Report. Report submitted to USDI National Park Service, Northeast Coastal and Barrier Network. (Completed October 15, 2003).

Skidds, D.E., 2004. Draft Northeast Coastal and Barrier Network Standard Operating Procedure (SOP): Using the Garmin V GPS Unit with DGPS Beacon. Submitted to the National Park Service.

Presentations

Brotherton, David K. November 6, 2003. *National Park Service and Wildlife Conservation Society Amphibian and Reptile Inventory of National Parks in the Northeast.* Seminar presented at Shippensburg University, Shippensburg, Pennsylvania.

Cahoon, Donald R., James C. Lynch, Charles Roman, and George Frame. 2004. *An evaluation of salt marsh accretion and elevation dynamics at Jamaica Bay, Gateway National Recreation Area, New York using the surface elevation table.* Proceedings of the Scientific Symposium and Public Forum: Jamaica Bay's Disappearing Marshes, March 3, 2004, New York Aquarium, page 13. (Scientific Symposium presentation)

Cahoon, Donald R. 2004. *Wetland elevation dynamics and sea-level rise: are the salt marshes at Jamaica Bay staying ahead of the curve?* Proceedings of the Scientific Symposium and Public Forum: Jamaica Bay's Disappearing Marshes, March 3, 2004, New York Aquarium, page 40. (Public Forum presentation)

Dolbeare, T. L., H. P. Warchalowski, D. T. Strang, and R. E. Barry. 2004. *Surveys of the mammals of national parks in coastal regions of Maryland and Virginia.* **Poster presentation**. American Society of Mammalogists 84th annual meeting, Humboldt State University, Arcata, California.

Dolbeare, T., H. Warchalowski, D. Strang, A. Sareen, C. Tanner, J. Mulligan, and R. Barry. 2004. *Surveys of the mammals of national parks in Maryland and Virginia.* **Poster presentation**. Northeast Fish and Wildlife Conference 60th annual meeting, Ocean City, Maryland.

Fabre, L. December, 2003. *NPSpecies Uses for NPS Natural Resource Staff*. Presentation to National Park Service Staff at Sagamore Hill National Historic Site, Oyster Bay, NY.

Fabre, L. April, 2004. *NPSpecies Uses for NPS Natural Resource Staff*. Presentation to National Park Service Staff at the Virginia National Wildlife Refuge, Cape Charles, VA.

Milstead, Bryan & Sara Stevens. December. 5, 2003. *The Northeast Coastal and Barrier Network Monitoring Program.* Meeting with the New York Parks, Sagamore Hill.

Milstead, Bryan & Beth Johnson. Dec. 5, 2003. *Natural Resource Inventory and Monitoring Program.* Meeting with the New York Parks, Sagamore Hill.

Milstead, Bryan & Sara Stevens. January 1, 2004.*The Northeast Coastal and Barrier Network Inventory and Monitoring Program.* Sandy Hook Partners Meeting, Sandy Hook Unit. Gateway N.R.A.

Milstead, Bryan & Sara Stevens. February 24, 2004. *The Northeast Coastal and Barrier Network Inventory and Monitoring Program. Northeast Region Natural Resources Management Retreat.* Staten Island, Gateway N.R.A.

Milstead, Bryan & Sara Stevens. December. 5, 2003. *The Northeast Coastal and*

Barrier Network Monitoring Program. Meeting with Virginia and Maryland Parks, Virginia.

Milstead, Bryan & Beth Johnson. March 22, 2004. *Natural Resource Inventory and Monitoring Program*. Meeting with Virginia and Maryland Parks, Virginia.

Milstead, Bryan & Sara Stevens. August 8, 2004. *The Northeast Coastal and Barrier Network Inventory and Monitoring Program.* Conservation Biology Meeting Fieldtrip to Fire Island National Seashore.

Milstead, Bryan & Sara Stevens. September 9, 2004. *The Northeast Coastal and Barrier Network Inventory and Monitoring Program.* Applied Coastal Ecology Class. University of Rhode Island.

