

Southeast Coast Network Inventory & Monitoring Program

National Park Service
U.S. Department of the Interior

Inventory and Monitoring Division
Southeast Coast Network



Wadeable Stream Monitoring Program Summary

Overview

The aquatic communities present in streams are largely controlled by the condition and type of in-stream habitat. These habitats are the product of stream channel morphology and any imposed disturbances (natural or anthropogenic). The structural component of a stream is highly variable and is controlled by geology, slope, geomorphic landforms, and bed and bank material. These components along with climatic and land use history dictate the complexity of the channel, but ultimately the current hydrologic regime will dictate the quantity and quality of habitat available for occupation.

Channel adjustments can lead to altered habitat conditions that may disrupt trophic interactions, impair ecosystem function, and reduce habitat quality. In addition to habitat degradation, substantial lateral adjustments of the stream channel may result in the loss of park land and threaten cultural sites.

Although many of the parks in the Southeast Coast Network contain some relatively pristine terrestrial areas, the streams flowing into and through the parks have and continue to be influenced by upstream conditions and past land use. To determine the influence upstream stressors have on the wadeable streams in SECN parks, it is necessary to monitor the in-stream and riparian habitats of these streams as well as the upstream basin morphology and land cover characteristics that are known to affect streams. Besides providing an understanding of how upstream stressors are influencing channel morphology and habitat conditions within the parks, these data are important baselines from which other resources can be assessed and managed.

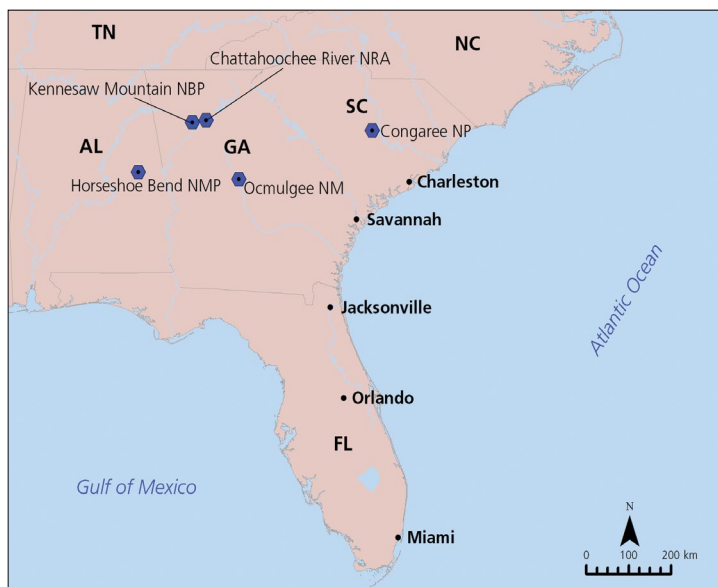
This monitoring effort was developed to provide data that will give park resource managers insight into the status of, and trends in, stream and riparian habitat conditions.

Approach and Objectives

Wadeable streams are narrowly defined as small- to medium-sized, perennially-flowing waterbodies with easily identifiable channel banks that can be accessed and traversed without the use of a watercraft. Sampling locations are perennial stream segments within or bordering park boundaries.

Data are collected from these locations at four spatial scales: basin (the area of land from which water and sediments drain into a stream network); stream segment; stream reach (sampling location within a stream segment), and transect.

Basin- and segment-scale metrics will be determined for all sampling locations during the first year of protocol implementation and then updated no less than once every nine years for the geomorphic characteristics and



The network has initiated wadeable stream monitoring at five SECN parks.

once every six years for the land use/land cover characteristics. All other data collection will occur once every three years during summer.

Monitoring objectives for the wadeable stream program include:

- Determine the status of and trends in watershed characteristics that are known to affect stream habitat;
- Determine the status of and trends in active and inactive channel features and geomorphic dimensions of wadeable streams; and
- Determine the status of and trends in physical measures of benthic and riparian habitat features present in the selected stream reaches.

In addition to these monitoring objectives, the data collected under this effort will allow the wadeable stream resources within SECN parks to be broadly summarized and compared to streams surveyed by other organizations, highlighting similarities and differences in these resources as they relate to general stream habitat and geomorphic conditions.

