



Water Quality Monitoring, Fiscal Year 2022

Overview

The Cumberland Piedmont Network Inventory and Monitoring Program (CUPN) began long-term water quality monitoring at Abraham Lincoln Birthplace National Historical Park in fiscal year 2004. Water quality is measured every other month on alternate years at four sites (see map on page 2): North Branch of Knob Creek (NBKC), Knob Creek at the Boyhood Home Unit (KCKC), and Sinking Spring at the Birthplace Unit (SSTS). Howell Spring (Birthplace Unit; HSSS) was added in 2016 to give a better understanding of nitrates found at Sinking Spring. Based upon program requirements and findings of the water quality inventory, parameters were chosen for long-term monitoring including water temperature, specific conductance (SpC), pH, and dissolved oxygen (DO). Samples were also analyzed for *Escherichia coli* (*E. coli*) and nitrate.

This brief summarizes data collected from November 17, 2021 through September 17, 2022 (FY22). Water quality data are available upon request to the Cumberland Piedmont Network.

Significant Findings

There was one violation of state standards during FY22. *E. coli* levels at Knob Creek at the Boyhood Home Unit were above state standards for single sample infrequent contact on September 21, 2022 at 727 MPN/100 mL sample (Figure 1).

While still below the EPA recommendations for freshwater aquatic life (90 mg/L) and drinking water (44 mg/L), nitrate concentrations are consistently elevated at Sinking Spring and Howell Spring (Figure 2). In FY22 this trend continued with mean nitrate concentrations of 13.81 mg/L at Howell Spring and 16.75 mg/L at Sinking Spring. Comparatively, mean nitrate concentration at Knob Creek was 3.27 mg/L and 0.51 mg/L at North Branch (Knob Creek).



Sampling sites, Knob Creek at the Boyhood Home Unit (left) and Sinking Spring at the Birthplace Unit (right), in September 2022. Photos by Brenda Wells.

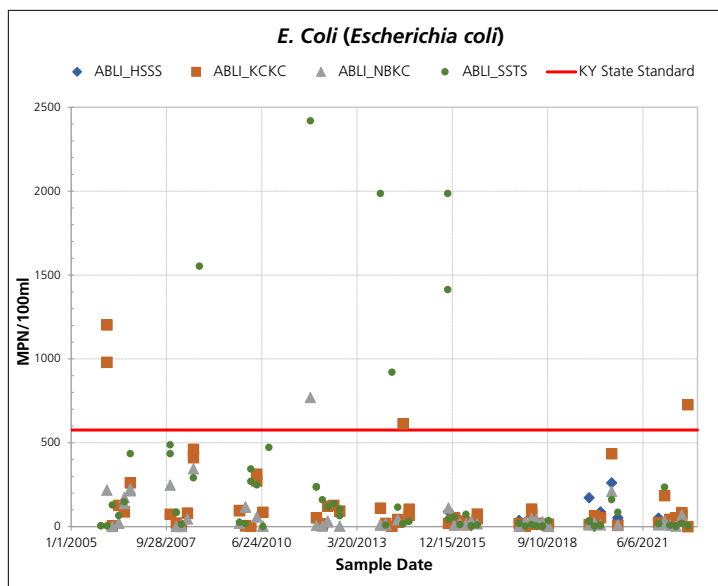


Figure 1. *E. coli* levels at Abraham Lincoln Birthplace NHP from 2005 to 2022. HSSS=Howell Spring at the Birthplace Unit; KCKC=Knob Creek at the Boyhood Home Unit; NBKC=North Branch at Knob Creek; and SSTS=Sinking Spring at the Birthplace Unit.

