

CREATING A FRAMEWORK FOR REPORTING ECOLOGICAL CONDITIONS

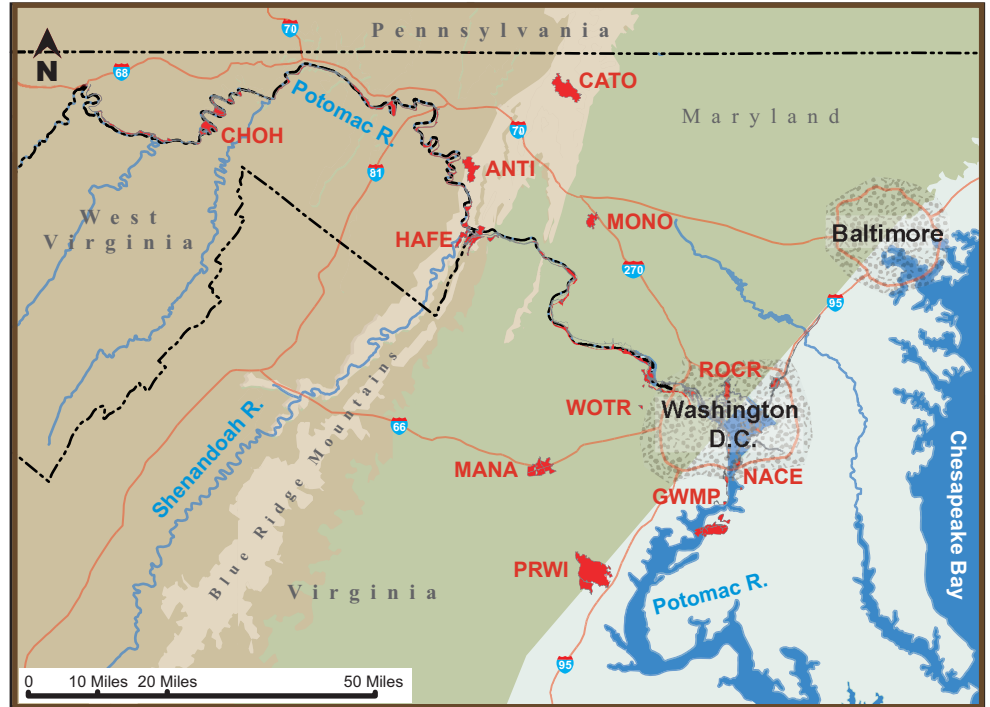


National Capital Region Network of the National Park Service

Knowing the condition of natural resources in the National Parks is critical to conserving the parks unimpaired for the enjoyment of this and future generations. The National Park Service (NPS) is implementing a series of programs designed to provide a stronger scientific basis for management actions. The Inventory and Monitoring (I&M) program was initiated in 1990 to help fulfill this mission.

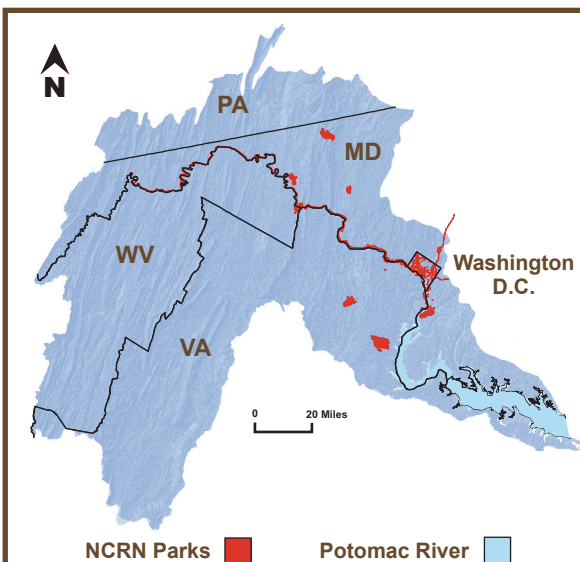
The intent of NPS monitoring is to track a subset of resources and processes, known as "Vital Signs," that represent overall ecological health, known or hypothesized stressors, and natural elements of important human value. The information obtained through Vital Signs monitoring will have applications for management decision-making, research, education and promoting public understanding of NPS natural resources.

