



Water Quality Summary, Fiscal Year 2017

Overview

The Cumberland Piedmont Network Inventory and Monitoring Program began long-term water-quality monitoring at Chickamauga and Chattanooga National Military Park in fiscal year 2003.

Water quality is measured every month over a two-year period followed by a five-year hiatus (concordant with the U.S. Geological Survey's national long-term water-quality program). Eight sites are monitored at the park. Six sites in Georgia including West Chickamauga Creek, Black Branch, Cave Spring, Skyuka Spring, Jackson Spring and Lookout Creek; and two in Tennessee including Rock Spring and Gum Spring monitoring at Black Branch (the latter beginning in October 2015). 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*) and acid neutralizing capacity (ANC).

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.

Significant Findings

Highlights of Fiscal Year 2017 Monitoring

There were three violations of *E. coli* standards documented during FY17. The state of Georgia standard of a single sample of 576 MPN/100mL was exceeded twice at West Chickamauga Creek, and once at Cave Spring. Most Probable Number (MPN) is a statistical method of estimating bacteria colony density. In both cases at West Chickamauga Creek, elevated *E. coli* value was associated with runoff from a rainfall event. This is indicative of non-point sources as animal waste is held in storage on the land surface until it is washed into streams during rainfall events. Cave Spring exceeded the standard once. The spring was not flowing at the time and was likely used by wildlife as a water source during this dry period of the year.

Dissolved oxygen was below the Georgia state standard of 4.0 mg/L four times; twice at Cave spring, and once each at Black Branch and West Chickamauga Creek (Figure 1). Cave Spring and Black

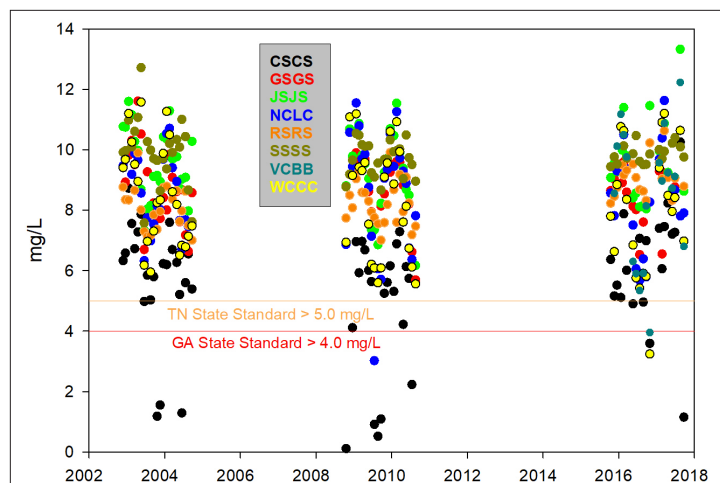


Figure 1. Dissolved Oxygen at Chickamauga-Chattanooga National Military Park (CSCS-Cave Spring, GSGS-Gum Spring, JSJS-Jackson Spring, NCLC-Lookout Creek, RSRs-Rock Spring, SSSS-Skuka Spring, VCBB-Black Branch, WCCC-West Chickamauga Creek). Dissolved oxygen concentrations are typically above state standards except at Cave Spring, when flow stops; and at Lookout and West Chickamauga Creeks, during drought.

Branch were not flowing during low DO measurements, and West Chickamauga Creek had low flow. Both conditions are associated with depressed DO.

The upper Georgia pH limit of 8.5 was marginally surpassed at Lookout Creek twice; 8.74 on February 22, 2017 and 8.53 on March 16, 2017. No obvious cause was found for slightly high pH values in this well-buffered stream (Figure 2).



Figure 2. Lookout Creek, December 15, 2016. Image by Jeff Duncan.

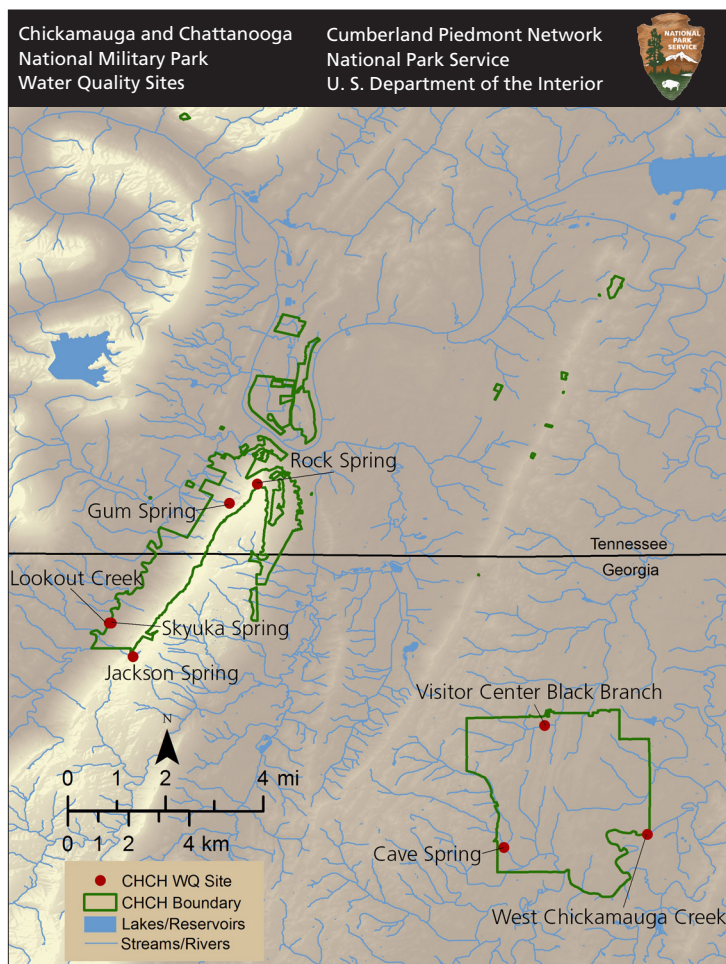
Water Quality Standards

Park waters are assigned specific state standards based upon designated uses. Georgia currently has standards for fecal coliform, but does not recognize *E. coli* specifically. Therefore, based on the lack of recreational use, we have adopted the USEPA recommendations for “Single Sample Infrequently Used Full Contact Recreation” standard of 576 MPN/100mL.

Parameter	Standard
Water temperature	Georgia—Less than 32.2°C Tennessee—Less than 30.5°C
Dissolved oxygen	Georgia—Greater than 4.0 mg/L Tennessee—Greater than 4.0 mg/L
pH	Georgia—Between 6.0 and 8.5 SU Tennessee—Between 6.0 and 9.0 SU
<i>Escherichia coli</i>	Georgia—Less than 576 MPN/100 mL Tennessee—Less than 487 MPN/100 mL
Specific conductance	No standard, Georgia or Tennessee
ANC	No standard, Georgia or Tennessee

Future Monitoring

Water-quality sampling will resume in fiscal year 2023.



Water-quality monitoring sites at Chickamauga and Chattanooga National Military Park 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>