RIVANNA CONSERVATION ALLIANCE

RIVANNA RIVER WATERSHED 2014-2016 STREAM HEALTH REPORT

Stream Watch and Rivanna Conservation Society Merger

The Rivanna Conservation Alliance (RCA) was established on January 1, 2016 through a merger between the Rivanna Conservation Society and StreamWatch.

The Rivanna Conservation Alliance is a 501(c)(3) nonprofit watershed organization created to provide the community with a set of tools and programs specifically designed to help clean and protect the Rivanna River and its tributaries.

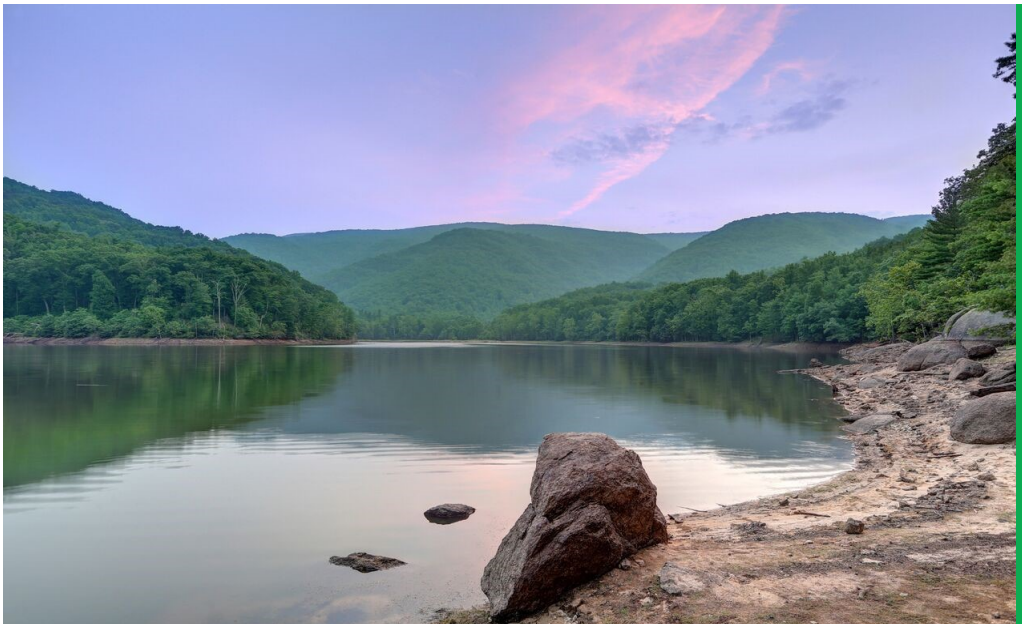
RCA's benthic monitoring program is certified by the Virginia Department of Environmental Quality (VADEQ) at Level III, meaning that the volunteer monitoring data are used for environmental decision-making as if the samples had been collected by state and local government professionals. RCA's bacteria monitoring program was certified by VADEQ at Level II. Volunteers collect data and collections are verified by VADEQ. Starting in 2018, RCA's bacteria monitoring program will also be Level III certified.

Our Mission

Protection of the Rivanna River and its tributaries through community involvement, conservation, education, recreation, restoration, water-quality monitoring and reporting.

Our Vision

A healthy, thriving community that values its rivers and streams.



