



Water Quality Summary, Fiscal Year 2017

Overview

The Cumberland Piedmont Network Inventory and Monitoring Program (CUPN) began long-term water-quality monitoring at Ninety Six National Historic Site in fiscal year 2004. Water quality is measured quarterly on alternate years at four sites. The sites include Star Fort Lake, Tolbert Branch, and the east and west boundary crossings of Henley Creek. Based upon program requirements and findings of the water-quality inventory, a set of parameters was chosen for long-term monitoring. Parameters include the field measures of water temperature, specific conductance (SpC), pH, and dissolved oxygen (DO). Samples were also collected for analysis for *Escherichia coli* (*E. coli*).

This brief summarizes data collected from October 1, 2016 through September 30, 2017 (FY17). Water-quality data are available upon request to the Cumberland Piedmont Network.



Figure 1. Tolbert Creek at West Boundary, February 8, 2017. Image by Johnathan Jernigan.

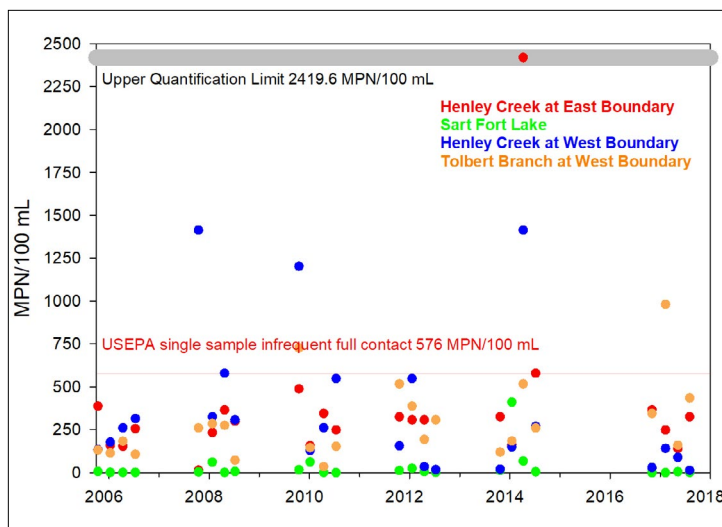


Figure 2. *E. coli* at Ninety Six National Historical Site FY06-FY17. Elevated *E. coli* is common to the stream of Ninety Six National Historical Site. Agricultural runoff is the likely source.

Significant Findings

Highlights of Fiscal Year 2017 Monitoring

Water-quality standards were exceeded five times in FY17 including the upper pH limit twice at Star Fort Lake; dissolved oxygen twice at Henley Creek where it enters the western boundary of the park; and *E. coli* once at Tolbert Branch (Figure 1) where it enters the western boundary of the park.

Elevated pH (above the state standard of 9.0) in Star Fort Lake is common during warmer weather. The likely cause of the increased pH is a product of photo-synthesis of algae in the lake. If photosynthesis consumes more CO₂ than can be atmospherically in-gassed into the lake the end result is the production of hydroxyl ions which raise the pH. Low flows were attributed to depressed DO at the Henley Creek site, which was below the state standard of 4.0 mg/L. *E. coli* exceeded the EPA single sample for infrequent recreational contact standard of 576 MPN per 100 mL at Tolbert Branch. Most Probable Number (MPN) is a statistical method of estimating bacteria colony density. Elevated *E. coli* at Tolbert Branch and Henley Creek (Figure 2) is common as these streams drain agricultural land (livestock) before they enter the park. The lake was three degrees above the state limit of 32.2°C during the July sample.

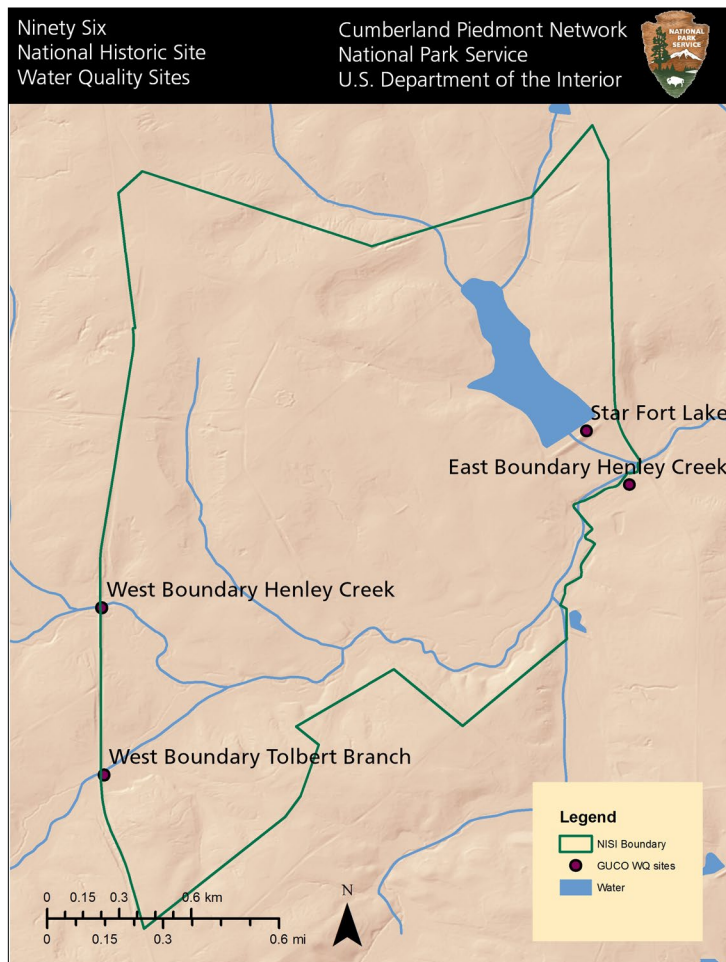
Water Quality Standards

All Ninety Six National Historical Site waters are considered “South Carolina Outstanding Resource Waters,” the highest standards under the Clean Water Act as promulgated by the state. The state currently does not impose a standard for *Escherichia coli* bacteria so we have adapted the USEPA recommendations for “Single Sample Infrequently Used Full Contact Recreation.” Acid Neutralizing Capacity (ANC) and Specific Conductance (SpC) are without state standards or federal guidelines. These parameters are useful in interpreting water quality.

Parameter	Standard
Water temperature	Less than 32.2°C
Dissolved oxygen	Greater than 4.0 mg/L
pH	Between 6.0 and 8.5 SU
<i>Escherichia coli</i>	Less than 576 MPN/100 mL
Specific conductance	No standard
ANC	No standard

Future Monitoring

Water-quality sampling is scheduled to resume in fiscal year 2019.



Water-quality monitoring sites at Ninety Six National Historic Site in FY 2017.

About the Cumberland Piedmont 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 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.

Effective long-term management and stewardship of natural resources in the Cumberland Piedmont Network begins with baseline knowledge of these resources. To acquire this knowledge, an inventory program was established by the National Park Service with the goals of acquiring baseline information for a variety of resources, from bibliographic information to species occurrence and distribution.

For More Information

CUPN Home Page:

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

CUPN Reports & Publications:

<http://science.nature.nps.gov/im/units/CUPN/publications.cfm>

About the NPS Inventory & Monitoring Program:

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

Data Downloads via the Natural Resource Information Portal:

<http://irma.nps.gov>