



Water Quality Summary, Fiscal Year 2019

Overview

The Cumberland Piedmont Inventory and Monitoring Network began long-term water quality monitoring at Russell Cave National Monument in fiscal year 2004 (October 2003 through September 2004). Water quality is measured monthly for two years at three sites; Ridley Cave, Picnic Entrance and the mouth of Russell Cave (see map and Figure 1). 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 park-specific concerns, parameters were 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*) and nitrate.

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. Ridley Cave, September 11, 2019. Image by Mary Shew

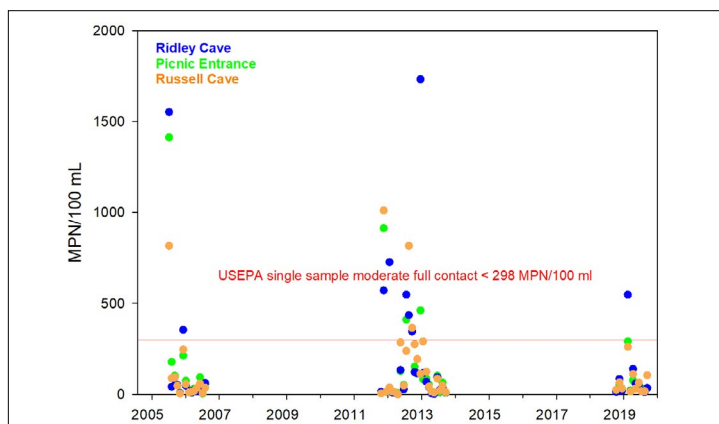


Figure 2. *E. coli* at Russell Cave National Monument FY05–FY19.

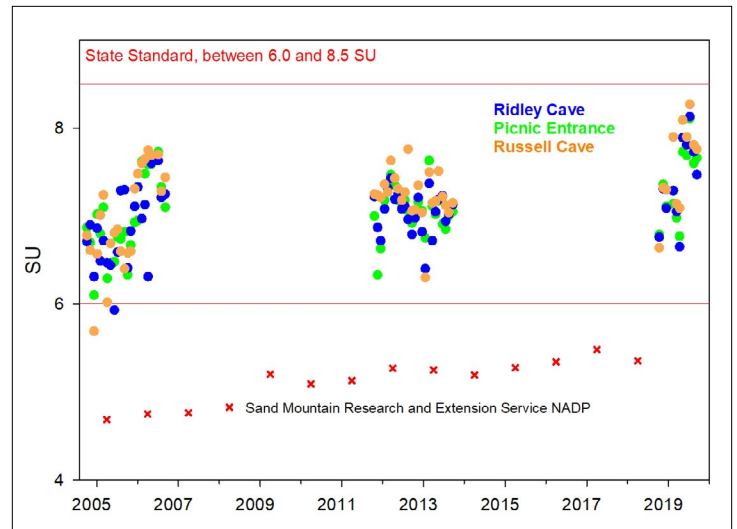


Figure 3. pH at Russell Cave National Monument FY04–FY19. The slight increase in pH of park waters is also observed in annual averaged atmospheric precipitation sampled at the Sand Mountain Research and Extension Service NADP station 77 kilometers (48 miles) to the south.

Significant Findings

Highlights of Fiscal Year 2019 Monitoring

One violation of water quality standards was recorded during FY19. *E. coli* surpassed the USEPA single sample *E. coli* standard for infrequent recreational use of 298 MPN/100 mL at Ridley Cave with a concentration of 547.5 MPN/100 mL (Figure 2). MPN, Most Probable Number, is a statistical method of estimating bacteria colony density. This sample was taken during flood conditions. This single violation is not due to a lack of runoff-producing rainfall (the mechanism for entrainment of non-point source bacteria) as four of the eleven sample events were above normal flow. The January sample was canceled due to a lapse of federal funds.

There appears to be a slight increase in the pH of park waters since 2004 (Figure 3), reflecting a regional trend in precipitation pH as measured at the nearest National Atmospheric Deposition Program (NADP) at the Sand Mountain Research and Extension Service station (AL99), 77 kilometers (48 miles) to the south.

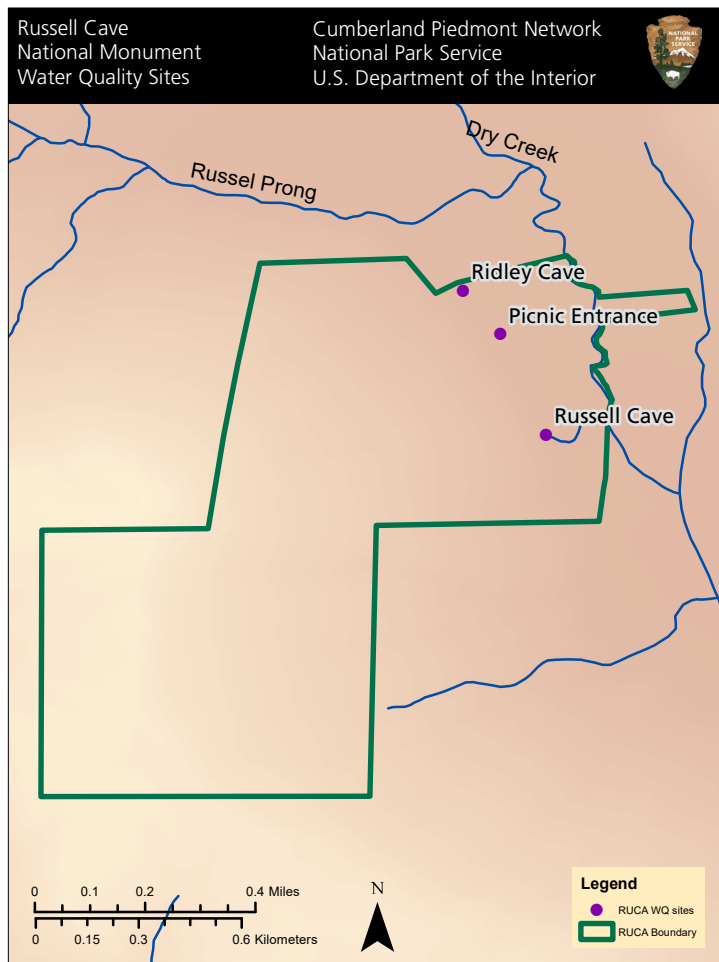
Water Quality Standards

All park waters are considered “Outstanding Alabama Water” under the Clean Water Act as promulgated by the state of Alabama. The state currently does not impose a standard for *E. coli* bacteria so the network adapted the USEPA recommendations for “Single Sample Moderate Full Contact Recreation.” While there is no aquatic life standard for nitrate, we can use the drinking water standard for a point of comparison. SpC is without a state or federal guidelines but is useful in interpreting water quality results.

Parameter	Standard
Water Temperature	Less than 32.2°C
Dissolved Oxygen	Greater than 5.5 mg/L
pH	Between 6.0 and 8.5 SU
<i>Escherichia coli</i>	Less than 298 MPN/100 mL
SpC	No standard
Nitrate	Not to exceed 45 mg/L as NO ₃

Future Monitoring

Water quality sampling continues through fiscal year 2020.



Water-quality monitoring sites at Russell Cave National Monument 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>