Milstead, Bryan & Sara Stevens. September 23, 2004. *Selection of "Vital Signs" to Monitor Ecosystem Integrity for Northeast Coastal National Parks.* Monitoring Science and Technology Symposium. Denver, CO.

Milstead, Bryan. September 27, 2004. *Career Opportunities in the National Park Service.* Natural Resources Science Introductory Course. University of Rhode Island.

Sareen, A., T. Dolbeare, D. Strang, H. Warchalowski, and R. Barry. 2003. *Surveys of mammals of national parks in Virginia and Maryland*. **Poster presentation**. Student Research Day, Frostburg State University, Frostburg, Maryland.

Skidds, D.E. 2004. *Development of Sampling Schemes for Estuarine Monitoring at Parks within the Northeast Coastal and Barrier Network and the Northeast Temperate Network.* (http://www.nature.nps.gov/im/units/ncbn/products/Monitoring/hex_slides_v2.ppt)

Stevens, S., and S. Huse. 2004. *Northeast Region Database Template and Conversion SOP*. NPS National Data Managers Meeting, Las Vegas, Nevada.

Stevens, S. 2004. *Northeast Coastal and Barrier Network Vertebrate and Vascular Plant Inventories.* Presentation to National Park Service Staff at the Virginia National Wildlife Refuge, Cape Charles, VA.

Stevens, S. 2004. *Northeast Coastal and Barrier Network Vertebrate and Vascular Plant Inventories.* Presentation to National Park Service Staff at Sagamore Hill National Historic Site, Oyster Bay, NY.

Publications

Behler, J. L., C. M. Castellano, and T. J. Crockett. 2004. Geographic Distribution: Graptemys geographica (Northern Map Turtles), USA: New Jersey. Herpetological Review 35 (2): 186.

Castellano, Christina, John L. Behler, Robert P. Cook, David K. Brotherton. 2003. National Parks in the Northeast: Preserving America's Herpetological Heritage. Herpetological Review 34(3), 192-193.

Castellano, C. M. and J. L. Behler. 2003. Natural History Notes: Glyptemys insculpta (North American Wood Turtle Diet). Herpetological Review 34(4): 362.

Castellano, C. M. and J. L. Behler. 2004. Geographic Distribution: Pseudemys rubriventris (Red-bellied Cooter), USA: New Jersey. Herpetological Review 35 (2) 186-187.

Castellano, C. M. and J. L. Behler. 2004. Aspects of the natural history of the Wood Turtle (Glyptemys insculpta) and implications for conservation and resource management. IUCN Turtle Survival Alliance 2004 Conference Abstracts, pp. 2-4. Orlando, Florida 16-17 August.

Duffy, Mark C., J. Brock, M. Harris, M. Ransmeier, A. Rodriguez. *Inter-agency Partnerships for Coastal Geomorphologic Monitoring*. National Park Service. Spatial Odyssey II - Service-wide GIS Conference. Orlando, FL. December 2003.

Psuty, Norbert P., J. Pace, M. Duffy, B. Milstead**.** *Protocol Development for Shoreline Change Mapping and Analysis, Northeast Coastal and Barrier Network, National Park Service, USA*. Published in: Proceedings, Littoral 2004, Delivering Sustainable Coasts: Connecting Science and Policy, Cambridge Publications, pp. 7-11.