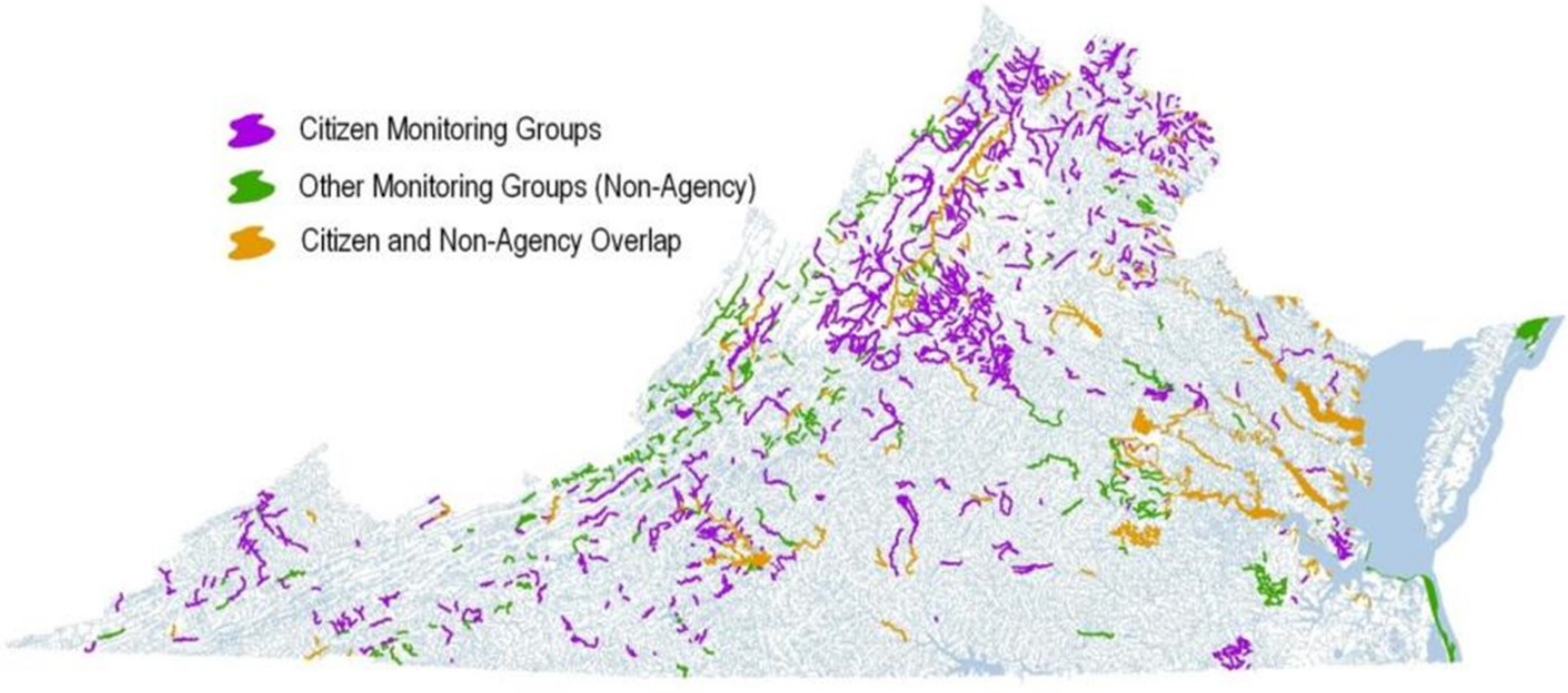
In This Report

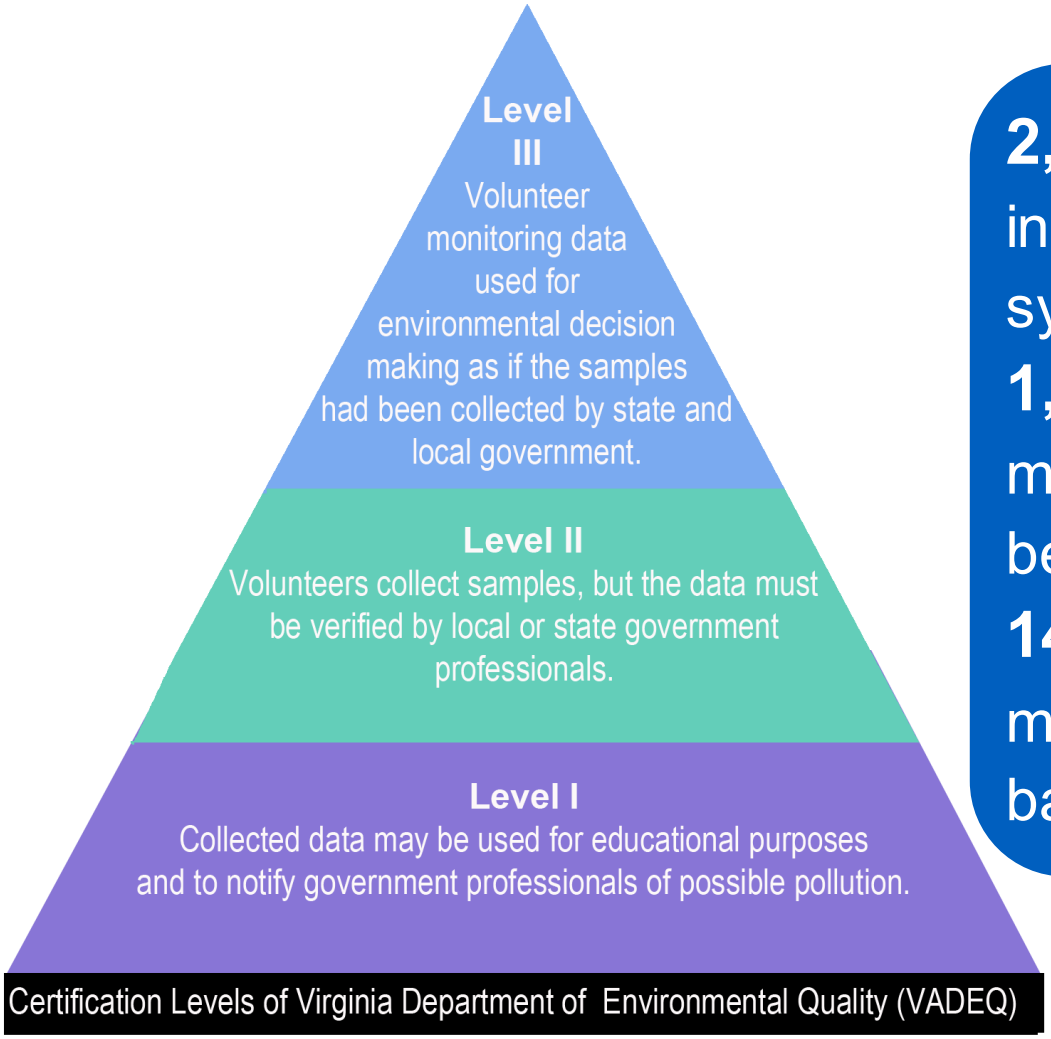
Why Monitoring is Important

RCA aims to help the community make sound water stewardship decisions by providing high-quality information about stream health. Streams are influenced by both natural and human factors. RCA focuses on the human factors surrounding stream health. In order to detect changes related to human activity, RCA monitors health in many streams over multiple years.

