

FY2015
ANNUAL ACCOMPLISHMENTS REPORT
FOR INVENTORIES AND VITAL SIGNS MONITORING
NORTHEAST COASTAL AND BARRIER NETWORK (NCBN)

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Northeast Coastal and Barrier Network FY 2015 Accomplishments Report

I. Overview

The Northeast Coastal and Barrier Network (NCBN) includes eight parks located along the Atlantic coast from Massachusetts to Virginia: Cape Cod National Seashore (CACO), Fire Island National Seashore (FIIS), Sagamore Hill National Historic Site (SAHI), Gateway National Recreation Area (GATE), Assateague Island National Seashore (ASIS), George Washington Birthplace National Monument (GEWA), Thomas Stone National Historic Site (THST), Colonial National Historical Park (COLO). These parks contain critical coastal habitat for many rare and endangered species, as well as migratory stopovers, acting as essential 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.

All NCBN parks continue to be pressured by encroaching development, intense recreational activity, and now due to climate change, sea level rise, increased storm intensity, amplified variability in surface and groundwater levels, and ocean acidification. These are expected to be among the most pressing natural resource management challenges in the near future. In addition, being within the urban sprawl of the Northeast creates additional pressure to on these sensitive and often last remaining pristine ecosystems.

The NCBN Inventory and Monitoring Program, developed to provide parks with credible, defensible scientific information, will help managers and scientists track the changes that occur in condition of their park's natural resources. As part of the National Park Service's original effort to "improve park management through greater reliance on scientific knowledge," the Cape Cod Ecosystem Monitoring (CCEM) program, an NCBN park, was established to develop and implement a long-term monitoring program that would serve to aid park managers in making sound stewardship decisions. The program at CACO was established in the early 1990's as one of the few "Prototype" parks tasked with developing a monitoring program for coastal parks. As part of this process, the CCEM program adopted an ecosystem-based, issue-oriented approach for monitoring ecosystem integrity, working closely in partnership with the USGS-Biological Resources Division. CCEM developed monitoring protocols based on the issues identified in Roman and Barrett's 1999 report *Conceptual Framework for the Development of Long-term Monitoring Protocols at Cape Cod National Seashore*. Not long after, in 2000-2001, the NCBN Monitoring Program was established as part of the newly formed and funded NPS Inventory and Monitoring Program (NPS I&M). The NCBN program extended the Cape Cod CCEM program by building the Network monitoring plan on the same approach for the additional seven network parks. Cape Cod National Seashore is one of the NCBN Program parks and shares the monitoring along with the seven other parks.

The following report provides a summary of accomplishments for FY15 on inventory and monitoring projects being developed and implemented by the NCBN program. In FY15, the network received a total of \$914,800; this includes \$788,040 in Vital Signs Monitoring funding, and \$82,300 from the NPS Water Resources Division. The Network also received \$25,000 additional I&M funds to help develop collaborative projects with other NER Networks. Some of this funding was returned to I&M WASO due to cancellation of planned staff training as a result of NE regional restrictions on travel at the end of the fiscal year.

FY15 Summary

Vital Signs Monitoring continued in FY15 with salt marsh vegetation and nekton monitoring occurring at FIIS and SAHI. Two seasonal employees were hired to conduct the monitoring under the supervision of

Network Biologist, Erika Nicosia. This year the Network was awarded a Mosaics in Science intern who joined our salt marsh monitoring crew for the summer.

Sediment Elevation (SET) data was collected at 120 SET sampling locations, two times at each location during the year by NCBN biologist, Jim Lynch, with the assistance of other NCBN and park staff. SET data was collected in nine parks, including 2 parks (ACAD, BOHA) in the Northeast Temperate Network and 2 parks (NACE, GWMP) in the National Capital Region Network. Collaboration continued with NOAA and USGS scientist on the development of the SET monitoring protocol. The three agencies continue to work together to develop a protocol that can be adopted widely by other agencies, organizations, and institutions interested in monitoring surface marsh sediment elevation. The protocol was completed, peer reviewed and is in the final stages of formatting for publication.

The NCBN citizen science marsh bird monitoring program was implemented for the third year at COLO and fourth year at CACO, the second year at ASIS and for the first year at GATE. Our partnership also continued with the Saltmarsh Habitat & Avian Research Program (SHARP), founded by a group of academic, governmental, and non-profit collaborators to provide critical information for the conservation of tidal-marsh birds. The NCBN continues to work closely with these partners to share data and develop a monitoring program with comparable goals, objectives and data collection methods.

