Horseshoe Bend National Military Park

National Park Service
U.S. Department of the Interior

Inventory & Monitoring Program
Southeast Coast Network

Resource Brief: Amphibian Community Monitoring, 2011

Vital Sign Overview

Amphibian communities of the Southeast Coast Network (SECN) are monitored because of their global importance as ecological indicators, documented population declines and extinctions, and their high level of diversity in the Southeast. With an estimated 140 amphibian species, the Southeast accounts for about half of the total number of amphibians in the U.S.

The SECN has 61 known amphibian species: 26 in Caudata (salamanders, newts, amphiumas, sirens), and 35 in Anura (frogs and toads). Because of their complex life histories, habitat requirements, anatomy, and physiology, amphibians are considered to be good indicators of changes in ecosystem conditions as they are affected by climate change, land use development and conversion, contaminants, and changes in hydrology.

Significant Findings

We detected 135 vocalizations from 13 anuran species using automated recording devices (ARDs).

We documented 61 post-metamorphic amphibians in 15 taxa (species, family, or genus) and 324 larval stage amphibians in two taxa during visual encounter surveys (VESs).

Fowler's toad (*Anaxyrus fowleri*) (Figure 1) and spring peeper (*Pseudacris crucifer*) had the highest frequency of occurrence.

Spring peeper and Cope's gray treefrog (*Hyla chrysoscelis*) had the highest relative detection frequency of vocalizations on the ARDs, while Fowler's toad had the highest relative abundance during VESs.

Fowler's toad, spring peeper, and Southern leopard frog were the most widely-distributed amphibians.

Squirrel treefrog (*Hyla squirella*) and spotted dusky salamander (*Desmognathus conanti*) were added to the park species list. No non-native species were found.



Figure 1. Fowler's toad (*Anaxyrus fowleri*) at Horseshoe Bend National Military Park. Photo by Briana Smrekar.

Sampling Effort

Data were collected at 30 spatially-balanced random locations (Figure 2) using a combination of ARDs and VESs.

Auditory recordings were collected at the park from 3/11/2011 through 5/31/2011. Visual surveys were conducted from 8/2/2011 through 8/18/2011.

Analysis of data collected indicates that current sample size is sufficient to characterize amphibian diversity.

This monitoring protocol was implemented again at the park in 2012. Monitoring activities are next scheduled for 2016.

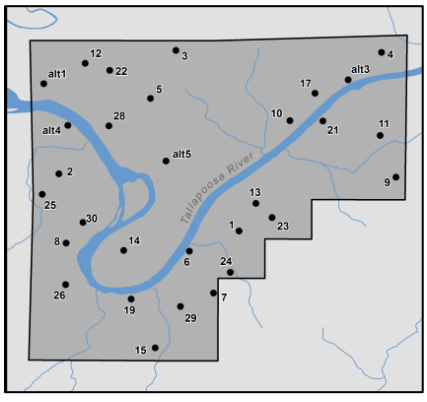


Figure 2. Spatially-balanced sampling locations at Horseshoe Bend National Military Park, 2011.

Monitoring Techniques

Determining the species that are present at a site can provide a great deal of insight to the condition of that location. Surveying for an elusive species, however, can be challenging and a single visit to a site cannot determine a species' true presence or absence. Further, weather variables such as temperature, precipitation, and humidity play a crucial role in whether or not an Anuran will call or if a salamander emerges from its below-ground residence. Therefore, a comprehensive approach is necessary to ensure a site is adequately characterized.

Two techniques are used to monitor amphibians, an automated recording device and a visual encounter survey. Since most vocal anurans (i.e., frogs and toads that vocalize) call at night, monitoring these species can be challenging. Often times, personnel need to work through the night and this not only presents several safety concerns but also can be expensive. The ARD was deployed for 77 days and programmed to record at specific intervals throughout the evening, night, and morning; times when we know anurans are most likely to call. When viewed in specialized software, Anuran calls display unique patterns that can be identified through an automated process. A VES is a time-constrained survey where the site is manually searched for amphibians (particularly species that do not vocalize like salamanders), including throughout the vegetation, under logs, leaves, rocks, and other cover objects. The VESs were conducted once at each sample site. Each sample site is 0.5 ha (~ 1acre).

About the Southeast Coast Network

The Southeast Coast Network (SECN) includes 20 parks, 17 of which contain significant and diverse natural resources (Figure 3). In total, SECN parks encompass 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 missions also, including four national seashores, two national historic sites, two national memorials, seven national monuments, two national military parks, as well as a national recreation area, national battlefield and an ecological and historic preserve. The parks 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 Network encompasses more than 253,000 acres.

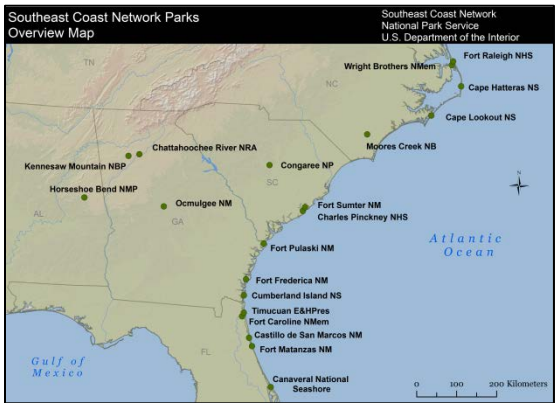


Figure 3. Locations of parks within the Southeast Coast Network.

About the Inventory & Monitoring Program

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 current 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:

- Determine the status and trends in selected indicators of the condition of park ecosystem,
- Provide early warning of abnormal conditions,
- Provide data to better understand the dynamic nature and condition of park ecosystems,
- Provide data to meet certain legal and Congressional mandates, and
- Provide a means of measuring progress towards performance goals.

For More Information

SECN Home Page: http://science.nature.nps.gov/im/units/secn/index.cfm

SECN Reports & Publications: http://science.nature.nps.gov/im/units/SECN/publications.cfm

Inventory & Monitoring Program: http://science.nature.nps.gov/im/index.cfm

Data Downloads via the Natural Resource Information Portal: http://nrinfo.nps.gov/Home.mvc

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