Our local streams give us recreational opportunities, aesthetic pleasure, life-giving drinking water, and many other benefits. Streams also flow to downstream communities and the Chesapeake Bay. We owe it to ourselves and our neighbors to care for our streams as thoughtfully as possible.

Virginia Waters Monitored by Citizen or Other Non-DEQ Groups





2,094 miles
in the Rivanna River system
1,579 miles
monitored in RCA benthic program
142 miles
monitored in RCA bacteria program

CERTIFIED LEVEL II:
Monitoring bacteria in our streams allows RCA to evaluate the health of our watershed. RCA monitors E. coli levels in local streams. This program will achieve Level III certification in early 2018.

CERTIFIED LEVEL III:

RCA's benthic monitoring program evaluates the macroinvertebrates (bottom-dwelling bugs) that live in our streams. Macroinvertebrates are biological indicators of stream health.

RIVER STEWARDS: Surveying the Rivanna River RCA documents pollution sources, interacts with community members on and around the river and to share information about the native flora and fauna.

Benthic Monitoring Results

How we rate the health of our streams

1

Benthic macroinvertebrates (bottom-dwelling bugs) are sampled with a net twice yearly.

2

The bugs are sorted and identified. All samples are processed in accordance with a quality assurance project plan approved by DEQ.

3

Each sample produces a score that is determined by factors such as the number, types, pollution sensitivity, and diversity of bugs found.

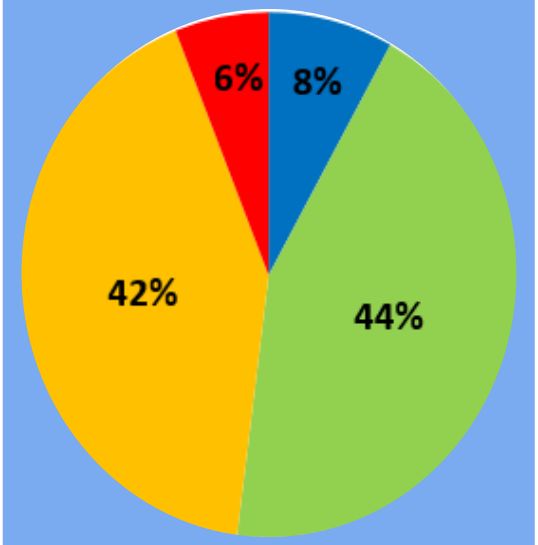
4

GOOD

Three years of scores are analyzed and averaged to obtain an overall rating for the site.

To learn more visit: www.rivannariver.org/long-term-monitoring-program/

Health at 50 Representative Monitoring Sites



- Very Good (4 of 50)
- Good (22 of 50)
- Fair (21 of 50)
- Poor (3 of 50)

Streams rated as “fair” or “poor” fail to meet the Virginia water quality standard for aquatic life