The network also developed and/or continued cooperative efforts with the University of Rhode Island (URI) for herpetological inventories and science communication needs, the Virginia Institute of Marine Science (VIMS) and the Seagrass Ecology Lab at SUNY Stony Brook in New York for estuarine water quality and seagrass monitoring. Because NCBN parks were severely affected by Super Storm Sandy in 2012, funding was provided from Superstorm Sandy Recovery/Construction and Resiliency funds in 2013-2014, to assure implementation of estuarine nutrient enrichment and seagrass monitoring for contiguous years at FIIS for 2013-2016 field seasons. SeagrassNet and bay-wide monitoring occurred at FIIS in 2015 to help evaluate the impacts of Super Storm Sandy on water quality in the bay. Ocean shoreline position monitoring continued during both fall 2014 and spring 2015 at FIIS, GATE, ASIS, GEWA, SAHI and CACO, following the network's published protocol.

The NCBN Program Manager continues to manage over \$8,000,000 in Hurricane Sandy projects for FIIS, ASIS, GATE and CACO. These projects are due to be completed in the fall of 2016, but data management and report review and publication will continue through 2017.

II. Accomplishments

Inventories

- NCBN supported box turtle inventory/monitoring being conducted at FIIS (WIFL Estate) by University of Rhode Island scientist, Nancy Karraker. A total of 89 turtles were captured and marked during an intensive four-day survey during the summer of 2015 at WIFL. About 30% of the turtles were new individuals.
- University of Rhode Island scientists completed entry of data collected by NPS staff from 1980-2006 on box turtles. Data proofing is underway.
- A URI graduate student is in the second year of determining the environmental triggers of hibernation and emergence in box turtles to help inform mowing activities in parks. At the WIFL Estate, 20 box turtles are being tracked using radio-telemetry. Weather stations have been established at turtle hibernation sites and random locations to determine the temperature, precipitation, and humidity thresholds associated with the initiation of hibernation in the fall and emergence in the spring.

- URI scientist and graduate student began a new study to examine the roles that box turtles play in seed germination and dispersal and if digestion by a box turtle aids or inhibits germination of non-native plants.
- University of Rhode Island scientists conducted a herpetological inventory at COLO in spring-summer 2015. Survey methods employed at COLO in 2015 replicated those used in a previous NCBN inventory (2001-2003) so that comparisons of herpetofaunal diversity can be made over time. Additional methods were used to increase the probability of finding hard to detect amphibians and reptiles in the park. Notably, this inventory yielded a new county record for a salamander found in the park. Data summary and report available 2016.
- As part of the inventories described above, a graduate student and Research Associate from the University of Rhode Island conducted a pilot study on abundance and body condition of spadefoot toads. This work will be expanded upon into a full research project in spring-summer 2016.
- NCBN Biotech, Dana Filippini began to update the avian inventories for NCBN parks. This year she completed the surveys at SAHI and entered the data. The inventory method is based on the MIDN forest bird monitoring protocol, and MIDN staff assisted NCBN in developing the sampling design for the park.
- The NCBN Data Manager continues to work with Natureserve on the vegetation mapping report for ASIS. All other products for ASIS are complete; NCBN staff are working closely to assist the cooperator in completing the report.
- Rutgers collaborators completed and submitted the pre-Sandy report and maps for Fire Island National Seashore, Gateway National Recreation Area, and Assateague Island National Seashore. Post-Hurricane Sandy maps and reports for ASIS, FIIS and GATE funded through Hurricane Sandy supplemental funds, were completed summer 2015 and are in review.
- Geomorphological Maps (pre-hurricane Sandy) for Fire Island NS, Gateway NRA, Assateague Island NS were completed and in peer review.

Vital Signs Monitoring

Forest vegetation monitoring (GEWA, THST, COLO)

- A four-person field crew shared with MIDN and NETN conducted forest health monitoring at three NCBN parks (GEWA, THST, COLO).
- Natural Resource Data Series Report for the 2014 field season and two resource briefs for COLO, GEWA and THST were completed in the fall of 2015. Spatial and biological data finalized and posted to IRMA.