Websites
New:
Assateague Island National Seashore Natural Resources Profile.
http://www.nps.gov/asis/pphtml/nature.html

Gateway National Recreation Area Jamaica Bay Institute. http://www.nature.nps.gov/jbi/

Enhanced:
Cape Cod National Seashore's Prototype Long-term Ecosystem Monitoring Program.
http://www.nature.nps.gov/im/units/caco/

Northeast Coastal and Barrier Network Inventory and Monitoring Program.
http://www.nature.nps.gov/im/units/ncbn/

V. Status of Park Vital Signs Monitoring

Coastal and Barrier Network 2004	Air Quality	Water Quality	Water Quantity	Geologic Resources	Plants	Animals	Landscape Characteristics

Planning and Design							
# parks monitoring w/ NRC funding	8	8	0	8	8	8	8
# parks monitoring w/ other funding	1	6	0	4	4	5	0
Protocols Implemented							
# parks monitoring w/ NRC funding	0	0	0	0	0	0	0
# parks monitoring w/ other funding	1	4	0	2	3	5	0
Analysis/Synthesis Available							
# parks monitoring w/ NRC funding	0	0	0	0	0	0	0
# parks monitoring w/ other funding	1	3	0	0	2	5	0

Note: Air (CACO), Water (CACO,GATE, FIIS, ASIS, COLO, GEWA), GEO (CACO,ASIS,GATE, FIIS), Plants (ASIS, CACO, GATE, COLO), Animals (ASIS, CACO, GATE, FIIS, COLO).

VI. USGS Protocol Development and Monitoring-Related Research Needs

- Continue supporting the development of methods to use LIDAR technology to monitor shoreline change in coastal Parks.
- Work with the Networks to develop protocols to move Vegetation Mapping from a snap-shot in time to a long-term monitoring program.
- Protocol and statistical review.

Appendix 1: Summary of Major Network Accomplishments During FY 2004

Northeast Coastal and Barrier Network **-** This network of eight parks includes Cape Cod NS, Assateague Island NS, Colonial NHP, Fire Island NS, Gateway NRA, George Washington Birthplace NM, Sagamore Hill NHS, and Thomas Stone NHS. As part of its Vital Signs Monitoring efforts, the network is drawing from the monitoring design and protocol development work initiated by the Cape Cod NS Prototype Monitoring Program, and includes active participation from scientists with the USGS, EPA, NASA, and a number of universities in the Northeast region.

In FY 2004 the Network made substantial progress on all of the vital signs monitoring projects, including the selection of vital signs and measurable indicators for all projects, as well as the development of draft protocols and the implementation of pilot sampling for select projects. Also, the freshwater quality report for Network parks was completed, and a unified database template was developed that will provide easy access for both input and output of data from all Network projects. In addition, many of the inventory projects in the network were either completed or continued in FY 2004.

Biological Inventories

Network Objectives for Biological Inventories:

- 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.
- Conduct inventories targeted at vertebrate and vascular plant species in the Network parks and conduct quality assurance and review of all inventory products.
- 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.
- 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.

In FY 2004, *Mammal Surveys conducted by Frostburg University at George Washington Birthplace NM, and Thomas Stone NHS* documented 1 new species at each of these parks. Information on mammalian species distribution and abundance has been recorded for the first time in these parks.

As part of the avian inventory projects being conducted for the Network, staff from the College of William and Mary have been compiling *historical avian species records for Assateague Island NS* to learn about the existing bird distribution and diversity that exists in the park. Most notable among the information sources that span more than 100 years was data confirming changes in species ranges over time as illustrated in brown pelicans, double-crested cormorants, roseate terns, and others; as well as dramatic declines in other species populations.

Herpetological surveys at Assateague Island NS in FY 2004 discovered 5 uncommon species rarely seen or previously unknown to occur in the park – grey treefrog (*Hyla versicolor*), northern water snake (*Nerodia sipedon*), eastern garter snake (*Thamnophis sirtalis*), rough green snake (*Oepheodrys aestivus*), and red-bellied turtle (*Pseudemys rubriventris*). The grey tree frog, eastern garter snake, red-bellied turtle, and northern water snake had never been documented in the park.

Herpetological inventories at Colonial NHP, George Washington Birthplace NM, and Thomas Stone NHS that began in 2001 were completed in FY 2004. These inventories added new county records and range extensions for several species of frogs and salamanders. A total of 26 species of amphibians and 27 reptiles have been

documented for Colonial NHP, 10 and 11 respectively, for George Washington Birthplace NM, and 13 and 8, respectively, for Thomas Stone NHS.