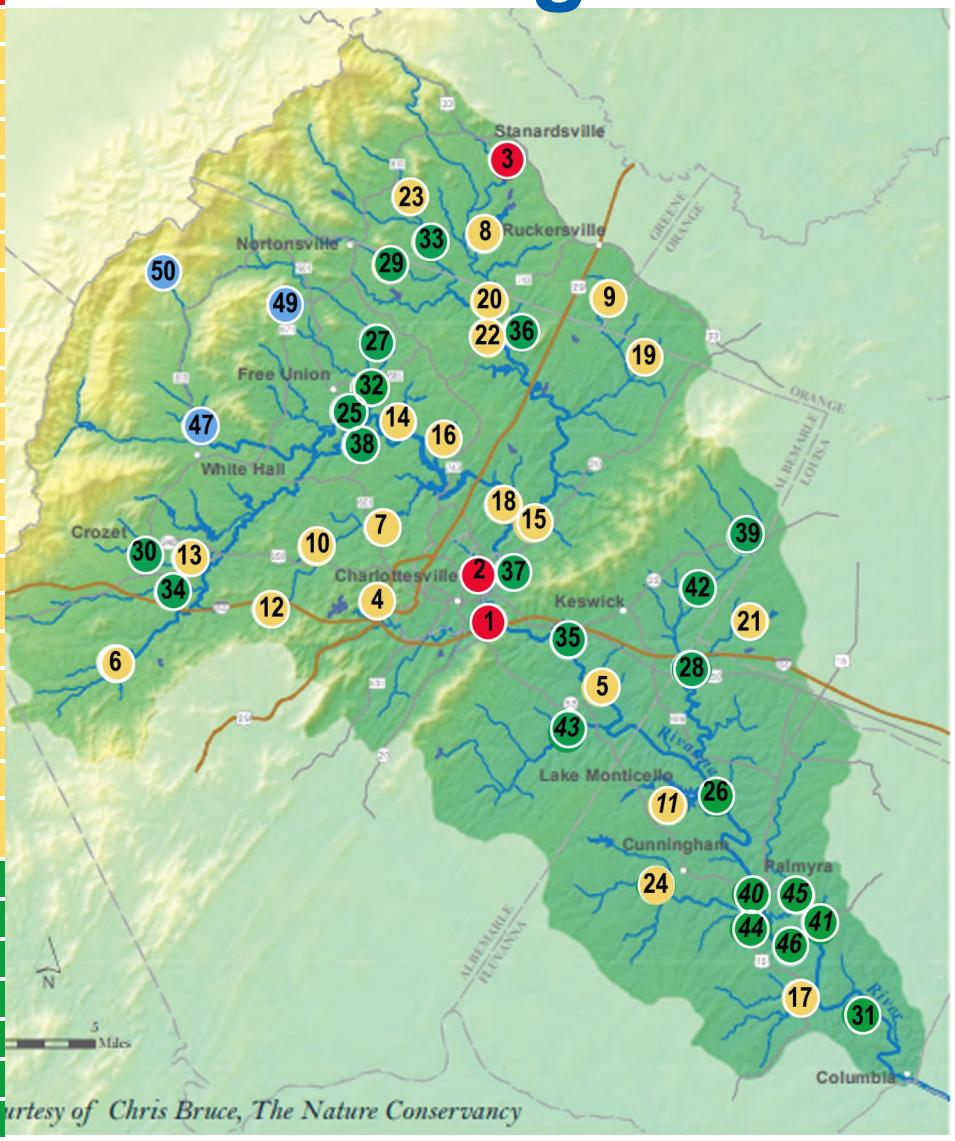
Why do site ratings vary?

It is not uncommon for sites to fluctuate between “good” and “fair” ratings. Several sites have moved between the two over the past decade. It is possible that these streams can recover to consistent good health with better management practices, and are more likely to recover than “poor” or consistently “fair” streams. One way to improve the quality of our streams is to buffer streams by planting trees and vegetation as well as refraining from clearing land alongside streams.

Stream Score (100-point scale)	Health
70 and over	Very Good
60-69.9	Good
40-59.9	Fair
25-39.6	Poor
0-24.9	Very Poor

Monitoring Sites

1	Moores Creek near Woolen Mills
2	Meadow Creek west of Locust Lane Ct
3	Stanardsville Run upstream of N. Ridge Way
4	Morey Creek south of Bellair
5	Carroll Creek in Glenmore
6	Mechums River @ 692 - B
7	Ivy Creek @ 601
8	Quarter Creek in Twin Lakes
9	Preddy Creek west of Rosewood Drive
10	Little Ivy Creek trib @ Kingston Rd
11	Lake Monticello trib #1 emptying to Jackson Cove
12	Ivy Creek in Rosemont
13	Lickinghole Creek south of Fairwinds Lane
14	Fishing Creek west of Willwood Dr
15	North Fork @ Forks of Rivanna
16	Naked Creek @ 844 - B
17	Carys Creek @ 15
18	South Fork @ Forks of Rivanna
19	Burnley Branch @ Burnley Station Road
20	Swift Run @ 605
21	Beaverdam Creek East Prong upstream of 600
22	North Fork @ Advance Mills
23	Parker Branch @ 633
24	Cunningham Creek Middle Fork upstream of Bell Farms Ln
25	Moormans River @ 601
26	Rivanna @ Crofton - A
27	Buck Mountain Creek @ 666 - A
28	Mechunk Creek @ 759
29	Lynch River @ 603
30	Powells Creek ~80 meters above Lickinghole
31	Rivanna @ Rivanna Mills
32	Buck Mountain Creek upper west of 665–A
33	Roach/Buffalo River north of 648
34	Stockton Creek @ 683
35	Rivanna @ Milton
36	Marsh Run upstream of 641
37	Rivanna @ Darden Towe
38	Mechums River @ 601
39	Turkeysag Creek @ 22
40	Cunningham Creek @ 15
41	Long Island Creek @ 601
42	Mechunk Creek upper @ 600
43	Buck Island Creek @ 729
44	Raccoon Creek @ 15
45	Ballinger Creek downstream of 625
46	Rivanna 5.2 km downstream of Palmyra
47	Doyles River @ 674
48	Fluvanna County reference stream #1 (Not shown)
49	Albemarle County reference stream #2
50	Doyles River upper @ National Park Boundary



Poor | **Fair** | **Good** | **Very Good**

Bacteria Monitoring Results

How we rate the health of our streams

Level III -The Colilert Method

100 mL water samples are collected from the various monitoring sites in the Rivanna watershed.