Ocean shoreline position monitoring (FIIS, ASIS, CACO, GATE, GEWA, SAHI)

- Shoreline monitoring (1D) continued to be collected by NCBN and Park Staff for fall and spring shorelines at ASIS, CACO, GATE, SAHI, GEWA, and FIIS. Rutgers' scientists under an NCBN/CESU task agreement continued to conduct the monitoring for the Network at GATE.
- Two GeoCorp Interns were hired by NCBN to assist at GATE under the supervision of Dr. Norb Psuty. The interns collected shoreline and topographic monitoring data for the Network and Hurricane Sandy projects and assisted with data analyses and report preparation.

Coastal topography monitoring (GATE)

- Rutgers collaborators expanded 3D monitoring at GATE to include Miller Field, Riis Park, and Aviation Road with future plans to include Fort Tilden. The data are used to provide metrics on the post-Sandy adjustment and resilience of the coastal system on both a site-specific and regional basis.

Marsh Bird monitoring (CACO, COLO, ASIS, GATE)

- Marsh Bird monitoring was implemented for the first time at GATE this year, April-July, 2015, and continued at CACO for the 4th consecutive year, COLO for the 3rd consecutive

year, and ASIS for the 2nd consecutive year.

- Ten volunteers were trained on how to collect the marsh bird data.
- NCBN Data Manager and Marsh Bird Project Lead continued discussions with SHARP and FWS personnel concerning the possibility of developing shared Avian Knowledge Network (AKN) Data Node for the common storage and archiving of marsh bird monitoring data. It's been decided that the database won't meet the needs of the NCBN Marsh bird monitoring program or the regional SHARP program.

Salt marsh vegetation and nekton monitoring (FIIS, SAHI)

- 2015 was the fourth year that salt marsh monitoring was conducted at FIIS, WIFL and SAHI.
- Two Biological Science Technicians were hired and stationed at FIIS and completed the sampling under the supervision of NCBN staff. Data entry for the 2015 field season has been completed. Data will undergo quality control procedures this winter prior to analysis for the annual data summary reports.
- One Mosaic in Science intern was awarded to the NCBN and was stationed with the salt marsh monitoring crew at FIIS.
- Annual salt marsh vegetation and nekton monitoring reports were published in the NR Data Series for ASIS and COLO.
- NCBN and USGS scientists received funding from USGS NPMP for a project entitled "Development of a Multimetric Index for Integrated Assessment of Salt Marsh Condition in the Northeast Coastal and Barrier Network." Collaborative work continued on this project. This is a three year project and will be completed in 2016.

Salt marsh sediment elevation monitoring (NCBN Parks CACO, GATE, FIIS, ASIS, COLO; NETN Parks ACAD, BOHA; NCRN Parks NACE, GWMP)

- 90 SET monitoring stations at five NCBN parks (GATE, FIIS, CACO, ASIS, COLO) were sampled in the fall and spring of FY15.
- 19 SET stations at two NCRN parks (NACE, GWMP) were sampled in the fall and spring of FY15 in collaboration with the NCRN.
- 22 SET stations at two NETN parks (BOHA, ACAD) were sampled in the fall and spring of FY15.
- Data from all NER SET sites (except CACO) has been entered and validated.
- Water level recorders were deployed at GWMP, COLO, ASIS, GATE, FIIS, CACO, BOHA and ACAD during FY15. These are being used to characterize the tidal patterns and differences in marsh flooding at the various SET sampling stations within each park.
- This year 7 water level gauges were maintained at ASIS, as well as 5 installed and maintained at FIIS for the Hurricane Sandy salt marsh resiliency and modeling project.
- NCBN and CACO staff met with Dr. James Morris (Univ. of South Carolina) to discuss the Hurricane Sandy salt marsh resiliency and modeling project (June 2015). Dr. Morris will be conducting the modeling effort.
- Collected soil cores at 16 locations at ASIS to measure soil characteristics (Bulk Density, water content – June/July 2015).
- Permanent 1m² vegetation plots were established at ASIS at the 16 SET stations.

Protocol Development

- The NCBN SET protocol draft was sent out to 7 peer reviewers for comments. Comments have been addressed and the protocol is close to publication (Fall 2015).
- Work on the Salt Marsh Bird monitoring protocol continued with a draft submitted for review to the NCBN program manager.
- Work on the Salt Marsh Vegetation protocol continues in collaboration with the protocol authors. The protocol has been peer reviewed and comments are being addressed.

