2025 RIVANNA RIVER WATERSHED STREAM HEALTH REPORT

MONITORING PROGRAM RESULTS FROM 2022-2024

RIVANNA
CONSERVATION ALLIANCE

Our Mission – Working with the community to conserve the Rivanna River and its watershed through water quality monitoring, restoration, education, and stewardship.

Our Vision – We envision a healthy Rivanna River and watershed that benefits and is sustained by the community.

LETTER FROM LEADERSHIP

Dear Friends of the Rivanna,

Every year in our Stream Health Report, we summarize the latest data collected by RCA's long-running bacteria and biological monitoring programs to determine whether our streams are meeting Virginia's water quality standards. This year, we're happy to report that one of RCA's bacteria monitoring sites once again met Virginia's revised water quality standard for recreation (page 6). Even better, the percentage of RCA's long-term biological monitoring sites meeting Virginia's water quality standard for aquatic life increased from 30% (2024 report) to 44% (page 4).

Throughout 2024, RCA's monitoring efforts made an immediate impact in the watershed. Our data helped:

- community members make decisions about river recreation,
- Albemarle County evaluate the impacts of stream restoration in Biscuit Run Park,
- Rivanna Water and Sewer Authority track bacteria levels in Moores Creek and the Rivanna River after a storm-related wastewater pump failure and repair, and
- the University of Virginia and the City of Charlottesville investigate streams with unexplained, high *E. coli* levels.

RCA's monitors also helped identify and report a petroleum spill in Meadow Creek.

Recognizing immediate and short term changes in water quality is important for identifying and responding to acute pollution events and assessing potential threats to public and ecosystem health. It is equally important that we routinely assess long-term water quality trends. Long-term data helps identify more gradual changes to stream health, including responses to ongoing stressors like land development and climate change, or improvement efforts such as large-scale restoration projects. As such, this year's report also includes preliminary findings from RCA's 2025 long-term biological trends analysis (page 2).

None of this work would be possible without our dedicated volunteers, partners, and financial supporters. We are deeply grateful for your continued support. Together, we're building a healthier, more resilient future for the Rivanna River watershed.

Many thanks,

Lisa Wittenborn, Ph.D.
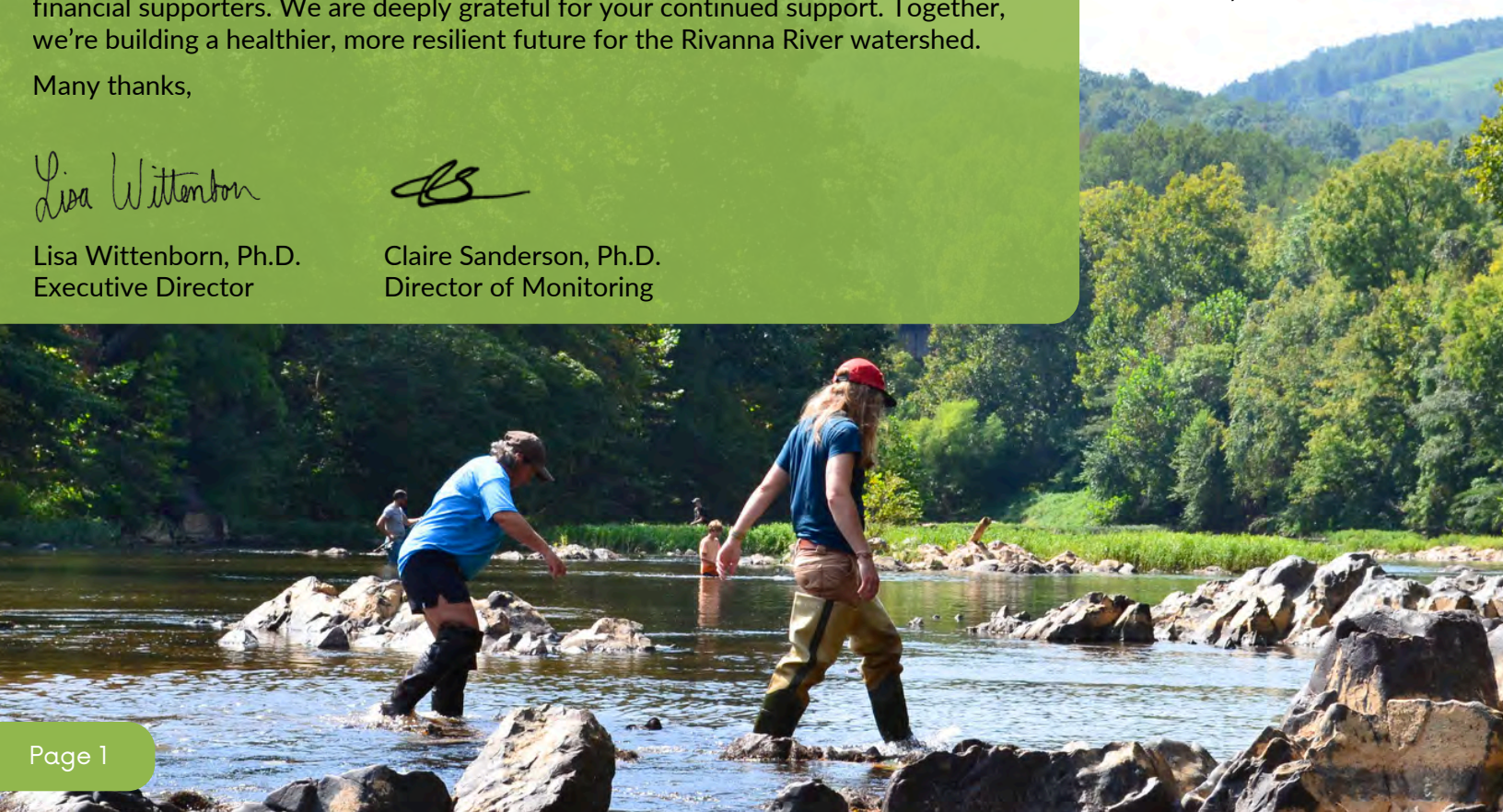Executive Director

