



Russell Cave National Monument Water Quality Summary Fiscal Year 2013

Water quality at Russell Cave National Monument is fair.



Warm humid air condenses at entrance of Russell Cave, July 18, 2013. Image by Mary Shew.

The Cumberland Piedmont Network Inventory and Monitoring Program began long-term water quality monitoring at Russell Cave National Monument in fiscal year 2004. Water quality is measured monthly for two years at three sites; Ridley Cave, Picnic Entrance and the mouth of Russell Cave. 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, a set of parameters was chosen for long-term monitoring; including the field measures of water temperature, specific conductance (SpC), pH, flow, and dissolved oxygen (DO). Samples were also collected for analysis for *Escherichia coli* (*E. coli*) and nitrate.

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 *Escherichia coli* bacteria so we have 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.

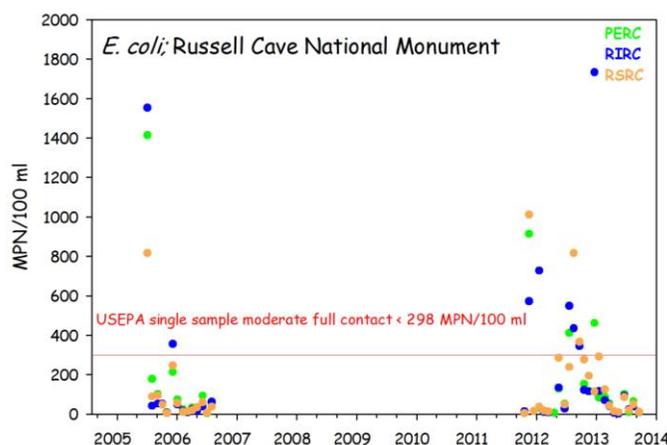
Water Temperature	Not to exceed 32.2°C
Dissolved Oxygen	Not to exceed 5.5 mg/l
pH	Between 6.0 and 8.5 SU
<i>Escherichia coli</i>	Not to exceed 298 MPN/100ml
SpC	No Standard
Nitrate	Not to exceed 45 mg/l as NO ₃

Sampling Sites

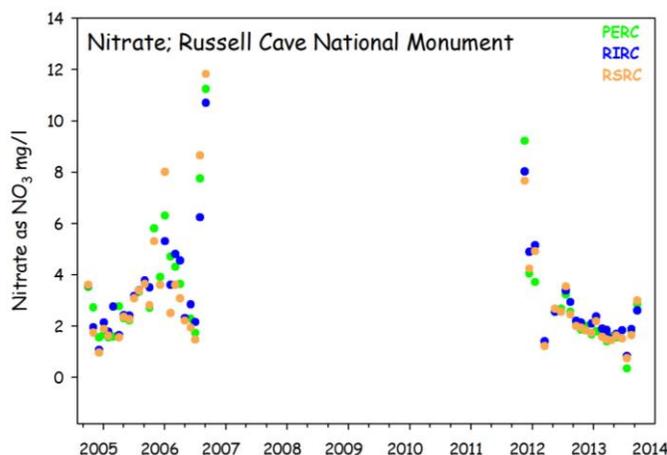
RIRC	Ridley Cave
PERC	Picnic Entrance Russell Cave
RSRC	Entrance Spring Russell Cave

Highlights of Fiscal Year 2013 Monitoring

Water quality improved in 2013 when compared to the previous year. However this apparent improvement is largely due to less flood events sampled. At Russell Cave, as with most karst systems, when flow is low, water quality is very good. When flow is high, water quality is degraded. Each exceedence of the 298 most probable number per 100 ml standard was coincidental with a rainfall event that produced non-point source runoff. There also appears to be a relationship to nitrate and runoff events. In times of high flow nitrate is too elevated. The cave’s karst watershed is largely confined to Doran Cove. Animal waste is held in virtual storage on the surface until it rains and is washed into sinkholes or the usually dry streambed feeding Russell Cave.



E. coli at Russell Cave National Monument 2005-2013.



Nitrate at Russell Cave National Monument 2005-2013.

Future Monitoring

Water quality will resume in fiscal year 2019. Water quality data are available upon request to the Cumberland Piedmont Network or our website: <http://science.nature.nps.gov/im/units/cupn/publications.cfm>