Planning/Park Integration

- NCBN assisted COLO with piloting a forest/grassland bird monitoring citizen science program.

NCBN will continue to conduct training for this program annually.

- NCBN Assisted NETN colleagues with RTK surveys at rocky intertidal sites at Acadia National Park (June 2015)
- NCBN assisted FIIS employees with elevation surveying in the sunken forest.
- NCBN assisted NGS (Galen Scott) and NPS colleague (Neil Winn) in the installation of a geodetic survey marker in Salisbury, MD.
- NCBN met with FIIS interpretive staff to discuss science communication needs.
- NCBN Data Manager assisted GRD in developing an integrated plan for monitoring artifacts along the shoreline and cliffs of GEWA. GEWA is currently addressing management issues concerning the parks' vulnerable paleontological and cultural resources along the eroding bluff face on the Potomac River. For example, a large number of fossilized megalodon teeth, cetacean vertebrae, and mollusk shells are exposed each year. Most are washed away into the river before they can be documented, and many are illegally removed by fossil hunters. The NCBN data manager met with Chief of Resource Management Amy Muraca, Superintendent Melissa Cobern, and paleontologist Justin Tweet, with GRD to discuss the ongoing NCBN shoreline position change monitoring at the park and how those efforts might be adapted to include paleontological monitoring of the parks' eroding bluffs.
- Sara Stevens represents the NPS on a multi-DOI agency working group, and provides review and NPS Hurricane Sandy data and information as requested. DOI Sandy Project Database and Internet Mapping Working Group (2 + hour long conference calls monthly with team, and additional review of database and mapping prototypes.)

III. Key Highlights

Youth and Volunteer Hours (Approximately 12,936 hours)

- 1 Mosaics in Science Intern- NCBN salt marsh monitoring program Hours: 280
- 2 GeoCorp Interns- NCBN Geomorphological monitoring program at GATE, stationed at Sandy Hook, mentored by NCBN cooperators from Rutgers. Hours: 280
- 1 University of Rhode Island Coastal Fellow-140
- 6 University of Rhode Island Students-working on NCBN science communication, FIIS/COLO herpetological inventories, NCBN remote sensing project. Hours: 6,240
- 3 University of Rhode Island Research Assistants - working on NCBN science communication, FIIS/COLO herpetological inventories. Hours: 5,460
- 13 marsh bird monitoring citizen science volunteers. Hours: 135
- 525 Middle School and High School students were presented a hands on "monitoring aquatic invasive species" program by NCBN Biotech, Dana Filippini.

Work conducted with WRD-provided water quality monitoring funds

(Funds transferred to the NCBN from the Water Resources Division typically pays for approximately one third of the NCBN water quality monitoring effort on an annual basis.)

Estuarine nutrient enrichment (ENE) monitoring (FIIS, CACO, GEWA, COLO, ASIS)

- NCBN collaborators from the Virginia Institute of Marine Sciences (VIMS) and Stony Brook University continued to collect estuarine water quality data for the NCBN based on the network's Estuarine Nutrient Enrichment (ENE) protocol. Water quality monitoring occurred at ASIS, GEWA and FIIS this year. All stations were successfully sampled. Chlorophyll samples were sent to Cape Cod National Seashore North Atlantic Coast Laboratory for analyses. Results have been returned to VIMS and Stony Brook. Digital copies of all data were created. All data collected at ASIS and GEWA will be submitted to the NCBN Estuarine Nutrient Enrichment Database in late 2015.

Seagrass monitoring (CACO, FIIS, ASIS)

- Stony Brook personnel conducted the park-wide rapid seagrass assessment from July 2 to July 31,

2015, visiting 198 locations within Great South Bay. Data were quality controlled and entered into the NCBN database.

- Stony Brook personnel also successfully performed the summer NCBN SeagrassNet survey. Biomass samples were collected and processed. All data was digitized, and will be entered into the SeagrassNet database, fall 2015.

