

In addition to the data and information generated by the I&M Division, our staff routinely provide expertise to support other park needs. For example, a Cumberland Piedmont Network bat ecologist provided technical assistance to staff at Chickamauga and Chattanooga National Military Park and the Washington Support Office.



The work focused on compliance for the Moccasin Bend National Archeological District related to the park’s General Management Plan Amendment and Environmental Assessment process. The ecologist helped to inform park planning and compliance efforts

by conducting an on-site assessment of habitat suitable for federally listed bat species. He discussed the proposed limited clearing of trees for viewsheds and trails with park staff, and provided recommendations for the park to consider during their planning process.

To the south, on the border of Everglades National Park, the South Florida/Caribbean Network assisted the park with collecting baseline data in advance of proposed water management changes

About the Inventory and Monitoring Program

Each day, National Park Service managers make decisions that have the potential to affect park resources for years to come. In the past, park managers did not have access to even baseline information about which resources were in the parks—much less information about the overall state of the ecosystem. This lack of reliable data often made informed decision making difficult.

To facilitate collaboration, information sharing, and economies of scale in inventory and monitoring, the National Park Service has organized more than 270 parks with significant natural resources into 32 ecoregional networks to conduct expanded inventory and monitoring activities. Each network supports a core, professional staff who conduct the day-to-day activities of the network and who collaborate with staff from network parks and other programs and agencies to implement an integrated, long-term program to monitor representative indicators of resource health, or “vital signs.”

The Southeast Region (SER) hosts six Inventory and Monitoring Program (I&M) Programs. Monitoring staff are involved in numerous activities and functions such as data collection; performing data analysis, synthesis, and modeling; and providing data and expertise to park managers. Network personnel are also called upon to provide input for resource assessments and planning activities.

APHN Big South Fork NRRRA • Blue Ridge Parkway • Great Smoky Mountains NP • Obed NSR **CUPN** Abraham Lincoln Birthplace NHP • Carl Sandburg Home NHS • Chickamauga and Chattanooga NMP • Cowpens NB • Cumberland Gap NHP • Fort Donelson NB • Guilford Courthouse NMP • Kings Mountain NMP • Little River Canyon National Preserve • Mammoth Cave NP • Ninety Six NHS • Russell Cave NM • Shiloh NMP • Stones River NB **GULN** Big Thicket NP • Gulf Islands NS • Jean Lafitte NHP and Preserve • Natchez Trace Parkway • Palo Alto Battlefield NHP • Padre Island NS • San Antonio Missions NHP • Vicksburg NMP **SECN** Cape Hatteras NS • Cape Lookout NS • Canaveral NS • Castillo de San Marcos NM • Chattahoochee River NRA • Charles Pinckney NHS • Congaree NP • Cumberland Island NS • Fort Caroline National Memorial • Fort Frederica NM • Fort Matanzas NM • Fort Pulaski NM, Fort Raleigh NHS • Fort Sumter NM • Horseshoe Bend NMP • Kennesaw Mountain NBP • Moores Creek NB • Ocmulgee NM • Timucuan Ecological and Historic Preserve • Wright Brothers NM **SFCN** Big Cypress National Preserve • Biscayne NP • Buck Island Reef NM • Dry Tortugas NP • Everglades NP • Salt River Bay NHP and Ecological Preserve • Virgin Islands NP



Above: Northern long-eared bats from a cave on the Lookout Mountain Battlefield unit in Hamilton County, Tennessee on April 13, 2012.

Left: Endangered Indiana bat from cave on the Lookout Mountain Battlefield unit in Dade County, Georgia on February 23, 2016. Photos by Steven Thomas, Cumberland Piedmont Network.

by implementing methods developed for monitoring invasive fish in canals. The data collected during this effort will allow the park to detect and respond to the potential threats of new exotic fishes at the headwaters of the Taylor Slough and eastern border of Everglades National Park.