Claire Sanderson, Ph.D.
Director of Monitoring

Biological sampling at Carys Creek

Case-making caddisfly larvae

Biological sampling at Fluvanna County reference stream

For over 20 years, RCA's Level III Biological Monitoring Program has been collecting stream health data at 50 long-term monitoring sites throughout the Rivanna River watershed. To collect these data, RCA staff and volunteer monitors sample benthic macroinvertebrates, the small organisms that live along the bottom of rivers and streams. Because these organisms vary in sensitivity to stressors, their community composition is indicative of general stream health at the site. Studying the types and diversity of organisms at each site helps assess the ability of these streams to support aquatic life and provides an important picture of how water quality is changing over time.
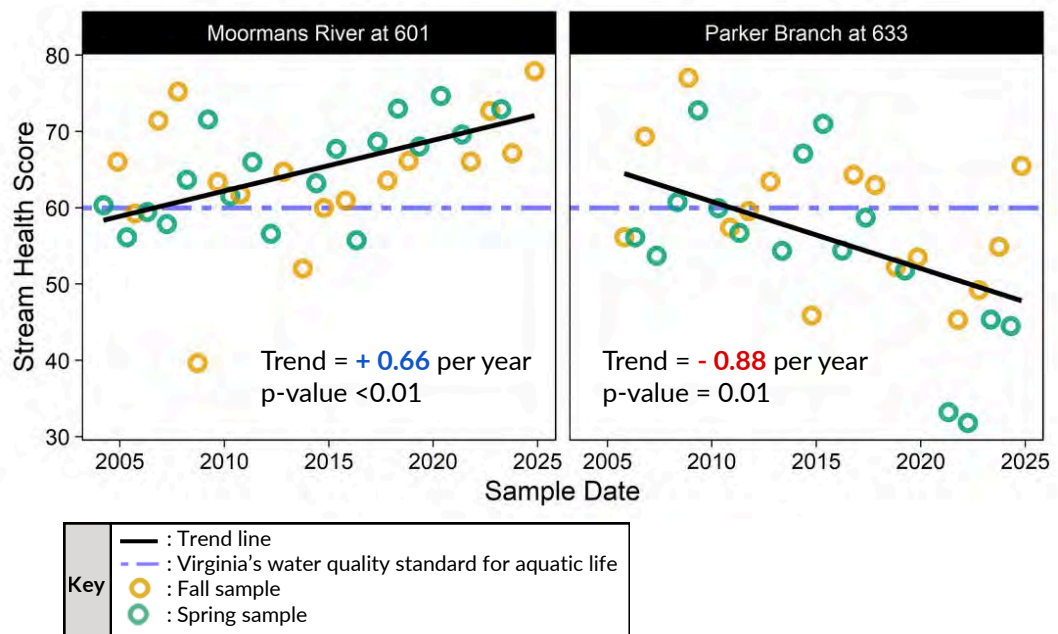
In 2019, RCA conducted its first long-term trends analysis on approximately 15 years of benthic data from all 50 sites. Results are shown in the table below (full report can be found at **rivannariver.org/long-term-monitoring-program**).