Work done on climate monitoring

- Sara Stevens attended the LCC Salt Marsh Resiliency meeting in Hadley, MA. Multi-agency meeting to initiate collaborative effort to collect and share data regionally.
- Salt marsh elevation and modeling project. This is a Hurricane Sandy funded project managed by the NCBN program manager. The outcome of this project will include climate change and sea-level rise models and scenarios for CACO, GATE, ASIS, FIIS.
- A network of water level monitoring instrumentation was deployed at CACO, FIIS, GATE and ASIS this year.
- The NCBN Program Manager established an IA with USGS to install and maintain both a tide gauge and weather station at FIIS.
- The NCBN Program Manager worked with NOAA to assure maintenance and repairs occurred on a critical NOAA tide gauge on Cape Cod that is used to support many park and Network projects.
- Sediment core samples were collected on marshes at ASIS and FIIS in order to enhance the salt marsh/sea level and climate modeling effort for these parks.
- Two MAST School student interns stationed at the Sandy Hook Unit of GATE implemented marine invasive monitoring at the park unit, under the mentorship of NCBN staff.

Bi-Regional I&M Collaboration

- Additional funds (\$25,000) were provided to each network in 2015 to promote collaboration. The NCBN along with the three other Northeast Region networks and the National Capital Region Network joined forces to develop a training workshop and a series of working groups focused on aquatic systems, birds, and forest vegetation. A training workshop was scheduled for September 2015 when the working groups would have face-time to further develop the collaborative products, as well as to discuss future collaboration. The workshop had to be cancelled as a result of regional restrictions on travel at the end of the fiscal year, and funding for the event was returned to I&M WASO.

Hurricane Sandy Project Management

- Sara Stevens continues to manage over \$8,000,000 in Hurricane Sandy funded projects for the Northeast Region.

Communications & Reporting

Data Management

- NPSpecies Updates--NCBN staff added 5 new species profiles and updated 214 profiles (primarily COLO birds) for NCBN parks.
- IRMA Updates--NCBN staff added 18 new/updated datasets to IRMA, most with digital or other holdings.
- NCBN data manager worked with park staff to created 40+ IRMA references, 50+ new holdings. Continued to assist Park staff on making their legacy IRMA references, holdings publicly accessible.
- NCBN Data manager is lead on a collaboration with CACO, NETN, MBD/WASO to upgrade existing NCBN saltmarsh database to meet new IMD Database Standards, one of the first I&M Networks to do so.

- NCBN Data manager worked throughout the year with Shoreline Position Change Monitoring partners on implementation of updated GPS data processing best-practices (necessitated by the adoption of a new version of the North American Datum, 1983); updated the program's GeoDatabases accordingly.
- NCBN staff revised annual reporting practices for Shoreline Position Change, Coastal Topography protocols.
- NCBN Data manager brought all Network databases into compliance with the latest version of Visual Basic (VB7) for use in 64-bit systems using Microsoft Office 2013 software. Assisted others with this issue (e.g., NCR staff).
- NCBN Data Manager served as a technical resource for staff from GUIL and GULN for implementation of the NCBN Shoreline Position Change Monitoring protocol.

Publications

Caldwell, J. M., M. E. Nixon, H. A. Neckles, and P. S. Pooler. 2015. Estuarine water quality in parks of the Northeast Coastal and Barrier Network: Vital signs estuarine nutrient-enrichment monitoring, 2006–11. Natural Resource Report NPS/NCBN/NRR—2015/902. National Park Service, Fort Collins, Colorado.

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Neil, A., and A. L. Babson. 2015. Database of tidal data coverage in and near Northeast Region National Parks. Natural Resource Data Series NPS/NER/NRDS—2015/759. National Park Service, Fort Collins, Colorado.

<https://irma.nps.gov/App/Reference/Profile/2220342>

Tefft E. 2015. Creating useful products from USGS topographic maps: GIS workflows developed in response to Hurricane Sandy data processing needs. Natural Resource Report. NPS/NCBN/NRR—2015/958. National Park Service, Fort Collins, Colorado.

<https://irma.nps.gov/App/Reference/Profile/2221960>

Tefft E. 2015. Working with elevation data to produce high-quality results: GIS workflows developed in response to Hurricane Sandy data processing needs. Natural Resource Report. NPS/NCBN/NRR—2015/959. National Park Service, Fort Collins, Colorado.