This year *Odonate (Dragonfly and Damselfly) inventory surveys were initiated at Fire Island NS, Gateway NRA, and Sagamore Hill NHS* following a cooperative agreement established in FY 03 with the RI natural History Survey. Field work was conducted monthly at all three parks, documenting over 35 species including three species on the NY Natural Heritage Program and NJ Natural Heritage Program's tracking lists: Rambur's Forktail *(Ischnura ramburii)*, Comet Darner *(Anax longipes)*, and Needham's Skimmer *(Libellula needhami).* Significant dragonfly migration events were also recorded at Gateway NRA. In addition, preliminary odonate species lists were generated and voucher specimen collections were created for each park. An amendment to the existing cooperative agreement was completed in FY04 to include the *inventory of dragonflies, damselflies and butterflies at Assateague Island NS*. Field work for this project will begin in the spring of 2005.

As part of the network's vegetation mapping initiative, a rare wetland community classified as Non-riverine Saturated Forest was documented for the first time at Colonial NHP. In addition, examples of the rare Coastal Plain Dry Calcareous Forest and Tidal Bald Cypress Forest communities were also documented in the park. The spatial extent of a rare holly forest was mapped on the Sandy Hook Unit of Gateway N.R.A. The only other Holly Forest of this type known from NPS lands is on Fire Island N.S.

Vital Signs Monitoring

Network Objectives for Vital Signs Monitoring:

- Hire and retain professional staff and provide a safe, healthy, and productive work environment.
- Develop and maintain working and decision-making processes that engage the network board of directors, technical staff, cooperators and managers of network parks.
- 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.).
- Identify and prioritize Network Vital Signs, develop protocols and implement programs to monitor these Vital Signs in Network parks.
- Integrate water quality monitoring in the Network Vital Signs monitoring plan.

Work on the *coastal geomorphology* project in FY 2004 included final selection of vital signs and measurable indicators, the development of a draft protocol for monitoring shoreline change, substantial scoping and pilot sampling for the coastal topographic change protocol, and final testing for the 'GIS Toolbox' that will display and analyze data from the coastal geomorphology vital signs projects for use by scientists and park managers. The draft shoreline change protocol will be submitted as part of the Network's Phase III Vital Signs Monitoring Plan in December 2004. Implementation of this protocol will provide parks with field data and associated maps of the position of shorelines on both bay and ocean coastlines, and allow analyses of changes in these shorelines over time.

Working in partnership with USGS and NASA, the Network conducted scoping and pilot sampling work for capturing and displaying data on coastal topographic features. Aerial surveys were conducted using both LIDAR (LIght Detection and Ranging) technology and a new NASA high quality digital imaging system to capture topographic information. The LIDAR-associated work in FY 2004 included the development of initial standards for data format, metadata, and the creation of draft derived products that will be developed for use by parks. The survey flight at Assateague Island NS marked the first use of NASA's newly acquired multi-spectral digital imaging system on an operational (non-test) flight in the NCBN. The camera collects high resolution

(~20cm pixels) multi-band imagery and was added to the NASA airborne platform primarily to address coastal park needs for large-scale, high quality photography.

In addition in FY 2004 the Network acquired, tested and trained park and Network staff to use geodetic (survey grade) GPS equipment that provides high precision (2 cm) three dimensional, real-time measurements. This equipment will be utilized for both aerial and ground-based surveys, and has already been used on a variety of projects at Assateague Island NS, Cape Cod NS, Fire Island NS, and Gateway NRA. In a demonstration of the improved efficiency provided by this equipment, topographic surveys at Assateague Island that required 160 person hours using optical survey equipment have been completed in 40 person hours with the geodetic GPS unit.