This year, we repeated the analysis on approximately 20 years of benthic data. Our preliminary findings (shown to the right) indicate that stream health, on average, is improving across the watershed. While this trend is not statistically significant, future analyses that factor in streamflow may change this result. At the majority of RCA's individual long-term sites, statistically significant trends were also not observed, however, four sites did show significant positive trends, while two had significant negative trends.

Site-specific increases in stream health scores may be linked to riparian tree plantings, stream restoration projects, and wastewater facility upgrades. Declines, on the other hand, may be associated with livestock access to streams, agricultural run-off, and loss of forested riparian buffers. To better understand these trends, RCA plans to conduct retrospective land-use case studies within select subwatersheds. These studies may highlight needs and opportunities for policies and on-the-ground efforts to promote water quality improvements.

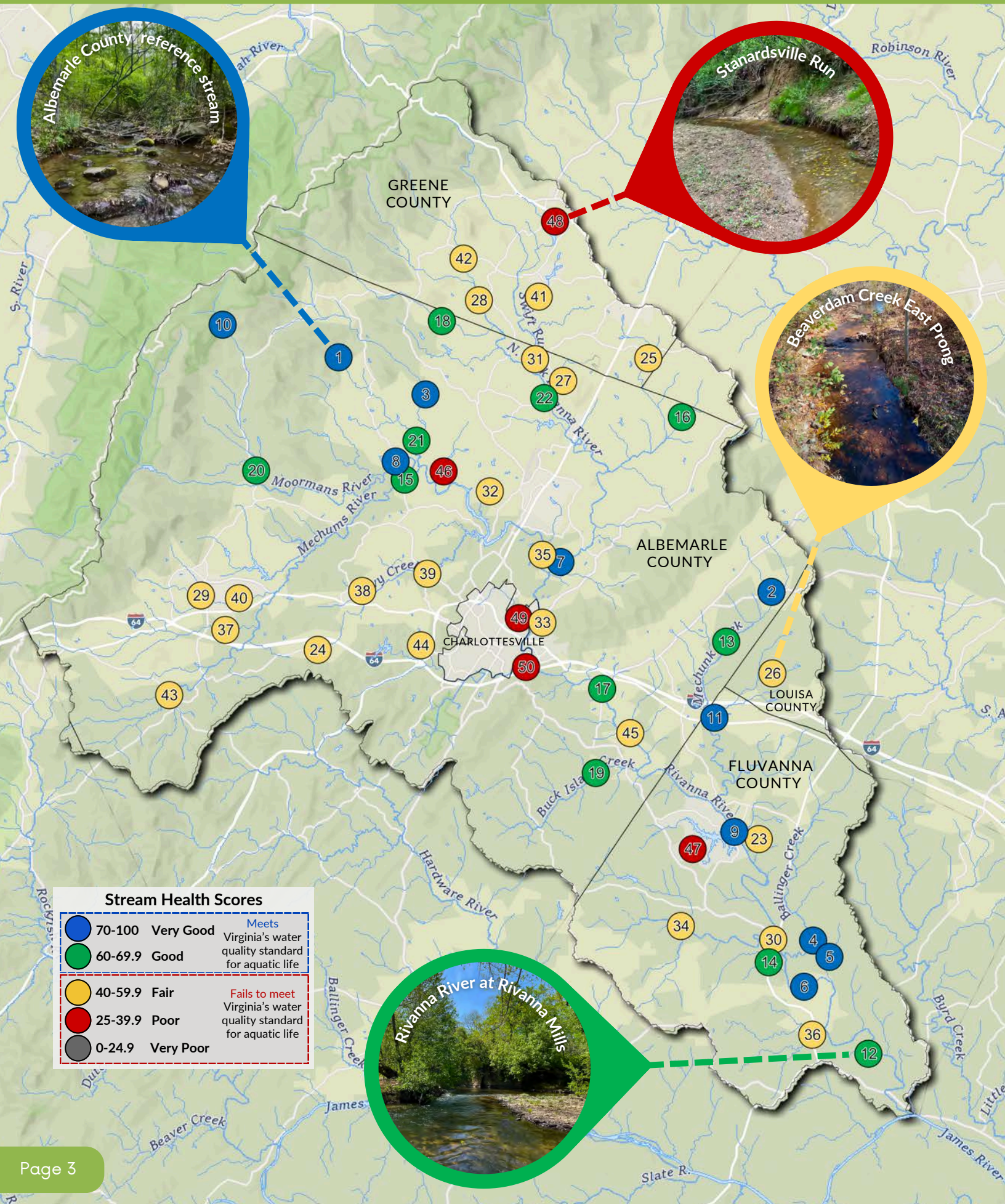| Long-Term Monitoring Site	2019 Long-Term Trends Results		2025 Long-Term Trends Preliminary Results	
	Data Range (No. of Samples)	Trend: Change in Stream Health Score Per Year	Data Range (No. of Samples)	Trend: Change in Stream Health Score Per Year
Buck Island Creek at 729	2004-2019 (28)	+ 0.84 *	2004-2024 (35)	+ 0.25
Marsh Run upstream of 641	2009-2019 (14)	- 2.67 *	2009-2024 (22)	- 1.30 *
Meadow Creek west of Locust Lane Ct	2004-2019 (26)	+ 0.56 *	2004-2024 (35)	+ 0.17
Mechunk Creek upper at 600	2005-2019 (23)	+ 0.47	2005-2024 (32)	+ 0.78 *
Moores Creek near Woolen Mills	2004-2019 (23)	+ 1.07 **	2004-2024 (32)	+ 0.34
Moormans River at 601	2004-2019 (28)	+ 0.45	2004-2024 (35)	+ 0.66 **
North Fork at Advance Mills	2004-2019 (28)	+ 0.46	2004-2024 (36)	+ 0.58 **
Parker Branch at 633	2005-2019 (23)	- 0.34	2005-2024 (31)	- 0.88 **
Rivanna River at Milton	2004-2019 (30)	+ 1.04 *	2004-2024 (38)	+ 0.76 **
Overall Watershed	2003-2019 (1129)	+ 0.21	2003-2024 (1537)	+ 0.11
Overall Watershed (Flow-adjusted)	2003-2019 (1129)	+ 0.31 *	2003-2024 (1537)	To be conducted