<https://irma.nps.gov/App/Reference/Profile/2221961>

Tefft E. 2015. Processing imagery with mosaic datasets to create functional outputs: GIS workflows developed in response to Hurricane Sandy data processing needs. Natural Resource Report. NPS/NCBN/NRR—2015/960. National Park Service, Fort Collins, Colorado.

<https://irma.nps.gov/App/Reference/Profile/2221963>

Nicosia, E. L. 2015. Monitoring salt marsh vegetation and nekton at Assateague Island National Seashore: 2014 summary report. Natural Resource Data Series NPS/NCBN/NRDS—2015/789. National Park Service, Fort Collins, Colorado.

<https://irma.nps.gov/App/Reference/Profile?code=2221962>

Nicosia, E. L. 2015. Monitoring salt marsh vegetation at Colonial National Historical Park: 2014 summary report. Natural Resource Data Series NPS/NCBN/NRDS—2015/791. National Park Service, Fort Collins, Colorado. <https://irma.nps.gov/App/Reference/Profile/2222010>

Nicosia, E. L. 2015. Monitoring salt marsh vegetation Gateway National Recreation Area's Sandy Hook Unit: 2014 summary report. Natural Resource Data Series NPS/NCBN/NRDS—2015/793. National Park Service, Fort Collins, Colorado. <https://irma.nps.gov/App/Reference/Profile/2222016>

Resource Briefs

- “Hurricane Sandy Coastal Resiliency Science” ArcGIS StoryMap. Developed by Sara Stevens, Thom Curdts and Kristen Hychka. <http://arcg.is/1KY1EpT>
- “Old Inlet Breach: Fire Island National Seashore Pre-and Post Hurricane Sandy.” ArcGIS slider map. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “After Hurricane Sandy, Fire Island Plans for the Future.” Resource brief. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “After Hurricane Sandy, Gateway Plans for the Future.” Resource brief. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “After Hurricane Sandy, Assateague Plans for the Future.” Resource brief. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “Submerged Habitat Mapping: Filling a Data Gap and Facilitating Resource Stewardship Following Hurricane Sandy.” Resource brief. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “Barrier Islands: Shifting sands provide protection and habitat.” Resource brief. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “Discovering the Secrets of Resilience: Through long-term monitoring, National Park Service scientists learn how coastal places rebound from storms and adapt to sea level rise.” Researcher profile. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “Sounding Seafloor Habitats: Researchers use sonar to map the underwater resources of four National Parks.” Researcher profile. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “Jordan Raphael and The Quest to Preserve the Sunken Forest.” Researcher profile. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “Coastal Resilience Goes Social: How a National Park Service intern uses social media to fuel conversation about coastal resilience.” Researcher profile. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “This Park’s Personality: Interpretive Ranger Sonia Taiani Brings Shoreline Dynamics and Post-Sandy Resilience Research at Fire Island National Seashore to Life for Visitors.” Researcher profile. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “After Sandy, National Parks Get Storm-Ready: Park Scientists Muster Elevation Data and Redesign Information Systems to Prepare for Future Storms.” Researcher profile. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “A Wildlife Biologist in the Making: The Mosaics in Science program brought Reina Galvan 2,000 miles from home and one step closer to her dream.” Researcher profile. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “Elevation Mapping Helps Build Resilient Coastal Communities.” Resource brief. Northeast Coastal and Barrier Network, National Park Service. 2014.
- “Sounding Seafloor Habitats: Mapping submerged habitats at three parks affected by Hurricane Sandy.” Photo slider. Northeast Coastal and Barrier Network, National Park Service. 2015.

- “Discovering the Secrets of Resilience: National Park Service scientists learn how coastal places rebound from storms and adapt to sea level rise.” Photo slider. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “Enhancing NPS Elevation Mapping Capacity: Park Scientists Gear up to Gauge Coastal Parks' Resilience to Storms, Sea Level Rise, and Climate Change.” Photo story. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “New Mapping Tools Empower NPS to Protect Coastal Communities.” Resource brief. Northeast Coastal and Barrier Network, National Park Service. 2015.
- “Learning about Natural Resilience after Large Storms.” Resource brief. Northeast Coastal and Barrier Network, National Park Service. 2015.

