

Chickamauga and Chattanooga National Military Park

National Park Service
U.S. Department of the Interior

Inventory and Monitoring Division
Cumberland Piedmont Network



Water Quality Summary, Fiscal Year 2016

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 US Geological Survey's national long-term water quality program). Eight sites are monitored at the park: six sites in Georgia (West Chickamauga Creek, Black Branch, Cave Spring, Skyuka Spring, Jackson Spring and Lookout Creek); and two in Tennessee (Rock Spring and Gum Spring). Based upon program requirements and findings of the water-quality inventory, a set of parameters was chosen for long-term monitoring. These 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 1 October 2015 through 30 September 2016. Water quality data are available upon request to the Cumberland Piedmont Network. See <http://science.nature.nps.gov/im/units/cupn/about.cfm> for more information.



Figure 1. Black Branch, 18 February 2016. Image by Joe Meiman.

Significant Findings

Highlights of Fiscal Year 2016 Monitoring

There were ten violations of *E. coli* standards documented during FY16. The state standard of a single sample exceeding

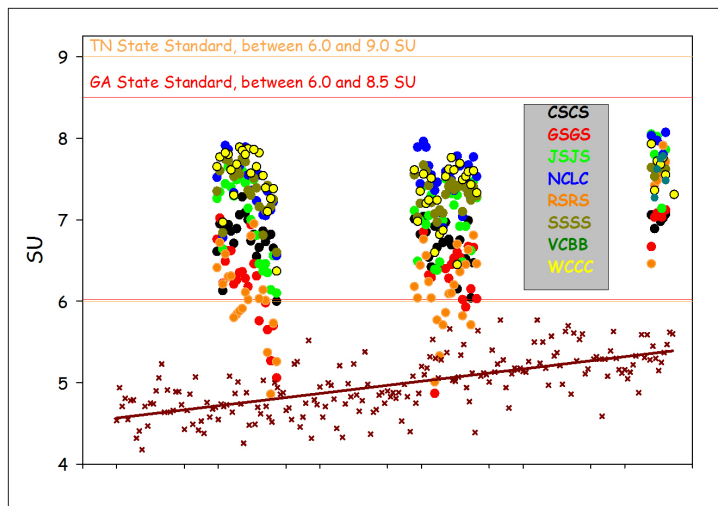


Figure 2. pH at Chickamauga-Chattanooga National Military Park and the National Atmospheric Deposition Program site AL99, 2000 through 2016 (CSCS—Cave Spring, GSGS—Gum Spring, JSJS—Jackson Spring, NCLC—Lookout Creek, RSRs—Rock Spring, SSSS—Skyuka Spring, VCBB—Black Branch, WCCC—West Chickamauga Creek).

576 MPN/100mL in Georgia or 487 MPN/100mL in Tennessee was exceeded four times at West Chickamauga Creek, twice each at Gum Spring and Black Branch, and once each at Cave Spring and Lookout Creek. Most Probable Number (MPN) is a statistical method of estimating bacteria colony density. In all cases, with the exception of Gum Spring, each 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. On one occasion Gum Spring exceeded the Tennessee standard. The spring was under normal flow conditions and it is likely that recent wildlife use was the cause of high *E. coli*. Gum Spring attracts wildlife because it is a rare source of surface water on the northwest side of Lookout Mountain.

The National Atmospheric Deposition Program began routine monitoring at Sand Mountain Alabama (NTN Site AL99), approximately 60 miles west of the park, in 1984. Average monthly wet deposition pH from the Sand Mountain station is plotted with pH of the CHCH water quality sites in Figure 2. When a least-square regression (a line that best fits the data) is plotted through the monthly atmospheric pH data a significant upward trend in pH is shown (Figure 2). Note that pH of the more acidic springs at CHCH (Jackson [JSJS], Gum Spring[GSGS], and Rock Spring [RSRS]) has also increased over this same time span.

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 continue throughout fiscal year 2017.

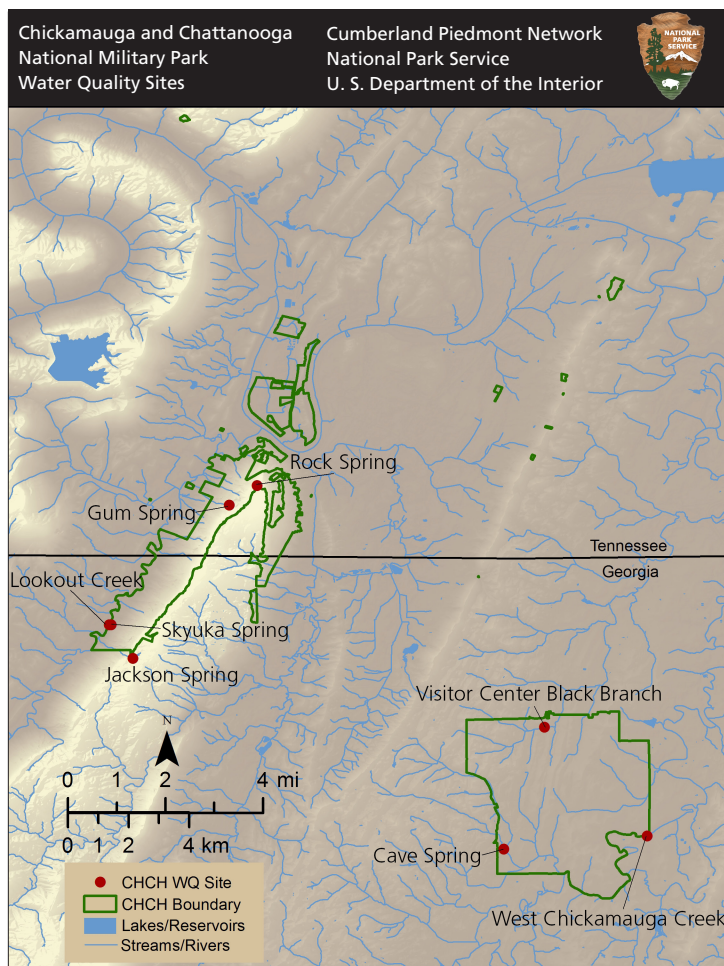


Figure 3. Water-quality monitoring sites at Chickamauga and Chattanooga National Military Park in FY 2016.

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>