



Water Quality Monitoring, Fiscal Year 2025

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 (FY04). Water quality is measured quarterly in alternate years at four sites: Star Fort Lake (STFL), the west boundary of Tolbert Branch (WBTB) and the east (EBHC) and west (WBHC) boundary crossings of Henley Creek (see map on page 2). Based upon program requirements and findings of the water quality inventory, a set of parameters was chosen for long-term monitoring. These include field measures of water temperature, specific conductance, pH, and dissolved oxygen (see Table 1 on page 2). Samples were also collected for laboratory analysis of *Escherichia coli* (*E. coli*).

This brief summarizes data collected from April 2004 through August 2025, highlighting November 5, 2024, through August 5, 2025 (the spring sampling event was canceled due to travel restrictions). Water quality data are available upon request to the Cumberland Piedmont Network.

Significant Findings

Due to travel restrictions, the spring sampling event was canceled, leaving only three samples to comprise the FY25 effort. There were five violations of state water quality standards in FY25. There was one occurrence of pH exceeding the state upper limit of 8.5 SU in November 2024 at Star Fort Lake at 9.44 SU. Standard units (SU) is a standardized way to express acidity or alkalinity of water. It is not uncommon to see elevated pH levels in this lake, as annual algal blooms can consume dissolved carbon dioxide, causing an increase in pH.

There was a single record of dissolved oxygen at 3.9 mg/L, just under the state limit of 4.0 mg/L, at Star Fort Lake in August 2025 (Figure 1). There were three violations of the EPA recommended single sample infrequent use full contact *E. coli* standard of 576 MPN/100 mL (Figure 2). Most Probable Number (MPN) is a statistical method of estimating bacteria colony density. Two high values were found at both Henley Creek sites in August 2025 during a flood event and again at the West Boundary Henley Creek site in November 2024 during high flow. These elevated bacteria values are associated with non-point source contaminants from adjacent private lands.

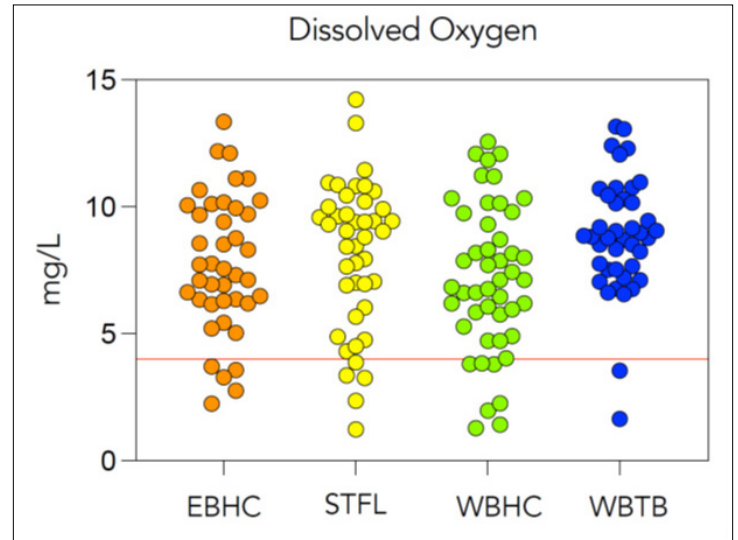


Figure 1. Dissolved oxygen at Ninety Six National Historic Site, April 2004 through August 2025. The red line denotes the South Carolina dissolved oxygen standard of 4 mg/L. Dissolved oxygen levels are generally good with exception of occasional depressed oxygen during low flow.

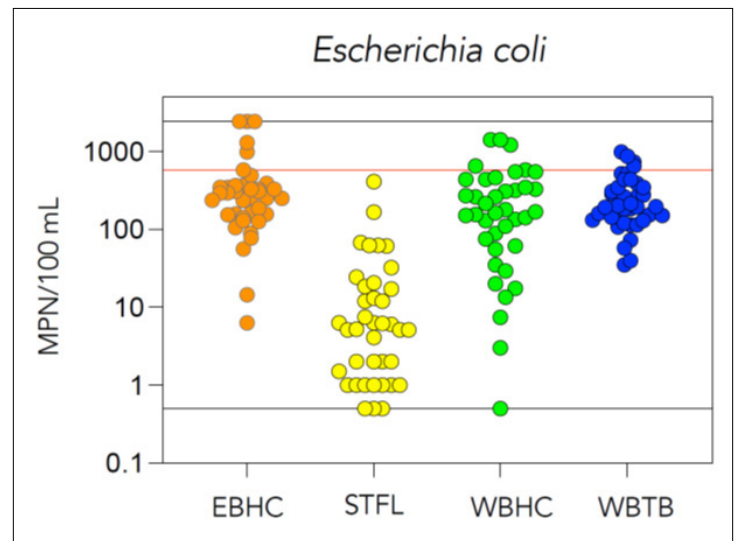


Figure 2. *E. coli* at Ninety Six National Historic Site, April 2004 through August 2025. The red line represents the EPA single sample limit of 576 MPN/100 mL for infrequent use recreational contact. The lower black line is set at 0.5 and represents values below the detection limit of 1 MPN/100 mL. Likewise, the upper black line is set at 2420 MPN/100 mL, representing all values above the detection limit. High flow conditions are typified by high bacteria levels.

