National Park Service Climate Change Activities in the Southeast

The National Park Service (NPS) Southeast Region (SER) is responsible for managing 66 parks most of which contain significant natural resources. NPS supports a wide range of activities to address its mission to preserve these resources, unimpaired, for the enjoyment of future generations. In addition, identified are several areas where we believe collaboration between Southeast Natural Resources Leadership Group (SENRLG) member organizations would be beneficial.

I. Knowledge Acquisition

A. Inventory and Monitoring (I&M) Program

National parks protect many of the nation's most pristine and intact ecosystems. As a result, many parks are used as benchmark ecological sites because they are less influenced than other areas by the confounding effects of anthropogenic land use and land cover changes. The following examples highlight Southeast Region (SER)-sponsored monitoring within National Parks to detect short and long-term climate change and effects on biota and ecosystems.

- **Vital signs monitoring:** SER Parks are organized into five I&M networks which have begun long-term monitoring of the most important indicators ("vital signs") of park ecological conditions. Working with park managers and subject matter experts from universities and partner agencies, the networks have identified their highest priority issues and monitoring needs, developed conceptual models of park ecosystems, and have developed databases and procedures for managing, analyzing, and reporting monitoring results. Organizational structures that include superintendents and natural resource managers for all parks are in place. Virtually all of the high-priority vital signs selected by the networks are directly or indirectly related to climate change, and in fact are being used to study climate change. For example, the Southeast Coast Network, in addition to evaluating changes in weather and climate variables, plans to evaluate vital signs data in the context of effects of climate change by looking at: the effects of sea level rise on coastal shorelines, including shoreline position and the location of shoreline erosion hotspots; changes in the spatial extent, species composition, and elevation of coastal salt marsh wetlands; and trends in amphibian, breeding bird, and plant species distribution and diversity.
- **Climate monitoring stations:** Several climate stations are located within SER National Parks, including two state-of-the-art Climate Reference Network (CRN) stations overseen by the National Oceanographic and Atmospheric Administration (NOAA) in Mammoth Cave National Park (NP) and Cumberland Island National Seashore (NS). More CRN stations are planned for the SER. NPS also hosts National Weather Service (NWS) Cooperative Observer Program (COOP) stations, interagency Remote Automated Weather Stations (RAWS), and many state and local stations.
- **Inventory and provision of climate data:** The NPS, with assistance of SER has completed an inventory of all existing climate monitoring stations in its parks, has direct access to multiple climate databases, and is working with Regional Climate Centers to provide historical and current climate data.

With establishment of the I&M program, NPS has invested much time and effort to compile, evaluate, synthesize, and disseminate monitoring data to parks and partners. This systematic, park-based approach provides a functional, on-the-ground monitoring infrastructure that can be enhanced to help meet Department of Interior (DOI) climate monitoring needs.

- **Park-based scoping of climate change indicators:** All SER I&M networks completed a multiyear, comprehensive scoping process to identify and prioritize vital signs. This process involved hundreds of NPS staff and technical experts. Most vital signs selected were also identified by the DOI Climate Change Task Force as key resources likely to be affected by climate change.
- **Legacy data inventories:** All I&M networks have cataloged and evaluated historic datasets collected within parks. In some SER parks, effects of climate change are already documented via reports, photographs, range assessments, and scientific surveys.
- **High-quality data collection and management:** All monitoring supported by the NPS I&M Program complies with peer-reviewed protocols and includes complete metadata that are professionally managed. Protocols are shared on the internet and through the National Biological Information Infrastructure's Natural Resource Monitoring Partnership.
- **Existing climate change partnerships:** NPS is an active participant in climate change monitoring and research programs including the CRN and the National Phenological Network. Park-based projects sponsored by U.S. Geological Service (USGS), the National Aeronautical and Space Administration (NASA), and the National Science Foundation (NSF) are focused on detecting, understanding, and mitigating climate change impacts on parks and associated ecosystems.
- **Education and Outreach:** National Parks are the most visited and iconic environments for the public to experience the consequences of climate change. NPS has a unique capacity through NPS Research and Learning Centers, and interpretive and educational programs to communicate the effects and importance of climate change.

B. Research

Parks, academic institutions, and other organizations are also conducting climate change research in SER parks not under the I&M framework. This work includes research into: changes in species ranges over time; past and present patterns of sea level rise; carbon sequestration within a park; climate induced carbon loss from soils; the amplification of climate change effects by high ambient ozone levels; and physiological strategies of non-native plants in field systems and how modeled climate change would affect their competitive advantage with native grasses and forbs.

II. Mitigation and Adaptation

The SER as well as its individual parks are undertaking a myriad of activities to reduce their carbon footprints and to adapt to impacts, both anticipated and already being experienced, from climate change. These activities fall into the following categories of actions.

A. Climate Friendly Parks (CFP)

The NPS and U.S. Environmental Protection Agency (EPA) have partnered to make National Parks models of climate stewardship and education. As participants in this program, parks:

- hold a CFP workshop to educate park employees about climate change and air pollution and the roles they can play in reducing air pollutants;
- develop a plan for each park to reduce its emissions of greenhouse gases and other air pollutants using a electronic spreadsheet that helps a park conduct an emission inventory and develop strategies for reducing emissions through development of an action plan; and
- communicate to the public how climate change and air pollution affect park resources, how the park is mitigating and adapting to the effects, and how individuals can reduce their greenhouse emissions.