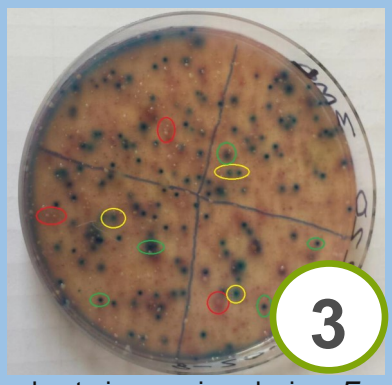
A Colilert media is dissolved into the water sample. The sample is distributed into a 97 well tray and sealed. The samples are incubated for 24 hours.

The sample is inspected to determine the presence of *E. coli*. A most probable number (MPN) is recorded for the sample.

Level II - The Coliscan Method

A water sample is collected from the various monitoring sites in the Rivanna watershed.

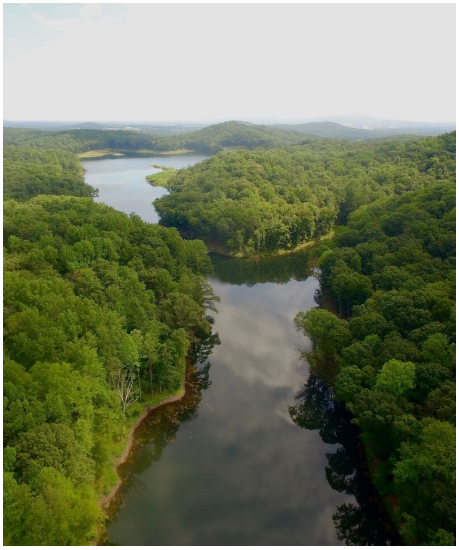
3 mL of the water sample are mixed with Coliscan media and plated. The samples are incubated for 24 hours.



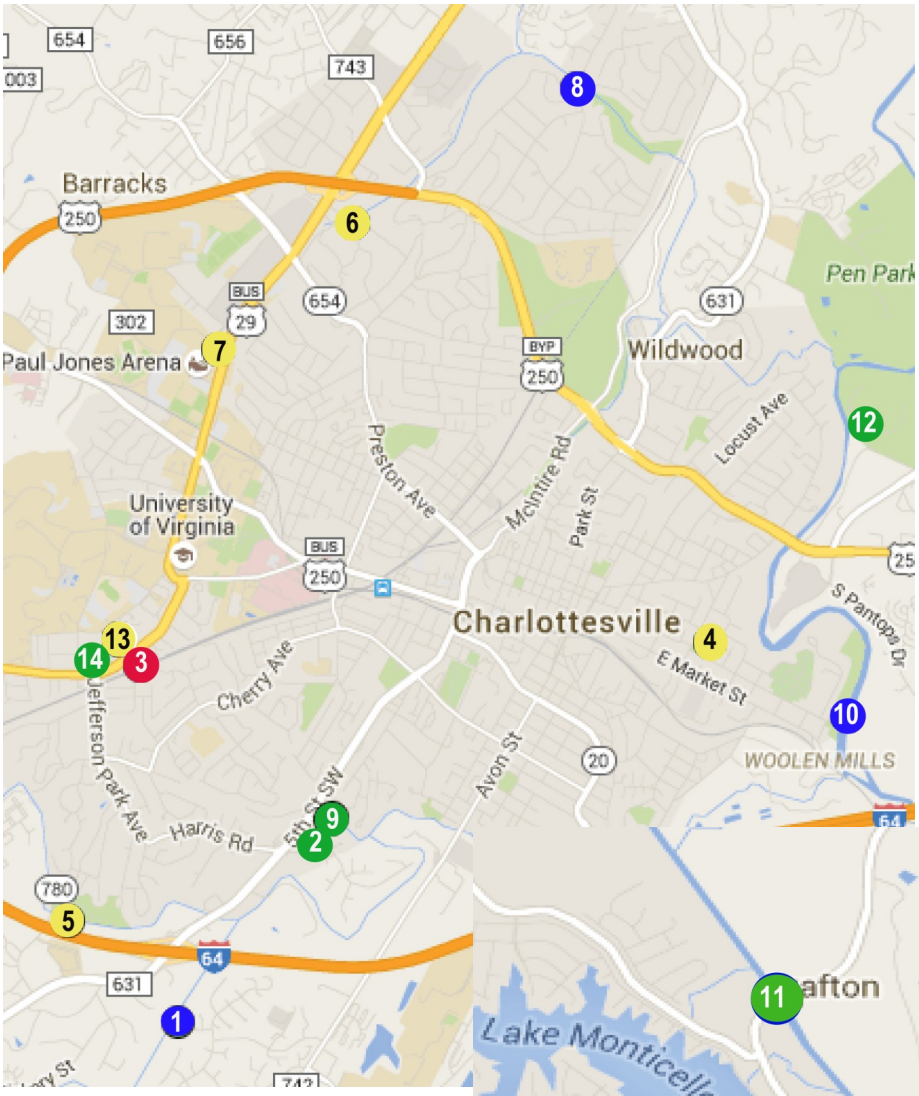
The bacteria grow in colonies. *E.coli* are then identified and counted by RCA monitors and recorded as colony forming units (CFU).

