



Water Quality Monitoring, Fiscal Year 2023

Overview

The Cumberland Piedmont Network Inventory and Monitoring Program (CUPN) began long-term water quality monitoring at Carl Sandburg Home National Historic Site (CARL) in fiscal year 2003. Sampling occurs quarterly in alternating years. Water quality is measured at four sites: Front Lake (FLFL; Figure 1), Side Lake (SLSL), Mountain Reservoir (MRFL), and Trout Pond Spring (TSSL; see map on page 2). Based upon program requirements and specific park concerns, parameters were chosen for long-term monitoring including water temperature, specific conductance (SpC), pH, and dissolved oxygen (DO). Samples undergo laboratory analysis for *Escherichia coli* (*E. coli*).

This brief summarizes data collected from November 1, 2022 through August 1, 2023 (FY23). Water quality data are available upon request to the Cumberland Piedmont Network.



Figure 1. Front Lake in July 2022 (top) and drained in January 2023 (bottom). Photos by Johnathan Jernigan.

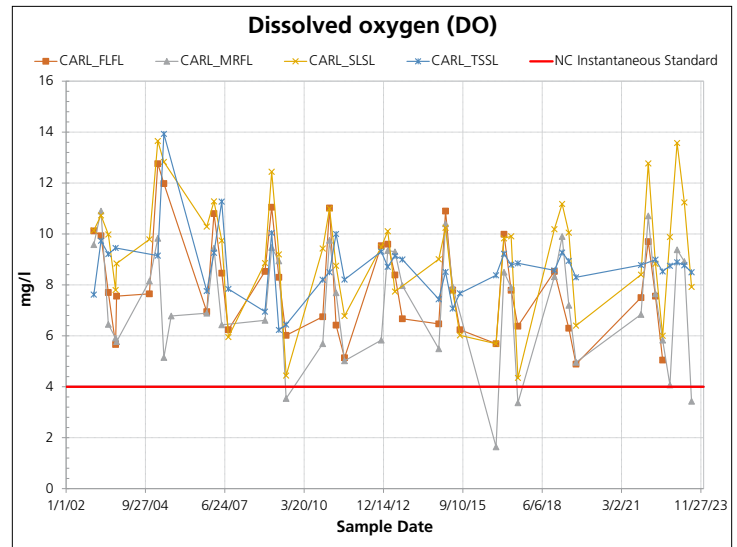


Figure 2. Dissolved oxygen at Carl Sandburg Home National Historic Site FY03–FY23. Red line indicates North Carolina instantaneous water quality standard minimum for dissolved oxygen.

Significant Findings

In FY23 only one sample was collected from Front Lake due to pond drainage from an earthen dam bank failure (Figure 1).

There was one violation of North Carolina's water quality standards in FY23. Dissolved oxygen at Mountain Reservoir was 3.43 mg/l on August 1, 2023, below the North Carolina instantaneous state standard of 4.0 mg/l (Figure 2). On November 1, 2022, dissolved oxygen at Mountain Reservoir was barely above this criteria at 4.07 mg/l.

There were eight apparent violations of North Carolina's lower pH limit of 6.0 SU (standard unit), however, low pH is a natural condition of the waters of Carl Sandburg Home National Historic Site. The granitic bedrock provides no natural buffering and surface water pH is very close to that of the precipitation. North Carolina stipulates that a water body is not in violation if it is a natural condition. There appears to be a slight increase in the pH of park waters since 2002, reflecting a regional trend in precipitation pH as measured at the nearest National Atmospheric Deposition Program (NADP) station NC45 at Mt. Mitchell, North Carolina (57 kilometers [36 miles] to the north). There were no violations of water temperature or *E. coli* in FY2023.

Water Quality Standards

All CARL waters are considered “North Carolina High Quality Waters, WS II and WS IV,” a combination that gives Carl Sandburg Home National Historic Site the highest standards under the Clean Water Act as promulgated by the state of North Carolina. The state currently does not impose a standard for *Escherichia coli* bacteria, so the network adapted the EPA recommendations for “Single Sample Infrequently Used Full Contact Recreation” standard of less than 576 MPN/100 mL. Most Probable Number (MPN) is a statistical method of estimating bacteria colony density. Specific conductance (SpC) is without state standards or federal guidelines. These parameters are useful in interpreting water quality.

Table 1. Parameters and Standards.

Parameter	Standard
Water temperature	Less than 29°C (84.2°F)
Dissolved oxygen	Greater than 4.0 mg/L
pH	Between 6.0 and 9.0 SU
<i>Escherichia coli</i>	Less than 576 MPN/100 mL
Specific conductance	No standard

Future Monitoring

Sampling will resume in FY2025.



Water-quality monitoring sites at Carl Sandburg Home National Historic Site in FY 2023.

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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