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<http://science.nature.nps.gov/im/>

Southeast Region

Inventory & Monitoring Program

Sound Science Supports Park Management

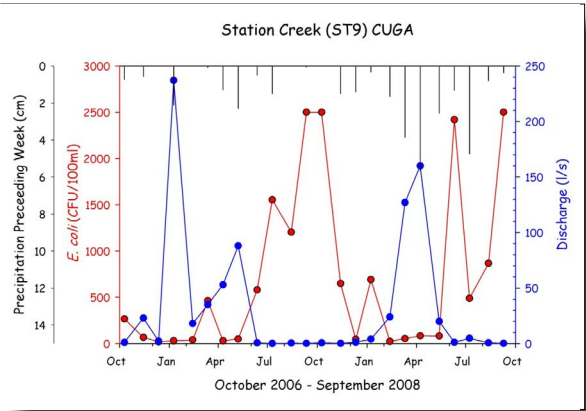
Introduction

The Southeast Region Inventory and Monitoring (I&M) Division works to provide park management with the natural resource information needed to make sound, science-based decisions that preserve and protect park resources. We accomplish this by providing technical assistance and conducting natural resource inventories and long-term monitoring of key indicators—or “Vital Signs”—of park ecological health. The connection between long-term scientific monitoring and the immediate planning, management, and decision-making needs of the parks is not always clear. Much of the work of the region’s five I&M networks focuses on collecting scientific data and informing park managers about the status of their resources. How does that work translate into helping parks protect their resources? Read on for some of the many ways that I&M is helping parks!

Taking action on Water Contamination

Discharge from North America Coal’s (NAC) Red Hills lignite mine was discovered within the Natchez Trace Parkway through routine water-quality monitoring. Two creeks were found to occasionally have specific conductance readings an order of magnitude higher than background values. Specific conductance is a measure of the ability of water to conduct an electrical current, and reflects the presence of dissolved ions in the water. The Gulf Coast Network hydrologist, at the request of the park superintendent, prepared a memorandum detailing the network’s findings. The park has used this information to coordinate with both NAC and the Mississippi Department of Environmental Quality to monitor and resolve the issue.

Routine monitoring at Cumberland Gap National Historical Park indicated a signature common to point-source contamination of *Escherichia coli* (*E. coli*) at Station Camp Creek in Virginia. There was no correlation between rainfall events and high bacterial loads, rather *E. coli* levels were the highest when flow was the lowest – rising in late spring, peaking through the summer and trailing off in the autumn. Higher flow periods in the winter months coincided with low *E. coli* concentrations. These results led to consultation with the Cumberland Piedmont Network hydrologist; targeted sampling by the park showed the source to be a failing septic system in the park’s campground. The park used these data to secure funds to replace the septic system, and subsequent routine sampling showed that bacteria levels returned to normal.



Above: *Escherichia coli* at Station Creek, Virginia, in Cumberland Gap National Historic Park. Virginia does not have a single sample standard for *E. coli*. The USEPA limit is 576 CFU/100mL.

National Park Service
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Inventory and Monitoring Division
Southeast Region



Eradicating Invasive Species

Invasive plants can dramatically alter park ecosystems, and are routinely cited as one of the most substantial threats to park resources. Detecting new infestations of invasive plants, and eradicating them while they are still in small controllable populations, is the most successful and cost effective strategy for preventing the establishment of invasive plant species. The South Florida/Caribbean Network focuses effort along the most likely routes, or “corridors of invasiveness,” such as trails, roadways, campgrounds, and boat launches. Surveys are conducted in Biscayne National Park, Everglades National Park, and Big Cypress National Preserve by an experienced botanist and an Exotic Plant Management Team member. Exotics are treated immediately when possible or are reported to park



staff. From 2009–2016, a total of 121 exotic species were detected across the three parks in 1,153 infestations. Twenty-three percent of the infestations were treated immediately upon detection, and the remaining were reported quickly to park staff.