This newsletter is the outcome of the May 2005 Vital Signs workshop on the National Capital Region Network (NCRN) parks and is targeted for resource managers and scientists.

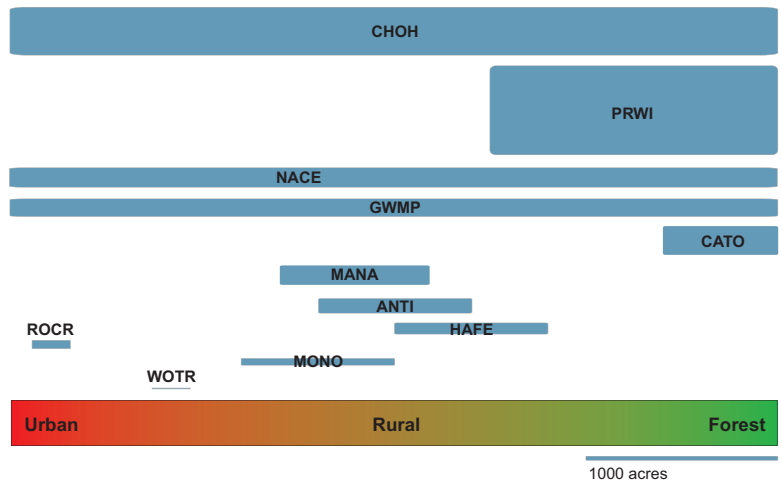


Legend for the map: Appalachia (tan), Blue Ridge (light tan), Piedmont (light green), Coastal Plain (light blue), NCR Parks (red).

Locations of the National Parks of the National Capital Region Network. See the following page for the park name acronyms.



The National Capital Region Network parks are largely within the Potomac River watershed, the second largest watershed of the Chesapeake Bay. Source: J. Runde, NPS.

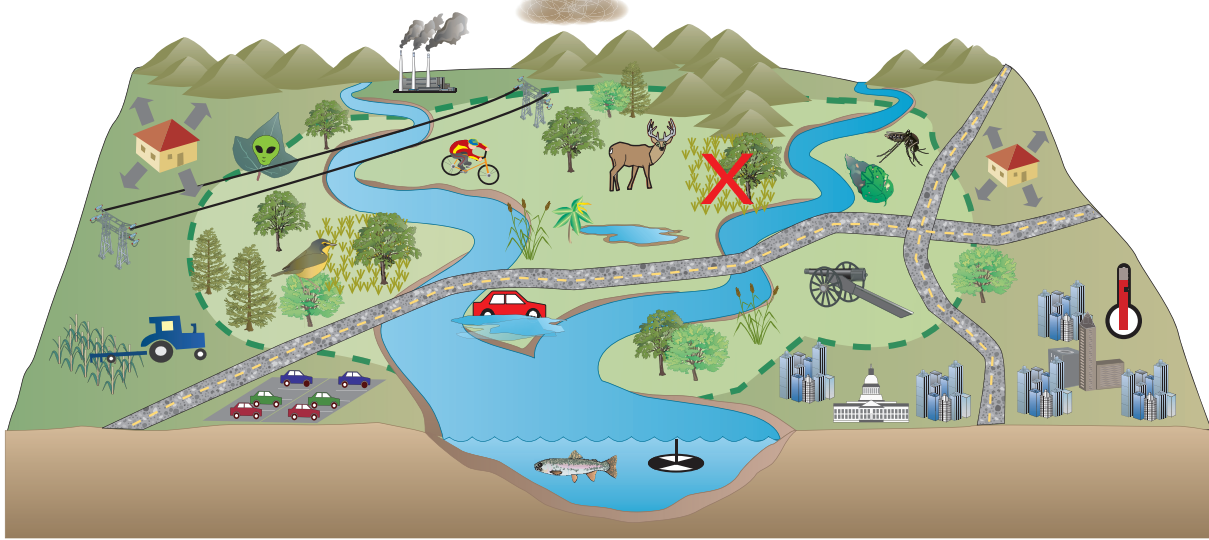


The relative size of the 11 national parks within the National Capital Region Network, from largest (top) to smallest (bottom). The horizontal position of the park acreage bar is indicative of the surrounding watershed land use (urban, rural and forest). The park acronyms are identified on the following page.