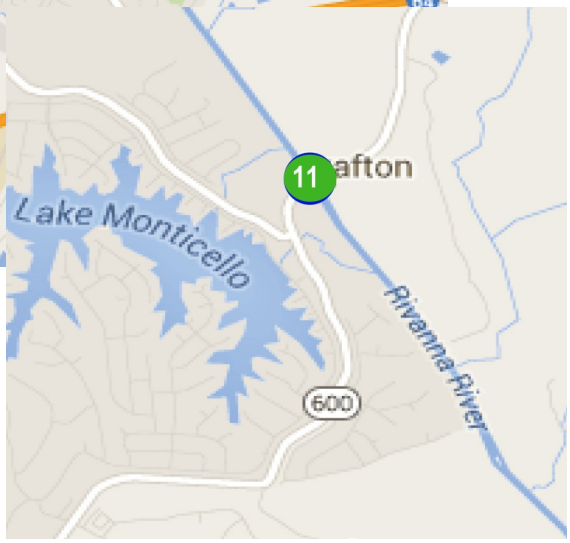
About the Bacteria Monitoring Program

The bacteria monitoring program was launched in July 2012. Our volunteers sample most sites once per month from February to November using Coliscan© Easygel (Level II method) or Colilert media (Level III method). During the summer, popular recreational sites are sampled once per week. Bacteria levels are one indicator used to determine if water is safe for swimming or other recreation. RCA monitors fecal bacteria levels, specifically *Escherichia coli* (*E. coli*), which originate in the intestines and fecal matter of warm blooded animals.



Bacteria Monitoring Sites





Site #	Site Name	Percent of samples exceeding safety standards
3	Lodge Creek- South of Jefferson Park Ave	38%
*7	Meadow Creek-Copeley Rd.	29%
*4	Meade Creek-Meade Park**	25%
5	Moore's Creek Upper- Azalea Park	25%
*6	Meadow Creek- Meadow Brook Gardens	24%
*13	Eastern Trib. to Lodge Creek	24%
*2	Lodge Creek-Southeast of 5th St.	15%
*9	Rock Creek- Southeast of 5th Street	15%
*14	Western Trib. to Lodge Creek	14%
11	Rivanna River- Crofton	10%
**12	Rivanna River Darden Towe Park**	10%
10	Rivanna River- Riverview Park**	7%
*8	Meadow Creek- SE Brandywine Dr.	5%
1	Biscuit Run	3%

*Data collected 2015-2016,
**Data collected in 2014 and 2016

Water samples exceeding 235 CFU/100mL fails to meet Virginia Water Quality Standards set by Virginia DEQ.

Urban sites monitored

Water samples collected

Volunteers

How you can help lower bacteria levels

Wash your car on grassy areas

Pick up after your pet

Aim sprinklers away from paved areas

Maintain your septic system

Report illicit discharges

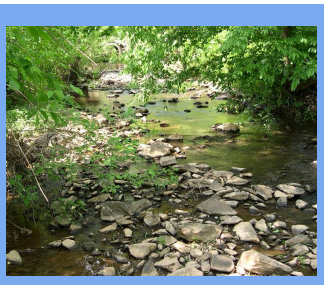
For the most up to date bacteria information visit: http://www.rivannariver.org/bacteria/

Stream Highlight

What would change the stream score?
Over time sampling scores may change, but that may or may not indicate a change in water quality. For example, the Stockton Creek site assessment tier moved from "fair" in 2014 and 2015 to "good" in 2016. This is most likely the result of a new sampling location, rather than a change in water quality.

In July 2014, the original stream riffle (i.e., a rocky/shallow part of a stream with rough water where stream samples are taken) was scoured by flooding. This required the monitors to find a new monitoring location. The monitors stayed within the same stream reach, but moved upstream to find a better sampling site. At the new riffles, the monitors observed much better microhabitat and found a wider diversity of macroinvertebrates in their samples.

Sampling scores may also change in response to trends in water quality, habitat conditions, and overall watershed health. The continued collection of benthic data provides an important baseline for detecting change over time, both positive and negative.



What is a reference stream?

Reference stream sites have no significant human disturbances. They drain the least disturbed watersheds in the Rivanna basin and receive the highest RCA assessment scores. All RCA reference sites continue to be in the "very good" assessment tier, which is consistent with past findings and continue to fit the definition of a true reference site. Streams are rated from "very poor" to "very good" using the Virginia Stream Condition Index, with streams in our watershed covering the entire range. Pristine streams are surrounded by forest and do not experience extreme runoff from development or agricultural sites. In contrast, poor quality sites typically lack riparian buffers and are degraded by runoff from lawns, parking lots, and storm drains, which erode stream banks and carry pollution into receiving streams.