The Everglades NP and Great Smoky Mountains NP are participants in this program.

B. Individual Park Actions

Below are a few of actions taken by SER parks to reduce their emission of greenhouse gases:

- Γρεεν ενεργψ πυρχηασινγ Χονγαρεε ΝΠ ανδ Γρεατ Σμοκψ Μουνταινσ ΝΠ ηαε πυρχηασεδ "green power" from utilities. In addition, Great Smoky Mountains NP has purchased a wind energy certificate equivalent to a 100% offset of two years estimated usage at its new Twin Creeks Science Center.
- Renewable energy generation Dry Tortugas NP replaced a 30 kilowatt (KW) diesel powered electric generation system on Loggerhead Key with a 15 KW photovoltaic system, and implemented conservation measures to reduce the size/cost of the new system. Everglades NP replaced a 10 KW diesel system with a photovoltaic system at its Shark Valley tower and comfort station.
- Energy efficient and sustainable facilities Blue Ridge Parkway, Great Smoky Mountains NP, Little River Canyon National Preserve and Mammoth Cave NP have all built highly energy efficient, visitor or education centers. Everglades NP and Dry Tortugas NP have constructed five sustainable replacement housing units which incorporate energy saving building materials, plumbing, lighting and appliances. Horseshoe Bend National Military Park incorporated recycled lumber and shingles in construction of three new pavilions.
- Conversion to renewable energy sources including bio-fuels Big South Fork National River and Recreation Area (NRRA), Congaree NP, Fort Donelson National Battlefield, Great Smoky Mountains NP and Kennesaw Mountain National Battlefield Park use biodiesel in all of their diesel vehicles and work equipment. Great Smoky Mountains NP has partnered with the Eastern Band of Cherokee Indians and the City of Gatlinburg to establish bio-diesel shuttle service between Cherokee, Newfound Gap, Gatlinburg, and park destinations.
- Purchase and use of electric, hybrid or more efficient vehicles Big South Fork NRRA, Congaree NP, Everglades NP and Great Smoky Mountains NP operate a total of 10 hybrid vehicles. In addition, SER parks operate many electric vehicles.
- Purchase and use of bio-based/recycled content products The majority of SER parks use biodegradable and environmentally-friendly cleaning supplies both for housekeeping and maintenance work (i.e., monument cleaning and preservation). In addition, most parks purchase products from “green” suppliers when possible. Big South Fork NRRA uses 165 gallons of recycled motor oil in its park fleet annually. It’s a closed loop program with the used oil picked up free of charge by the recycler.
- Recycling programs Great Smoky Mountains NP is establishing a recycling program throughout the park for offices, shops and households. Also, the facilities program recycles aluminum, antifreeze, asphalt, batteries, brick, tires, cardboard, fluorescent lamps, manure, mixed paper, scrap metals, toner cartridges, used oil, white paper, and wood chips.
- Visitor education through park interpretation SERO has developed a bulletin entitled Climate Change: Impacts on Southeastern Parks to be distributed to park visitors. SERO has also modified a national NPS table-top display, making it more reflective of the SER, for use at events in the SER. Everglades NP created an interpretive handout titled "Climate Change and South Florida's Parks”.

C. Training and Conferences

SER Park units have hosted a variety of climate change related training ranging from academic expert training to Climate Friendly Park training (discussed above) to green procurement training. Following are four examples of the types of training activities being undertaken in the SER.

- In January 2008 the Southeast Regional Office hosted a presentation by a Georgia Tech professor of climate change to raise awareness in the SER about climate change.
- The SER made available Energy Star Portfolio Manager Training to all SER parks. Portfolio Manager is an interactive energy management tool that is used to track and assess energy and water consumption across an organization’s set of buildings.

- Abraham Lincoln Birthplace National Historic Site has made green procurement training mandatory for all employees with purchasing authority.

In addition, the SER Office is partnering with EPA Region 4 on climate change by bringing in a detailee to: work on several of the activities listed above; capture areas of work that NPS SER may need to devote efforts to; and to identify partnering opportunities across the two agencies.

III. Areas of NPS Need and Potential Collaboration

A. Enhanced Ecological Monitoring

Parks are premier sites for detecting effects of climate change. NPS has a framework for monitoring high-priority vital signs and this NPS investment can be leveraged by coordinating monitoring and sharing information across federally managed areas.

B. Forecasting Climate Changes at Relevant Scales

Climate modeling typically provides information at the landscape or larger scale. Improvements in model downscaling techniques would enhance the value of predictions from climate models at management-relevant scales.

C. Integrated Assessments of Impacts

The range of climate change impacts to biota, hydrology, disturbances, and infrastructure/facilities is clearly documented by the International Panel on Climate Change and others. Working across agencies, assessments are needed to evaluate a broad range of both climate change and response scenarios. Scenario analyses must address priority concerns of the land managers. Assessments and findings would need to be communicated to all land managers in the Southeast.

D. Communication and Education

Education/communication materials based on sound science are needed for a range of audiences.

E. Guidelines for Implementing Adaptive Management Principles

Implementing static management actions, particularly for long-term projects, will not be prudent for many federal activities given the anticipated effects of climate change. Land managers need a set of management tools and options which can be flexibly applied and adapted as conditions change. Incorporating adaptive management principles into agency planning processes will help ensure alternatives are evaluated and that results influence future management actions.