Other southeast region monitoring networks do not have an invasive species protocol, but staff still keep a lookout for invasive species. For example, during vegetation monitoring fieldwork in August 2015, an ecologist from NatureServe spotted a highly invasive perennial grass (*Phragmites australis*) near a roadside pond at Mammoth Cave National Park. The crew documented the infestation and reported it to park management. This was the first known observation of this species within the park and the Cumberland Piedmont Network. A brief reconnaissance around the pond did not find additional populations. With quick action it may be possible to prevent its spread within the park and nearby wetlands.



Protecting Tortoises

The Gulf Coast Network has been monitoring a population of state-threatened Texas Tortoise, *Gopherus berlandieri*, at Palo Alto Battlefield National Historical Park since 2008. One of the first tortoises marked during this effort was later found dead on the road outside the park, apparently struck by a vehicle. Since that time, park staff have continued to record tortoises found dead on the highways adjacent to the park. These records, along with adjacent land use patterns, indicated that tortoises had very little chance to survive beyond the southwest boundary of the park.

Consultation between Gulf Coast Network staff, park management, and independent partners led to the recommendation to install fencing along these boundaries for the sake of tortoise conservation. The fence was completed in 2016, and through ongoing monitoring and documentation of tortoises found alongside the road, the Gulf Coast Network intends to document its effectiveness.



Above: A fence installed along the southwest border of Palo Alto Battlefield National Historical Park. The fence is intended to help conserve the gopher tortoise by impeding their path to the highways adjacent to the park.
Left and below: Gopher tortoise (*Gopherus berlandieri*) detected during monitoring in early 2017. Each tortoise is uniquely marked so that individuals can be tracked over time.



Evaluating Marine Resources

The South Florida/Caribbean network is partnering with park staff, other federal and state agencies, universities, and organizations in a large reef fish monitoring program that covers the Florida Keys, including Biscayne and Dry Tortugas National Parks. Data from this ongoing effort are being used to evaluate the effectiveness of the closure to fishing of the Dry Tortugas National Park Research Natural Area. The closure was proposed in order to increase the size and abundance of a variety of fish species. Initial data indicate that, since the closure, the size and abundance of a number of species has increased both within and outside of the closed area. This monitoring effort may also be used to evaluate the effectiveness of both the Biscayne National Park General Management Plan and Fisheries Management Plan.



Above: Gray snapper (*Lutjanus griseus*) and white grunt (*Haemulon plumieri*) at a patch reef in Biscayne National Park.
Right: Juvenile queen angelfish (*Holacanthus ciliaris*) in Dry Tortugas National Park. Photo by Rob Waara, South Florida/Caribbean Network.



Above: Nassau Grouper (*Epinephelus striatus*) in Dry Tortugas National Park.
Left: Yellowhead jawfish (*Opistognathus aurifrons*) in Dry Tortugas National Park. Photos by Rob Waara, South Florida/Caribbean Network.

Assessing Disaster Impacts

Inventory and monitoring data serve to document baseline natural resource conditions, and can be extremely useful to park managers interested in assessing the impacts of natural or human-caused disasters. Because documentation of I&M data is scientifically rigorous, repeating inventories or monitoring after an event can provide accurate and timely data on resource impacts. For example, several Southeast Coast Network parks (Canaveral National Seashore, Cape Hatteras National Seashore, Cape Lookout National Seashore, Cumberland Island National Seashore, Fort Matanzas National Monument, and Timucuan Ecological and Historic Preserve) recently requested additional shoreline surveys to be conducted post-Hurricane Matthew (October 2016). This additional survey work was completed in November 2016 and will be compared to data collected just prior to the storm event as part of routine monitoring activities.



Above: A photo taken in March 2017 of the shoreline on the west side of the A1A bridge at Fort Matanzas National Monument. At the same location in the summer of 2014, the shoreline stretched out past the pilings which are now in the water.



Below: This shoreline photo taken at Canaveral National Seashore in November 2016, shows bluffs cut by Hurricane Matthew.