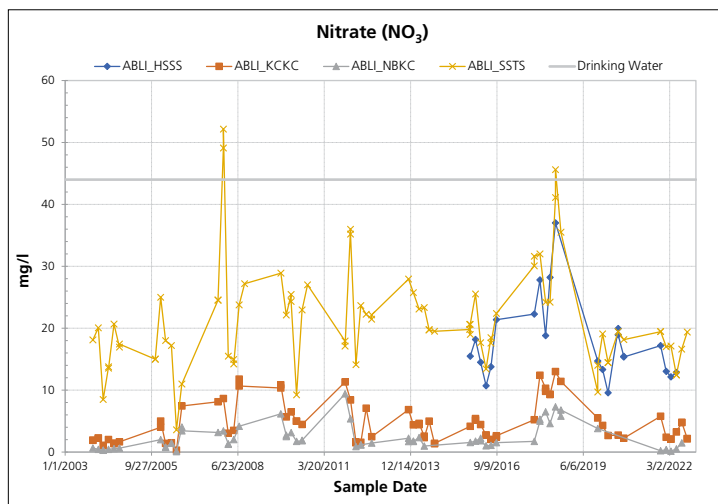


Figure 2. Nitrate concentrations at Abraham Lincoln Birthplace NHP. HSSS=Howell Spring at the Birthplace Unit; KCKC=Knob Creek at the Boyhood Home Unit; NBKC=North Branch at Knob Creek; and SSTS=Sinking Spring at the Birthplace Unit.

Water Quality Standards

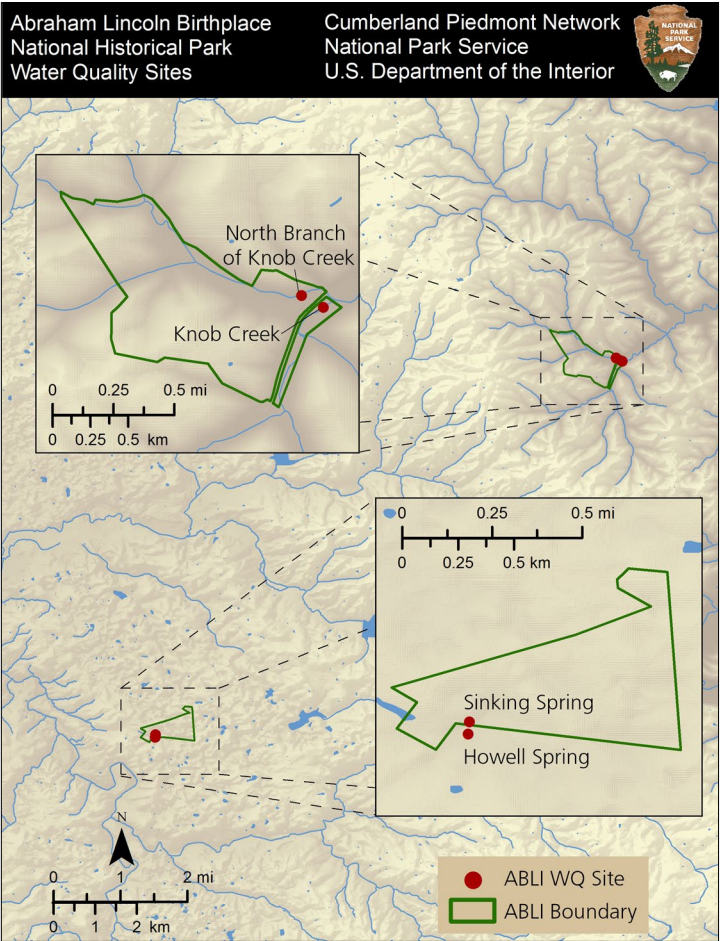
The streams of the Boyhood Home Unit are designated “Warm Water Aquatic Habitat (WW)” while Sinking Spring is classified as “Cold Water Aquatic Habitat (CW).” By virtue of being within a national park unit, all streams are considered “Outstanding Resource Waters.” This designation limits discharges of pollutants within the watersheds. The state currently does not impose a standard for *E. coli* bacteria, so based on the lack of recreational use we have adopted the EPA recommendations for “Single Sample Infrequently Used Full Contact Recreation” of 576 MPN/100 mL. We also use the EPA freshwater aquatic life recommendation for nitrate of 90 mg/L. The state drinking water standard for nitrates is 45 mg/L.

Table 1. Parameters and Standards.

Parameter	Standard
Water temperature	Less than 31.7°C (89.1°F)
Dissolved oxygen	Greater than 4.0 mg/L (warm water) Greater than 5.0 mg/L (cold water)
pH	Between 6.0 and 9.0 SU
<i>Escherichia coli</i>	Less than 576 MPN/100 mL
Specific conductance	No standard
Nitrate	Less than 90 mg/L

Future Monitoring

Water quality sampling is scheduled to resume in fiscal year 2024.



Water-quality monitoring sites at Abraham Lincoln Birthplace National Historical Park in FY 2022.

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:

<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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