DEVELOPMENT PRESSURES RESULT IN SHARED ISSUES FOR NCRN MANAGEMENT

- NCRN Parks**
- ANTI** Antietam National Battlefield
 - CATO** Catoclin Mountain Park
 - CHOH** Chesapeake & Ohio Canal National Historical Park
 - GWMP** George Washington Memorial Parkway
 - HAFE** Harpers Ferry National Historical Park
 - MANA** Manassas National Battlefield
 - MONO** Monocacy National Battlefield
 - NACE** National Capital Parks – East
 - PRWI** Prince William Forest Park
 - ROCR** Rock Creek Park
 - WOTR** Wolf Trap National Park for the Performing Arts

Nearly all of the National Capital Region Network (NCRN) parks lie within the Potomac River watershed, which is experiencing some of the most rapid population growth and urban development in the country. The parks act as important refugia in conserving remnants of the rich natural heritage disappearing from the urbanizing landscape. Vital Signs monitoring will facilitate the use of good science and data to make better decisions for managing parks confronted with the following shared issues.



The parks of the NCRN protect nationally and regionally important water, forest and grassland, wildlife, cultural and recreational resources. Development adjacent to park boundaries can have a significant impact on these resources by promoting exotic species invasions and the overabundance of native and pest species. On a regional scale, changes in land use intensity can influence spatio-temporal patterns in temperature, disease outbreaks and air pollution. Regional changes in urban development or agriculture also can alter water quality and quantity through the addition of impervious surfaces, the loss of forest and grassland areas, and the release of chemical and biological pollutants. In addition, major transportation and utility corridors bisect many of the parks and can interrupt the natural flow of water, air and biota. Priority Vital Signs (shown in bold type on the opposite page) have been selected to identify and understand changes in the valuable natural resources of the NCRN relative to these pressures.



Road corridors run around and through NCRN parks (MANA).



NCRN parks provide a respite for large urban populations (WOTR).



A high water event can lead to flooding and bank erosion (GWMP).

Priority Vital Signs of the National Capital Region Network

Air Quality & Climate

RESOURCE VALUES

The NCRN offers many opportunities for natural and cultural experiences to the public. Clean air benefits human and environmental health, and provides high visibility for park visitors to appreciate the scenic vistas. Because the atmosphere interacts with all parts of the environment, air quality and weather monitoring provides a context for evaluating changes to other natural resources.

RESOURCE STRESSORS

Increases in airborne particulate matter can degrade air quality and decrease visibility. Urbanization can contribute to these problems and create localized changes in temperature. Air pollution from continental and local sources also can increase levels of atmospheric mercury and ozone, and acid rain can act to transport pollutants to river and stream resources.

(Text in bold is used to designate NCRN Vital Signs.)

Biodiversity

RESOURCE VALUES

The parks act as green island refugia for at-risk fauna and flora in the urbanizing landscape. They contain a diverse variety of wetland and grassland ecological communities, which support a rich mixture of amphibian fish and bird species.

RESOURCE STRESSORS

Habitat loss associated with urbanization is a primary cause of declines in biodiversity. Human settlements also may act as a source of introduction for invasive exotic species, which can outcompete, infect or predate upon native species. Changes to park physical properties such as air quality and water quality also may negatively impact the parks' biota.

Water Quality & Hydrology

RESOURCE VALUES

Rivers, streams, wetlands, ponds and seeps located in the parks contribute substantially to the overall water chemistry of the region. Healthy water resources provide a variety of recreational opportunities and physical habitat for fish, aquatic macroinvertebrates and other aquatic life.

RESOURCE STRESSORS

As grasslands and forests are replaced with development inside and outside the parks, surface runoff increases of the region. Healthy water resources provide a variety of recreational opportunities and physical habitat for fish, aquatic macroinvertebrates and other aquatic life. Impervious surfaces also act to redirect flow and may result in altered surface water dynamics including localized flooding events, particularly if coupled with changes in precipitation.

Ecosystem Pattern & Processes

RESOURCE VALUES

The network of parks presents an opportunity for coordinated management to help preserve landscape processes. Forest regeneration can be observed in many of the parks, while others maintain large expanses of grassland habitat. Parks can act to promote healthy landscape dynamics by acting as biotic source habitat and connectivity corridors.