Public & Professional Engagement

Presentations

- Hychka K., Stevens S., Druschke C., Lee J., and J. Remillard. Science Communication and Coastal Resiliency. Presented at the Annual meeting of the Society of Wetland Scientists, June 1-4 2015, Providence RI.
- H. Wang, Q. Chen, E. K. Hartig, K. Hu, G. A. Snedden, P. S. Rafferty, J. C. Lynch, C. L. Johnson, B. R. Couvillion, S.J. Bentley, T. P. Blanchard, M. G. Larson and P. M. Orton. Modeling Hurricane Impacts on Salt Marsh Morphology in Jamaica Bay, New York City. Presented at the 2015 Society of Wetland Scientists Annual Meeting, May 31 – June 4, Providence, RI.
- Lynch, J. C., C. T. Roman, D. R. Cahoon and K. Medeiros. Long term monitoring of salt marsh elevation change and sea-level rise at three coastal National Parks in the northeast United States. Presented at the 2015 Society of Wetland Scientists Annual Meeting, May 31 – June 4, Providence, RI.
- Lynch, J.C. Wetland Elevation Monitoring in coastal parks of the northeast United States. Presented at the Somes/Meynell Wildlife Sanctuary, preserve. September 1, 2015, Mt. Desert, ME.
- Rasmussen, S.A., A.J. Neil, M.P. Bradley, C. LaBash, P.V. August, J.C. Lynch and S. Stevens. Collecting Elevation Data for National Park Service Salt Marshes in Response to Sea Level Rise and Post and Future Storm Evaluation. Poster presented at the 2015 Geological Society of America, Northeastern Region Meeting, 23-25 March, Bretton Woods, NH.
- Skidds, D.E. 2015. Streamlining GIS workflows with quick and easy ArcGIS Online mapping solutions. NPS I&M Data Managers Conference, May 4-7, 2015, Ft. Collins, CO
- Stevens S., NCBN's Role in Science Decision Making following Hurricane Sandy. Presented at the I&M Program Manager's Meeting, April 2015, Atlanta, GA.
- Stevens S., Metrics and Protocols-Monitoring Tidal Marsh Condition. Presented at Tidal Marsh Resiliency Coordination Workshop, U.S. Fish & Wildlife Service, December 8-9, 2014, Hadley, MA.

Outreach Activities

- Sara Stevens along with Charles Roman wrote numerous project “highlight” documents, providing photos, web links, etc. for use by DOI at various Hurricane Sandy events.
- NER Hurricane Sandy google website (developed and maintained by Sara Stevens)-- posting of all Hurricane Sandy project proposals, progress reports, resource briefs, photos, etc.
- NER Hurricane Sandy Science Story Map (developed and maintained by Sara Stevens and Thom Curdts)--posting of all science communication materials developed for Hurricane Sandy Projects

- NER Hurricane Sandy Science Flickr Site (developed and maintained by Erika Nicosia-NCBN employee)
- NCBN Marsh Bird Monitoring Lead, assisted COLO staff in implementation of the first season of a citizen science forest and grassland bird monitoring program that will be run by the park. Ten volunteers were trained. A total of 12 forest points and 8 grassland points were surveyed. Staff from the networks and park collaborated on the sampling design and NCBN staff conducted the training of the volunteers.
- The NCBN Biotech developed a program on Marine Invasive Species for the Interpretive staff at GATE, CACO and FIIS. She has been testing the program this spring and fall by teaching middle and high school students from three different RI schools about marine invasive species. The program included both class work and field work with protocols adapted from RI Coastal Management Council and Salem Sound Coastal Watch. Approximately 525 students were part of the outreach program.
- The NCBN Staff mentored two students from the Marine Academy of Science & Technology (MAST) at the Sandy Hook Unit of GATE. The school's curriculum focuses on marine sciences and marine technology/engineering. M.A.S.T. students are enrolled in college preparatory courses for four years. All students take three years of expanded laboratory science and three years of marine technology/engineering courses that cover the basic components of those subjects while integrating the specific marine concepts. She worked with them on establishing monitoring sites at various locations in the Park, monitoring techniques, and identification of marine invasive species. The mentorship will continue into 2016. The protocols used were adapted from RI Coastal Management Council and Salem Sound Coastal Watch.
- NCBN Staff created a Monarch Butterfly Outreach Program which will be given to the Interpretive staff at FIIS, CACO and ASIS. The program includes basic Monarch biology and conservation. To test the program it was presented at a RI High school. The program included a classroom session and then a field component where Monarchs were caught, tagged and released. The protocol used was adopted from Monarch Watch, a non-profit, educational and research organization.