The planning phase of the estuarine nutrients project was nearly completed in FY 2004, with the further development and testing of draft protocols for (1) *ecosystem indicators of estuarine nutrient enrichment*, and (2) *estuarine nutrient inputs* into park watersheds. Through an interagency agreement with USGS, field tests for ecosystem indicators of nutrient enrichment (including dissolved oxygen, photosynthetically active radiation, chlorophyll, turbidity and others) were evaluated and a draft monitoring protocol was developed. This protocol will be submitted with the Network Phase III vital signs monitoring plan. The protocol consists of a set of Standard Operating Procedures for the various project components, and the Spatial Sampling Design SOP includes probabilistic sampling designs for all North Atlantic Coastal Parks (NCBN parks plus Acadia NP and Boston Harbor Islands NRA) that were developed using the EPA's National Coastal Assessment (NCA) methodology and the technical assistance of NCBN staff. Thus, data from NPS Vital Signs monitoring will be compatible with NCA data, which places NPS units in a broader context and allows NPS data to contribute to regional assessments. Scoping work also continued in FY 2004 for a related protocol for sampling seagrass sites as an indicator of estuarine health, with three sampling events at Cape Cod NS in FY 2004.

The protocol for estuarine nutrient inputs will utilize existing data on land use to provide estimates of sources and amounts of nitrogen inputs into NCBN parks. In FY 2004 all databases to be utilized for this protocol were completed and accuracy-assessed, and a test run of the NLM-E model, which is a unique model extended to account for agricultural inputs and wastewater, was conducted for each NCBN park.

Pilot sampling as part of the salt marsh monitoring project, including both *salt marsh nekton* and *salt marsh vegetation*, continued in FY 2004, and substantial progress toward finalizing the two protocols was made. The nekton and vegetation protocols are being developed through an Agreement with USGS so that the NCBN parks will be part of a larger regional salt marsh monitoring effort that includes parks from the Northeast Temperate Inventory and Monitoring Network as well as several National Wildlife Refuges. Study site selection and pilot field sampling in NCBN parks in FY 2004 included vegetation and nekton sampling at Sagamore Hill NHS as well as nekton sampling at Cape Cod NS and Gateway NRA. In addition, study sites were selected for Assateague Island NS, so all seven NCBN parks with salt marshes will have been pilot sampled by 2005. The process of modifying the protocols (originally developed for the Cape Cod NS prototype monitoring program) to follow I&M Program standards has begun, and drafts of both nekton and vegetation protocols will be completed in 2005.

Pilot sampling for *salt marsh elevation* monitoring continued through FY 2004 at Gateway NRA and Fire Island NS. Monitoring was conducted between two and five times during the year for each of seven marshes at the two parks. The preliminary results of the 2-year elevation monitoring effort at Jamaica Bay were presented to the resource management community and the public at a Scientific Symposium and Public Forum sponsored by Gateway NRA. Results show that salt marshes at Jamaica Bay are rapidly deteriorating, that deteriorating marshes (e.g., Black Bank Marsh) had lower rates of elevation gain than healthy marshes (e.g., JoCo Marsh), and that the

deposition of sediment by the Jet-Spray method effectively restored marsh soil elevation to that of the adjacent vegetated marsh. In contrast, the elevation of the reference marsh at Big Egg Marsh continued to decline. In addition, a new Interagency Agreement was established with USGS to continue these efforts and to add sampling at Assateague Island NS marshes, through 2006.

The *Land Cover Change* project is being developed in collaboration with Dr. Y.Q. Wang at the University of Rhode Island. In FY 2004 scoping continued with the collection and processing of image and ground reference data from Fire Island NS, which is serving as the pilot park for this project. These data will be used as the baseline for long term monitoring at Fire Island NS, and when finalized these procedures will be utilized throughout the NCBN parks. Both terrestrial areas and submerged aquatic vegetation beds are being considered for inclusion in the monitoring protocols, and work in FY 2004 included the creation of a photo mosaic of Fire Island NS and conducting georeferenced submerged video transects of eelgrass and widgeon grass beds. Data from the video transects were processed so that they can serve as a reference for the classification of these areas using satellite imagery. Several other I&M Networks have also identified land cover change as a priority for vital signs monitoring, and Dr. Wang is actively involved with national I&M efforts to establish standards and guidelines for landscape monitoring and remote sensing applications which will then be utilized to complete the NCBN land cover change protocol.

