



Water Quality Summary, Fiscal Year 2019

Overview

The Cumberland Piedmont Network (CUPN) began long-term monitoring of water quality at Shiloh National Military Park (SHIL) in fiscal year 2004 (October 2003 through September 2004). Water quality is measured monthly for two years at nine sites: Owl Creek, Tilghman, Shiloh, and Upper and Lower Dill Branches, Rhea and Shiloh Springs and the Tennessee River at Pittsburg Landing (see map and Figure 1). The Lick Creek site was added in FY19 following acquisition of new land. Two years of monthly sampling is followed by five years of inactivity, a schedule based on the United States Geologic Survey national water quality program. Based upon program requirements and findings of the water quality inventory, parameters were chosen for long-term monitoring, including the field measures of water temperature, specific conductance (SpC), pH, flow, and dissolved oxygen (DO). Samples were collected for analysis for *Escherichia coli* (*E. coli*).

This brief summarizes data collected from October 1, 2018 through September 30, 2019 (FY19). Water quality data are available upon request to the Cumberland Piedmont Network.



Figure 1. Tilghman Branch, February 21, 2019. Image by Marcus Johnson.

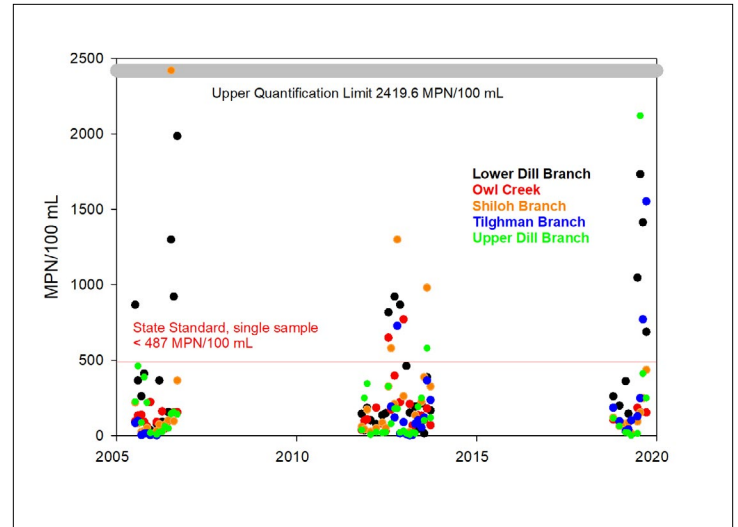


Figure 2. *E. coli* at Shiloh National Military Park FY05–FY19. Shown above are only park waters that have exceeded the state standard of 487 MPN/100 mL. High *E. coli* can occur following runoff-producing rainfall or at times of low flow when wildlife frequent these limited water sources during drought.

Significant Findings

Highlights of Fiscal Year 2019 Monitoring

Nine violations of state water-quality standards were recorded in FY19. The *E. coli* limit of 487 MPN/100 mL limit was exceeded seven times; four times at Lower Dill Branch, twice at Tilghman Branch and once at Upper Dill Branch (Figure 2). MPN, or Most Probable Number, is a statistical method of estimating bacteria colony density. Typically, elevated *E. coli* occur during high flow caused by runoff-producing rainfall. Flow during each of the high *E. coli* samples were either normal or low, and all occurred from August through September. It is likely that during times of low flow, wildlife are drawn to these rare sources of water as there are no other sources in these park-managed watersheds.

One violation of water temperature was recorded in the Tennessee River at Pittsburg Landing. On August 15, 2019 water temperature was found to be 30.6°C, 0.1°C above the state standard. There were an additional 19 apparent violations of the lower pH standard of 6.0; nine times at Rhea Spring and ten times at Shiloh Spring. Low pH at these springs have been documented to be a natural condition and thus are not actual violations of water-quality standards. The January sample was canceled due to the lapse of federal funds.

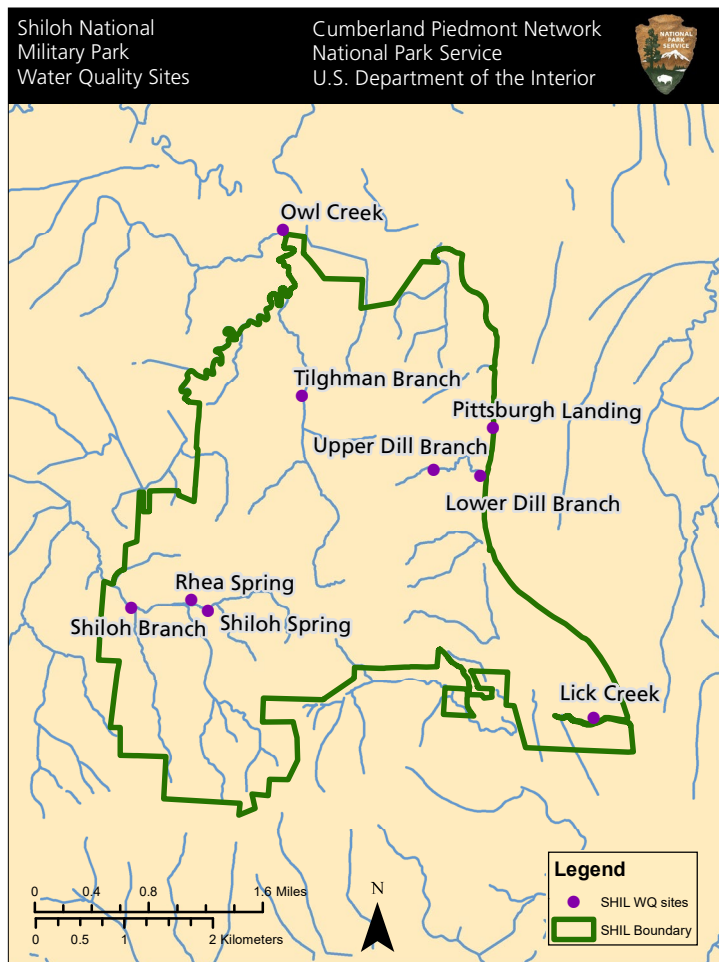
Water Quality Standards

All park waters are designated as “Fish and Wildlife” under the Clean Water Act as promulgated by the state of Tennessee, with exception of the Tennessee River, which is classified as “Recreational.” The Cumberland Piedmont Network uses the Tennessee Recreational standard for *E. coli*, 487MPN/100 mL. There are no state or federal standards for SpC or flow but they are useful in interpreting water quality results.

Parameter	Standard
Water Temperature	Less than 30.5°C
Dissolved Oxygen	Greater than 5.0 mg/L
Flow	No standard
pH	Between 6.0 and 8.5 SU
<i>Escherichia coli</i>	Less than 478 MPN/100 mL
SpC	No standard

Future Monitoring

Water quality sampling continues through fiscal year 2020.



Water-quality monitoring sites at Shiloh National Military Park in FY 2019.

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://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:

<http://irma.nps.gov>