RESOURCE STRESSORS

Regional land use change can fragment forest habitat and isolate the parks from the surrounding environment. Changes in habitat type or condition can result from internal park stressors such as an unchecked population boom of white-tailed deer or forest insect pests.

WORKSHOP RECOMMENDATIONS

Workshop participants recognized the value of Vital Signs monitoring to a) assess the efficacy of management practices and restoration efforts, b) characterize trends in the condition of parks, and c) identify gaps in knowledge where additional research should be promoted. Recommendations for achieving maximum value from Vital Signs monitoring are grouped into categories of human, biotic and environmental resources and presented below.

HUMAN

Target management actions that facilitate recreation and mediate its environmental impacts. Careful consideration is required of the effects of increasing visitation upon the parks, including trails and campgrounds, rights of way, poaching, parking and roadways.

Develop monitoring to assess human pressures from watersheds surrounding the parks. These pressures include changes in land use and impervious surface, encroachment and agricultural leaching of nutrients, sediments and pesticides.

Promote research to understand mechanisms by which humans influence the parks. Research into the impacts of visitor use, traffic and noise, as well as nutrient, sediment and pesticide pollutants would be especially beneficial.

BIOTA

Target management strategy to manage combinations of natural and highly modified habitats. Exotic species are present in all parks and require management, along with populations of native species (e.g., white-tailed deer and beaver) that potentially act as ecosystem engineers.

Develop monitoring to evaluate biodiversity and track the balance between native and non-native species. Specifically, monitoring of native populations of white-tailed deer and Canada geese, invasive plant and animal species, and rare, threatened or endangered species is recommended.

Promote research to inform management of invasive species, pests, rare species and ecological engineers. Better knowledge is needed of exotic plant species reinvasion after herbicide or fire control, the impacts of overabundant fauna on floral diversity, and the distribution and behavior of understudied fauna.

ENVIRONMENT

Target management actions to retain structure and value of diverse ecological environments. Special management needs are associated with unique habitats in wetland marshes, streams, seeps, vernal pools, riparian zones and sensitive soil environments.

Develop monitoring to assess health and stability of physical environments with emphasis on aquatic systems. Markers of healthy aquatic ecosystems include water column nutrients and chemicals, water flow, erosion, macroinvertebrates and amphibians, and stormwater overflows.

Promote research to improve knowledge of environmental impacts throughout the watersheds. Potential projects include groundwater and wetland mapping, and watershed-scale studies of stream intactness and inputs. Research into the caves and limestone glades within some parks also may help to understand and preserve these unique and rare features.

Facilitated by the **Integration and Application Network (IAN)** of the **University of Maryland Center for Environmental Science (UMCES)**, this National Capital Region Network Vital Signs workshop provided resource managers with an understanding of how conceptual diagrams can be constructed and used to communicate complex ecological principles, and to create a framework for reporting the Vital Signs monitoring within their parks.

Workshop Participants (in alphabetical order):

National Capital Region Network Park Managers: Andrew Banasik, Joe Calzarette, Duane Erwin, Marie Frias Sauter, Bryan Gorsira, Bill Hebb, Joe Kish, Jennifer Lee, Dale Nisbet, Susan Rudy, Vincent Santucci, Brent Steury, Kirsten Talken-Spaulling, Bill Yeaman

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Northeast Region: Brian Milstead, Theresa Moore, Greg Shriver, Sara Stevens

Washington DC Office of Inventory & Monitoring: Steve Fancy

IAN/UMCES: Tim Carruthers, Bill Dennison, Bob Gardner, Jane Hawkey, Adrian Jones, Todd Lookingbill, Tracey Saxby, Jane Thomas



The National Park Service is implementing Inventory & Monitoring programs (<http://science.nature.nps.gov/im>) nationwide through a series of 32 networks. The National Capital Region Network is based at the Center for Urban Ecology and coordinates biological inventories and long-term monitoring of natural resources found within eleven of the National Capital Region parks.



Nine university/research institutions and six federal agencies comprise the Chesapeake Watershed Cooperative Ecosystem Studies Unit (CW CESU; <http://cesu.al.umces.edu>). These partners provide leadership in watershed science and stewardship with special emphasis on the watershed of the Chesapeake Bay.



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