Scoping and planning work continued through FY 2004 on the *Visitor Impact Monitoring* project, including the review of final scoping reports from cooperators and a survey of park superintendents and natural resource staff. A workshop to finalize project objectives and determine the content of protocols was planned for 2005.

The report *Wetland and Water Quality Issues for Parks of the Northeastern US: A Scoping Report for the Coastal and Barrier Network* has been completed and reviewed. This report includes a summary of water bodies and wetlands in Network parks, information on waters listed through the Clean Water Act's mandated Water Quality Reports or Impaired Waterbodies Lists, provides statistics on wetlands potentially impacted by impaired waters, identifies outstanding resource waters, and summarizes existing water quality monitoring programs in or adjacent to park waters.

In FY 2004 the Network made a substantial effort to ensure that the *data management structure* is in place to allow for the successful implementation of all of the vital signs monitoring protocols. One major accomplishment this year was the creation of a unified database design for all vital signs monitoring projects. This structure will provide an easy-to-use, menu driven interface to help researchers and staff from all NCBN projects and parks understand, access, and utilize information from the monitoring projects. The new database template has been implemented to create three new databases including one that has been piloted for salt marsh nekton monitoring, and is being made available to all I&M networks.

Water Quality

The Network's *water quality monitoring* component, funded by the NPS Water Resources Division, is fully integrated with the design and implementation of the network-based vital signs program. The draft Vital Signs Monitoring Plan to be completed in December 2004 is a single, integrated monitoring plan that incorporates the "core vital signs" and water quality components.

In FY 2004 an interagency agreement with USGS was modified to evaluate data and information collected during field tests and to develop Phase III monitoring protocols for *ecosystem indicators of estuarine nutrient enrichment*. A draft protocol was completed and will be submitted along with the Network Phase III Vital Signs Monitoring Plan. This project will measure several indicators of estuarine health in all seven Network

parks with estuaries, including dissolved oxygen, chlorophyll-a, turbidity, sediment carbon, and bed and tissue characteristics of submerged aquatic vegetation. The protocol for spatial sampling design includes probabilistic sampling designs for all North Atlantic Coastal Parks (NCBN parks plus Acadia NP and Boston Harbor Islands NRA) that were developed using methodology of the USEPA National Coastal Assessment (NCA) with technical assistance of NCBN (Dennis Skidds). Thus, data from NPS Vital Signs monitoring will be compatible with NCA data, which places NPS units in a broader context and allows NPS data to contribute to regional assessments.

In addition to direct sampling of indicators of estuarine nutrients, the Network has continued to work through a cooperative agreement with Scott Nixon at the University of Rhode Island to develop a protocol to track *sources of nutrients* to park estuaries. Several existing databases and models are being utilized to estimate the sources, amounts, and types of nutrients entering park estuaries. In FY 2004 all databases were completed and are accurate; these include: Land Use, US Census, Agricultural, Sewage, and Atmospheric N Deposition data. Also, an extension of the Nitrogen Loading Model (NLM-E) was completed using the most accurate and recent land use data (1992). NLM-E was run for each park, including at 30-year historical analysis for Assateague Island NRA. The NLM-E is a unique model, extended to account for agricultural inputs and wastewater. This model uses readily available information to make a useful estimate of nitrogen loading to coastal parks. The upcoming release of the final report will provide park-specific estimates with guidelines for park managers for future runs of the NLM-E. Lastly, an attempt at running the MANAGE nitrogen source model resulted in the decision that the complexity of the model and time dedication required were not feasible for use in this project.