Teaching and Advising Students and Interns

- Salt Marsh Project Lead (Erika Nicosia) conducted a field workshop for a Biological Sciences department salt marsh ecology class at the University of Rhode Island, demonstrating nekton sampling and field techniques.
- Sara Stevens and Erika Nicosia were invited guest lecturers at the Natural Resources Science Department Senior Colloquium at the University of RI. The colloquium included ethics in science and developing a professional resume and cover letter, and interviewing techniques.
- Sara Stevens was a guest lecturer for an undergraduate science course at URI to present the NCBN monitoring program, and NPS opportunities and employment.
- All NCBN staff mentor both undergraduate and graduate students in the Department of Natural Resources Science at the University of Rhode Island on an ongoing, year-round basis.
- Dana Filippini presented marine invasive species monitoring to over 500 primary age students.

General Budget Assessment

Account	Description	Authorized	Expended	Balance
PPNENEIM1C/ PPMRSNR1Y.AM0000	Vital Signs	\$788,040	\$794,674	-\$6,634
PPNENEIM1C/ PPMRSNR1N.NR0000	WRD	\$82,300	\$82,300	0.00
TOTAL		\$870,340		

2015 Expenditures compared to original Workplan

Differences between the budget proposed in the NCBN FY2015 Annual Work Plan and the final budget presented here include:

- a \$6,040 authorized funding increase
- Total salary costs were \$31,859 less than originally budgeted, primarily due to hiring one less seasonal than budgeted for, as well as final benefit rates for employees.
- Cooperative agreement costs were \$33,408 higher due to final proposal requests and the need for additional assistance to NCBN for Hurricane Sandy project data management support.
- Travel funds were below the allocated travel ceiling (\$34,000) by \$6,655 mainly due to NER travel ceiling restrictions put in place in August, NCBN travel plans for the end of August and September were cancelled.
- Operations and equipment costs were \$11,146 higher than budgeted in the work plan due to additional funds available due to less expenditure in travel funds. These funds went to purchasing and repairing water monitoring equipment and GPS/RTK equipment for SET and elevation monitoring and other needs to support infrastructure for long-term monitoring.
- The NCBN account ended with a negative balance of \$6,634 due to funds transferred to a Regional I&M account to be used for Network collaborations, added twice into the final budget in September.

Contracts and Cooperative Agreements

- \$93,800 (\$50,000 Vital Signs funds, \$21,800 WRD funds , \$20,000 Park funds) University of Rhode Island-Development of Trend Analyses and reporting for Salt Marsh vegetation, nekton and bird monitoring, herp inventories. (Note: COLO added an additional \$20,000 to this agreement to add additional field work and project time to our previously funded herp inventory.)
- \$139,995 Colorado State University-Hurricane Sandy data management and data review support
- \$60,461 (WRD Funds) Virginia Institute of Marine Science (VIMS) Water quality and Seagrass monitoring-ASIS, COLO, GEWA

2015 Expenditure on water quality/quantity monitoring

- In FY 14 and FY15 part of the NCBN water quality and seagrass monitoring was funded through supplemental Hurricane Sandy funds due to the large effort to quantify changes in Great South Bay due to the breach of FIIS. On a typical year the NCBN collaborates with StonyBrook University and Virginia Institute of Marine Sciences through CESU Task agreements in order to collect the Network's water quality and seagrass data. These CESU Task agreements cost approximately \$90,000-\$100,000 annually. WRD funding covers approximately \$82,000 of that, and the rest comes from the Network's VS funds.

Additional funds leveraged by the Network

The national I&M Division (IMD) provided an additional \$25,000 that was added to a multi-network project collaboration project focused on aquatic systems, birds, and vegetation. Part of the collaboration included a workshop which had to be cancelled due to restrictions in travel toward the end of the fiscal year, despite the project having previously been approved by the region; the remaining funds were returned to I&M WASO.

The network also leverages resources by sharing its forest monitoring crew with the Mid-Atlantic Network (MIDN) and the Northeast Temperate Network (NETN). Sharing a field crew and protocol

allows the networks to share on administrative and data management costs, and attract more skilled technicians for the monitoring crew.