Lake Monticello

In October 2016, RCA volunteer water monitors arrived at Jackson Cove within Lake Monticello to conduct the biannual benthic monitoring. One of the measures of water quality is determined by the total number and diversity of bugs. The monitors became concerned when the first net (multiple nets equal a sample) yielded only midges and lunged snails (pollutant-tolerant species). A second net confirmed initial concerns.

Suspecting elevated bacterial levels, monitors moved upstream to investigate, where they located a broken sewer pipe (see right picture). A third monitor retrieved bacteria monitoring equipment and collected samples at the site. An Aqua Virginia repair crew was on site within an hour and the break was repaired that same day.

Following certified protocols and procedures, the bacteria sample was incubated for 24 hours and confirmed significantly elevated *E. coli* levels. In addition, local and state agencies were notified, resulting in additional sampling. Six months later (April 2017), RCA monitors returned to the site, collected additional samples, and documented that Jackson Cove was recovering.

Lake Monticello broken sewer pipe in stream

Cunningham Creek

Our Role

RCA currently serves as a member of the Cunningham Creek TMDL (total maximum daily load) Advisory Committee, convened by Virginia's Department of Environmental Quality (VADEQ). As a component of their deliberations, the Committee determined that additional and up-to-date monitoring data would be necessary to make informed decisions about how VADEQ would move forward. To provide this data, RCA agreed to monitor bacteria, benthic health, and water chemistry at three Cunningham Creek sites: South Fork (Sites 1 and 2) and Middle Fork.

Where do we go from here?

RCA's sampling results have been provided to VADEQ. This information, along with VADEQ and consultant-gathered data will be used to determine how to proceed with the TMDL. A final decision is expected by the end of 2017.

Understanding the Results

ASCI

Stands for the "Adapted Stream Condition Index:". This index allows RCA to use a formula to calculate overall stream health based on the types of macroinvertebrates found in the stream. We use ASCI in our benthic monitoring.

E. Coli

A type of bacteria found in the intestines of animals and humans. A presence of *E. coli* in water is a strong indication of recent sewage or animal waste contamination. We test for E. coli in our bacteria monitoring.

CFU

Stands for "colony forming units." This unit is used by RCA to estimate the number of E. coli found in a 100mL water sample. E. coli exceeding 235 CFU/100mL fails VADEQ water quality standards. We use CFU in our Coliscan methods.

MPN

Stands for "most probable number." This method allows monitors to report a concentration of E. coli based on positive/negative presence data. We use MPN in our Colilert method.

TMDL

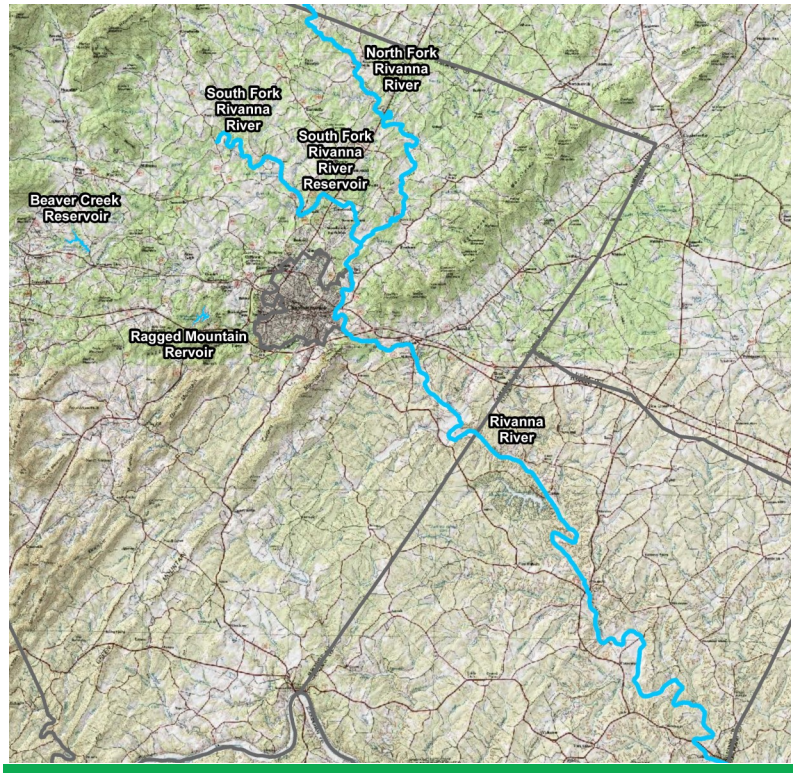
Stands for "total maximum daily load", the maximum amount of pollutant that a body of water can receive while still meeting standards. TMDL is a term used in a plan for restoring impaired waters.