Finally, in FY 2004 a draft of the report *Wetland and Water Quality Issues for Parks of the Northeastern US: A Scoping Report for the Coastal and Barrier Network* has been completed and reviewed. This report includes a summary of water bodies and wetlands in Network parks, information on waters listed through the Clean Water Act's mandated Water Quality Reports or Impaired Waterbodies Lists, provides statistics on wetlands potentially impacted by impaired waters, identifies outstanding resource waters, and summarizes existing water quality monitoring programs in or adjacent to park waters.

Public Interest Highlights (NCBN 2004)

Several Species and Plant Communities Recorded for the First Time in Network Parks

Surveys in FY 2004 resulted in the first recorded occurrences of many species in parks of the Northeast Coastal and Barrier Network, including reptiles, amphibians, mammals, dragonflies and damselflies. Mammal Surveys conducted by Frostburg University at George Washington Birthplace NM and Thomas Stone NHS documented 1 new species at each of these parks, making a total of 13 new species recorded for Thomas Stone NHS and 6 new species records for George Washington Birthplace NM since the project began. Information on mammalian species distribution and abundance has been recorded for the first time in these parks.

Herpetological surveys at four Network parks in FY 2004 discovered numerous species for the first time in the parks and surrounding areas. Five uncommon species rarely seen or previously unknown to occur were found in Assateague Island NS in FY 2004 – grey treefrog (Hyla versicolor), northern water snake (Nerodia sipedon), eastern garter snake (Thamnophis sirtalis), rough green snake (Oepheodrys aestivus), and red-bellied turtle (Pseudemys rubriventris). Inventories at Colonial NHP, George Washington Birthplace NM, and Thomas Stone NHS that completed in FY 2004 added new county records and range extensions for several species of frogs and salamanders.

Odonate (Dragonfly and Damselfly) inventories at Fire Island NS, Gateway NRA, and Sagamore Hill NHS in FY 2004 documented over 35 species including three species on the NY Natural Heritage Program and NJ Natural Heritage Program's tracking lists: Rambur's Forktail (Ischnura ramburii), Comet Darner (Anax longipes), and Needham's Skimmer (Libellula needhami). Significant dragonfly migration events were also recorded at Gateway NRA.

Also, as part of the network's vegetation mapping initiative, rare community types were identified and documented at Colonial NHP and Gateway NRA. In Colonial NHP, a rare wetland community classified as Non-riverine Saturated Forest was documented for the first time in FY 2004. In addition, examples of the rare Coastal Plain Dry Calcareous Forest and Tidal Bald Cypress Forest communities were also documented in the park. The vegetation mapping program also documented the spatial extent of a rare Holly Forest type on the Sandy Hook Unit of Gateway N.R.A. The only other Holly Forest of this type known from NPS lands is on Fire Island N.S. The salt marsh community at Jamaica Bay was determined to be the largest example documented by the NY Natural Heritage program in the state.

Experimental Airborne Surveys Coordinated with NASA and USGS Provide Parks and Agencies with New Methods for Tracking Changes to Coastal Topography

In FY 2004, the NCBN Geomorphologic Monitoring Program continued its applied research partnership with experimental technology programs at NASA and the USGS to develop a multi-sensor airborne platform for coastal data collection. By applying the strengths of each agency to common needs, the cooperative effort accrues tangible benefits to each of the partner organizations. The NPS benefits by focusing advanced scientific and technical research on park issues. Although experimental in nature, data collected through the research activity has been applied to specific park management questions, specifically beach-dune and wildlife management projects at Assateague Island, and dune management and beach replenishment projects at Fire Island, and Sandy Hook. As data from the multiple sensors are co-registered and combined, a detailed three dimensional representation of the coastal ecosystem can be viewed and analyzed. While the partnership currently operates within a limited coastal area, the technology and data products can be readily adapted for use in a variety of park settings and applications. Additionally, as the technology migrates from the research to the

commercial arena, the agency will have gained valuable expertise and efficiencies in acquisition, processing, and use of the data.