Water Quality Standards

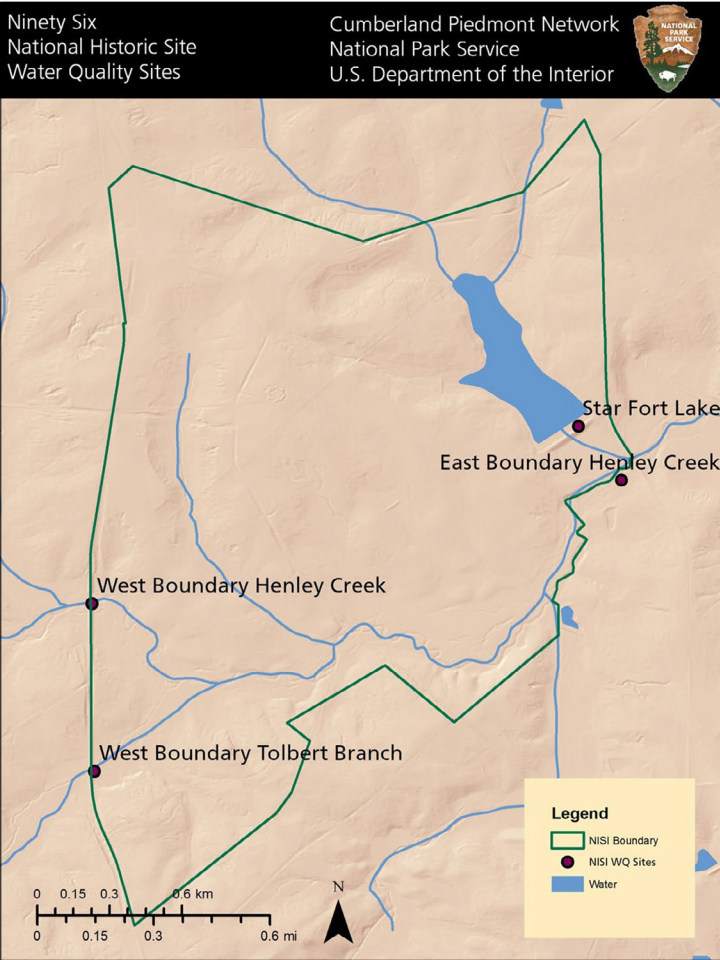
All park waters are considered “South Carolina Outstanding Resource Waters,” the highest standards under the Clean Water Act as promulgated by the state. South Carolina does not impose a standard for *E. coli*, so we have adapted the EPA recommendations for “Single Sample Infrequently Used Full Contact Recreation” standard of 576 MPN/100 mL. Specific conductance (SpC) is without a state standard or federal guidelines but is useful for interpreting water quality results.

Table 1. Parameters and Standards.

Parameter	Standard
Water temperature	Less than 32.2°C (90°F)
Dissolved oxygen	Greater than 4.0 mg/L
pH	Between 6.0 and 8.5 SU
<i>E. coli</i>	Less than 576 MPN/100 mL
Specific conductance	No standard

Future Monitoring

Water quality sampling is scheduled to resume in FY2027.



Water-quality monitoring sites at Ninety Six National Historic Site in FY 2025.



Henley Creek East Boundary (EBHC) on November 5, 2024. Notice high flow conditions that typically bring elevated *E. coli* to park waters. Photo by Johnathan Jernigan.

About the Cumberland Piedmont Network

In 1999 the National Park Service initiated a long-term ecological monitoring program in over 280 National Park Service units. This program monitors fundamental elements and processes in park ecosystems that help indicate the overall health or condition of park resources. Data generated from this program allow us to better understand natural processes and the results of management actions and help guide parks in the successful protection and use of park resources. Information gathered is shared widely as Network staff produce technical reports, resource briefs, and journal publications.

The Cumberland Piedmont Network, one of 32 networks across the country, includes 14 parks that share geographic proximity and common natural resources. Parks within each of the networks work together to plan, design, and conduct inventories and long-term monitoring. The Cumberland Piedmont Network provides long-term monitoring for water quality, cave bats, crickets and meteorology, Allegheny woodrats, forest vegetation, ozone foliar damage, and invasive species.

For More Information

CUPN Home Page:

<https://www.nps.gov/im/cupn/index.htm>

CUPN Reports & Publications:

<https://www.nps.gov/im/cupn/reports-publications.htm>

About the NPS Inventory & Monitoring Program:

<https://www.nps.gov/im/index.htm>

Data Downloads via the Natural Resource Information Portal:

<https://irma.nps.gov/Portal/>

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