The full data set and metadata will be available from the NPS data store at the Integrated Resource Management Applications portal (<https://irma.nps.gov/App/Portal/Home>).

Measures Used for Analyses

Basin Characteristics

Basin characteristics are important for interpreting stream and river channel conditions and include both basin morphometry and land use and land cover characteristics. Basin morphometry is most useful for the tributary streams not heavily influenced by anthropogenic stressors (suburban development and increased impervious area).

Measures: Drainage area, total stream length, drainage density, basin length, basin shape, average slope, standard deviation of slope, basin relief, basin relief ratio, standard deviation of elevation, entire stream gradient, and bifurcation ratio, land use/land cover, segment gradient, and Strahler stream order.

Geomorphic Dimensions

The geomorphic dimensions of the selected stream reaches are measured to develop an understanding of the natural range of variability of similar sized streams within and between park units. Understanding the variability in channel morphology between the study reaches helps determine which reaches are negatively impacted by upstream land use and land cover and provide an understanding of long-term trajectories of change along each stream reach.

Measures: Longitudinal profile (channel slope), reach sinuosity, bearing sinuosity, thalweg sinuosity, bankfull area, bankfull perimeter, bankfull hydraulic radius, bankfull width, bankfull depth, bankfull width to depth ratio, channel-full area, channel-full perimeter, channel-full hydraulic radius, channel-full width, channel-full depth, channel-full width to depth ratio, wetted width, active channel width, bankfull width, channel full width, floodplain width, thalweg position, thalweg depth, in-channel features, bankfull height, channel full height, bank undercut depth, bank undercut height, bank angle, bank sediment, bank erosion (presence and type), and bank stability index.

About the Southeast Coast Network

In 1999, the National Park Service initiated a long-term ecological monitoring program, known as “Vital Signs Monitoring,” to provide the minimum infrastructure to allow more than 270 national park system units to identify and implement long-term monitoring of their highest-priority measurements of resource condition. The overarching purpose of natural resource monitoring in parks is to develop scientifically sound information on the status and long-term trends in the composition, structure, and function of park ecosystems and to determine how well current management practices are sustaining those ecosystems.

The NPS Vital Signs Monitoring Program addresses five goals for all parks with significant natural resources:

1. Determine the status and trends in selected indicators of the condition of park ecosystems,
2. Provide early warning of abnormal conditions,
3. Provide data to better understand the dynamic nature and condition of park ecosystems,
4. Provide data to meet certain legal and congressional mandates, and
5. Provide a means of measuring progress toward performance goals.

The Southeast Coast Network includes 20 parks, 17 of which contain significant and diverse natural resources. In total, SECN parks encompass



Monitoring stream conditions at Horseshoe Bend National Military Park.

Habitat Measures

The habitat features that are measured as part of this protocol were chosen to provide an understanding of the habitats that are available for colonization by benthic invertebrates within each stream reach. Habitat measures selected for this protocol focus on inventorying large woody debris and bed sediment within each reach. These components of habitat have been shown to be highly influential in the distribution and character of biota within a stream (Allan 1995). These data will also facilitate future complementary studies that can focus on the other physical factors (e.g., current, temperature, and oxygen) that influence biotic assemblages.

Measures: Large woody debris amount, volume, position and function, bed material (pebble count), distribution of geomorphic channel units, canopy closure, dominant particle size, dominant habitat, vegetative cover, and ground cover.

more than 184,000 acres of federally-managed land across North Carolina, South Carolina, Georgia, Alabama, and Florida. The parks span a wide diversity of cultural and natural resource missions, as they include four national seashores, two national historic sites, two national memorials, seven national monuments, and two national military parks, as well as a national recreation area, a national battlefield, and an ecological and historic preserve. The park units range in size from slightly more than 20 to nearly 60,000 acres, and, when considered with non-federal lands jointly managed with NPS, the Southeast Coast Network encompasses more than 253,000 acres.

For More Information

SECN Home Page:

<http://science.nature.nps.gov/im/units/secn/index.cfm>

About the NPS Inventory & Monitoring Division:

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

Data Downloads via the Natural Resource Information Portal:

<http://irma.nps.gov>

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