NASA and USGS also benefit from this symbiotic relationship with the NPS. National parks provide generally undeveloped areas in which scientific research can be conducted without the disturbances inherent to heavily populated areas. In addition, parks have already established access to many of the study areas and their staffs possess the skills and equipment to conduct field measurements and thus verify the airborne survey data. For example, NASA's Wallops Island Flight Facility is in close proximity to Assateague Island National Seashore. On several occasions, NASA and the NPS have cooperated in conducting coincident air and ground surveys to provide independent accuracy verification of data collected using experimental instruments and technology. Parks also serve as excellent test beds for the development and evaluation of new data products and applications. Data collected by NASA aircraft is processed into GIS ready data products and distributed to parks for evaluation and use. This iterative and cyclical process of review and revision has improved the capabilities of each of the partner agencies to perform their respective roles.

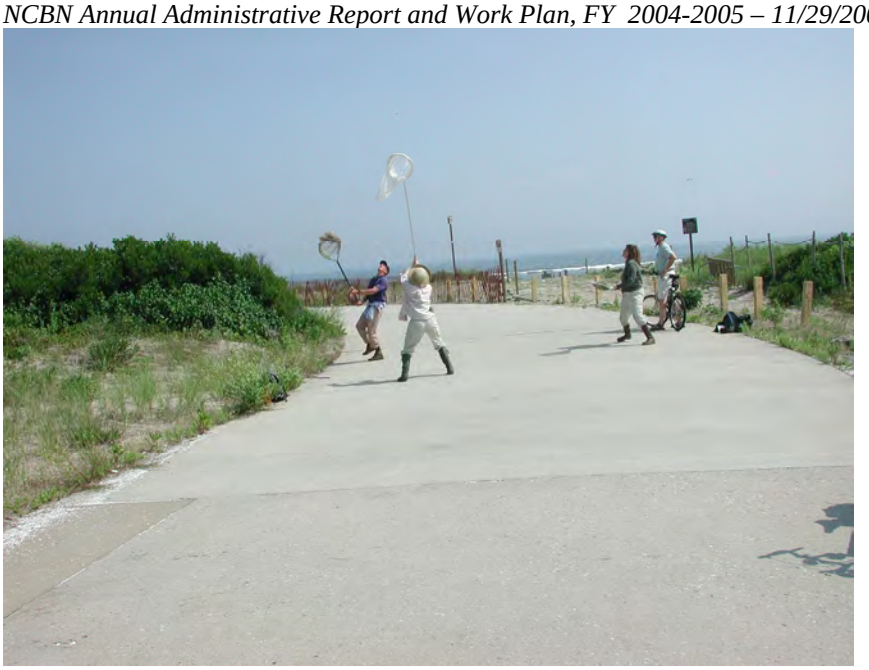
New Evidence Indicates Salt Marshes at Gateway NRA are Deteriorating and that Novel Restoration Method May Reverse the Trend

The salt marshes at Jamaica Bay are rapidly deteriorating and the causes for the deterioration are not clear. The elevation monitoring at GATE shows that deteriorating marshes (e.g., Black Bank Marsh) had lower rates of elevation gain than healthy marshes (e.g., JoCo Marsh). Monitoring also showed that thin-layer deposition of sediment by the Jet-Spray method effectively restored marsh soil elevation to that of the adjacent vegetated marsh. In contrast, the elevation of the reference marsh at Big Egg Marsh continued to decline.

NCBN 2004 Photos

Dr. Charles Roman and staff, on the way to Fire Island National Seashore to conduct SET monitoring, 2004.

Cooperators, Wildlife Conservation Society, conducting herpetological surveys at Assateague Island National Seashore, 2004.



Cooperators, Rhode Island Natural History Survey, conducting Migratory Dragonfly surveys at Gateway NRA, 2004.

Shenandoah National Park staff and USFWS cooperators conducting fish surveys at George Washington Birthplace NM, 2004.