2016 Cunningham Creek Sample Results

Site Code	Benthic* (ASCI Score)	Benthic Assessment	Bacteria** (CFU/100ml)	Bacteria Assessment
Middle Fork	73.1	Very Good	34	Meets VADEQ standards
South Fork, Site 1	66.9	Good	200	Meets VADEQ standards
South Fork, Site 2	70.3	Very Good	567	Fails to meet standards

* Score is average of one spring and one fall sample
**Results are from one fall sample, verified by VADEQ

Rivanna River Stewards



River sections paddled by Rivanna River Stewards

Goals of the Rivanna River Stewards

- Provide RCA with a presence on the river
- Monitor water quality of the Rivanna
- Remove trash and document potential pollution sources
- Interact with community members on and around the river
- Share information about the native flora and fauna

2016 Impact

In addition to the work of the river stewards, volunteer clean ups removed hundreds of tires and bags of trash.

7 Future Goals

1. Improve boat access points for the Rivanna River
2. Improve signage at boat take out and put in locations
3. Remove large litter items from the river including couches, car parts, etc.
4. Monitor pipe discharges
5. Address river bank erosion
6. Create a feedback loop between stewards and local officials
7. Increase the number of paddles and segments of river and creeks covered

Thank you!

To all those who help to protect stream health in the Rivanna River Watershed– the many dedicated volunteers, private landowners who support our field work and the many individuals who support us financially.

Foundations and organizations that provided funding to RCA 2014-2016

• Albemarle County • Anonymous • Ballyshannon Fund •
• BamaWorks Fund of the Dave Matthews Band •
• Charlottesville Area Community Foundation • Chesapeake Bay Restoration Fund •
• City of Charlottesville • Crutchfield Corporation • Dominion Foundation • Fluvanna County •
• Grace Church Keswick • J&E Berkley Foundation • Luck Companies •
• National Fish and Wildlife Foundation • New Belgium Brewing • Northrop Grumman •
•Patagonia • Rivanna Garden Club • Royal Bank of Canada •
• Rivanna Water and Sewer Authority • Virginia Environmental Endowment •

Community Partners

• Albemarle County • City of Charlottesville • Fluvanna County •The Nature Conservancy •
• Rivanna Water and Sewer Authority • Thomas Jefferson Planning District Commission •
• Thomas Jefferson Soil and Water Conservation District • University of Virginia •

2014-2016 Volunteer Monitors

Alex Bijak
Ami Riscassi
Anne Dunckel
Art Petty
Ashley Brill
Amanda Demmerle
Becky Minor
Beth Kuhn
Bill Bechholz
Bill Weaver
Bob Letts
Brigitte Rau
Brit Minor
Burke Graham
Carol Long
Cecilia Rosenberg
Charles Friedman
Chelsea Trice
Christine Kastan
Clai Lange
Cristina Cornell
David Smith
Deana Sackett
Doni Ahearn
Donna Shaunesey
Dot Preis
Eileen deCamp
Eileen Stephens
Elizabeth Ersitoff
Emily Kuhn
Evie Sackett
Francoise Johnson
Frances Lee-Vandell
Frank Wilczek
Gene Potter
Gus Colom
Harriet Bell
Hollins Mills
Ida Swenson
James Peacock
Janet Bearden
Jill Meye
Jill Zimmerman
Jillian Burgan
Jim Kabat
Jim Nix
Jim Surdokowski
John Edelen
John Tansey
Karen Siegrist
Keggie Mallett
Ken Kastan
Laura Troy
Laurel Williamson
Lavinia deVillier
Leigh Surdukowski
Leslie Middleton
Linda Birch
Lisa Wittenborn
Liz Sidamon-Eristoff
Laura Troy
Maggie Morris
Marilyn Potter
Marilyn Smith
Mary Lofton
Mary Loose
DeViney
Matt Mitchell
Mecca Burns
Megan Dobbs
Melba Atkinson
Michael van den Bossche
Mike Culp
Mike Fisher
Nancy Ford
Neil Means
Pat Wilczek
Patricia Burkett
Peter Hatch
Peter Matthews
Rob Bergstrom
Roger Black
Roger Temples
Rose Brown
Sarah Hood
Sean Grsegorczyk
Shina Huyn
Shane Grzegor-czyk
Sharon Ellison
Shirley Halladay
Susan Meyer
Susan Sleight
Susan Rigby
Se Jeong
Shaina Phillips
Susan Rigby
Tammy Bowers
Tana Herndon
Tina Colom
Tom Barfoot
Vera Leone
Vicki Metcalf
Victoria Young
Vicky Metcalf
Wendy Roberman
William (Bill) Marley
Zona Chalifaux
Zan Tewksbury

Why Stream Conservation Matters

70% of Earth is composed of water, yet only 2.5% of Earth's water is fresh water that humans can use for everyday life. Fresh water is an extremely valuable and limited resource that must be protected. Healthy streams support our fisheries, provide recreational opportunities, supply reliable drinking water, and support our overall economy. It costs less to keep our streams clean than to restore polluted streams. Water is essential for all living things, please help keep it clean.

What you can do

Pick up after pets

Create and enhance riparian buffers

Fence animals out of streams

Reduce chemical use

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CONSERVATION ALLIANCE

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