

Fort Donelson National Battlefield

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 Inventory and Monitoring Network began long-term water-quality monitoring at Fort Donelson National Battlefield in fiscal year 2004. Water quality is measured quarterly on alternate years at five sites: Lake Barkley at the overlook, Hickman and Indian Creek Embayments, Hickman Spring, and Indian Creek at Graves Battery. While the park is nearly surrounded by water (the spillway elevation of the Lake Barkley Dam defines the boundary along the US Army Corps of Engineers operated lake), Hickman Spring and Indian Creek at Graves Battery are the only perennial waters within the boundaries of the park. We consider it efficient to monitor adjacent waters due to their immediate aesthetic importance while collecting park waters. Based upon program requirements and findings of the water quality inventory, a set of parameters was chosen for long-term monitoring; including 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 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. Hickman Creek Embayment, 9 May 2016. Image by Brenda Wells.

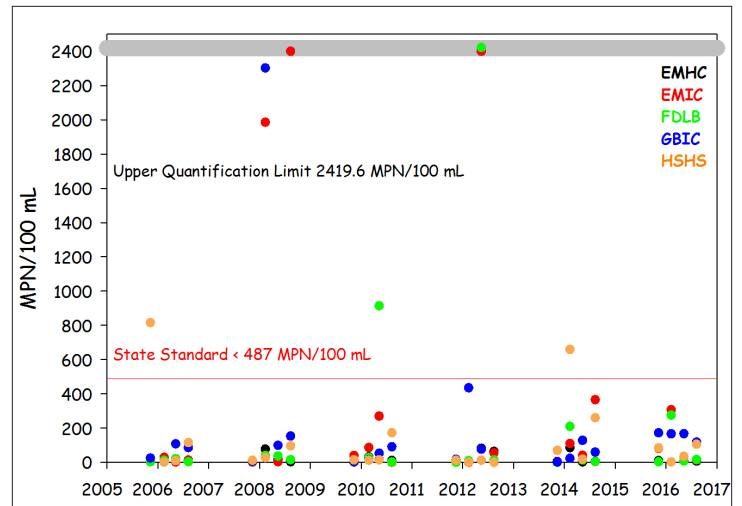


Figure 2. *E. coli* at Fort Donelson National Battlefield FY04-FY16 (EMHC—Hickman Creek Embayment, EMIC—Indian Creek Embayment, FDLB—Lake Barkley, GBIC—Indian Creek at Graves Battery, HSHS—Hickman Spring).

Significant Findings

Highlights of Fiscal Year 2016 Monitoring

There was one apparent violation of the state dissolved oxygen standard of greater than 5.0 mg/L. On 13 November 2015, Hickman Spring had dissolved oxygen of 3.0 mg/L. This violation of the standard is due to natural conditions as flow from the spring had ceased, leaving a series of disconnected pools.

For the first time in our monitoring of park waters there were no violations of the state *E. coli* standard of less than 487 MPN/100mL (Figure 2). Most Probable Number (MPN) is a statistical method of estimating bacteria colony density. This does not necessarily mean that water quality is improving; it is more likely a result of quarterly sampling not coinciding with runoff producing rainfall events.

Water Quality Standards

All park waters are considered “Exceptional Tennessee Waters.” This designation prohibits discharge and other pollution sources. Criteria are defined as Tennessee’s “Fish & Aquatic Life and Recreational” standards, a combination of the highest standards under the Clean Water Act as promulgated by the state.

Parameter	Standard
Water temperature	Less than 30.5°C
Dissolved oxygen	Greater than 5.0 mg/L
pH	Between 6.0 and 9.0 SU
<i>Escherichia coli</i>	Less than 487 MPN/100 mL
Specific conductance	No standard

Future Monitoring

Water quality sampling is scheduled to resume in fiscal year 2018.

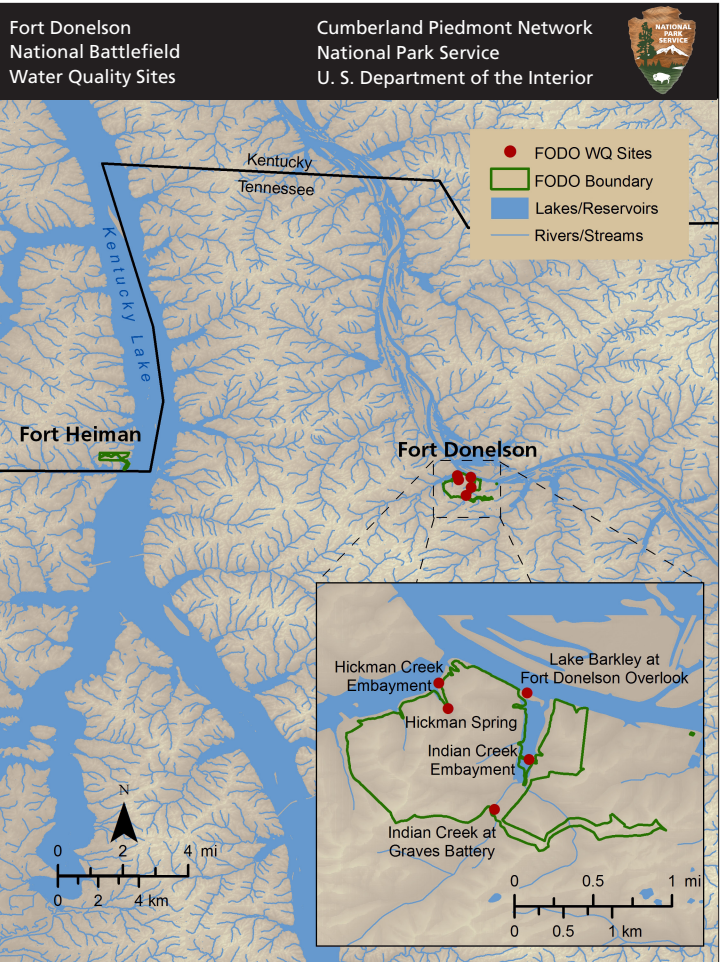


Figure 3. Water-quality monitoring sites at Fort Donelson National Battlefield in FY 2016.

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>