Sites with statistically significant trends (2019 and 2025 studies). Blue: significant positive trends, red: significant negative trends, grey: nonsignificant trends. *significance at p<0.05, **significance at p≤0.01.

Trend = + 0.66 per year
p-value <0.01

Trend = - 0.88 per year
p-value = 0.01

Key
— : Trend line
– · – : Virginia's water quality standard for aquatic life
○ (yellow) : Fall sample
○ (green) : Spring sample

Graphs of two of the six long-term monitoring sites with statistically significant trends (2025 study). Each circle represents a single sample.

Biological sampling at Mechunk Creek

BIOLOGICAL MONITORING 2022-2024

Albemarle County reference stream

Stanardsville Run

Beaverdam Creek East Prong

GREENE COUNTY

ALBEMARLE COUNTY

LOUISA COUNTY

FLUVANNA COUNTY

CHARLOTTESVILLE

Rivanna River at Rivanna Mills

Stream Health Scores

	Score	Rating	
🔵	70-100	Very Good	**Meets** Virginia's water quality standard for aquatic life
🟢	60-69.9	Good	
🟡	40-59.9	Fair	**Fails to meet** Virginia's water quality standard for aquatic life
🔴	25-39.9	Poor	
⚫	0-24.9	Very Poor	

#	Site Name	Change
1	Albemarle County reference stream	
2	Turkeysag Creek at 22	
3	Buck Mountain Creek upper west of 666	
4	Ballinger Creek downstream of 625	▲
5	Long Island Creek at 601	▲
6	Rivanna River downstream of Palmyra	▲
7	North Fork at Forks of Rivanna	▲ ⇗
8	Moormans River at 601	▲ ⇗
9	Rivanna River at Crofton	▲
10	Doyles River upper at National Park Boundary	
11	Mechunk Creek at 759	▲
12	Rivanna River at Rivanna Mills	▲
13	Mechunk Creek upper at 600	⇗
14	Raccoon Creek at 15	
15	Mechums River at 601	▲
16	Burnley Branch at Burnley Station Rd	
17	Rivanna River at Milton	▲ ⇗
18	Lynch River at 603	
19	Buck Island Creek at 729	▲
20	Doyles River at 674	
21	Buck Mountain Creek at 665	▲
22	North Fork Rivanna River at Advance Mills	▲
23	Fluvanna County reference stream	
24	Ivy Creek in Rosemont	
25	Preddy Creek west of Rosewood Dr	
26	Beaverdam Creek East Prong	
27	Marsh Run upstream of 641	⇘
28	Roach/Buffalo River north of 648	
29	Powells Creek above Lickinghole Creek	
30	Cunningham Creek at 15	
31	Swift Run at 605	
32	Naked Creek at 844	
33	Rivanna River at Darden Towe	
34	Cunningham Creek Middle Fork - Bell Farms Ln	
35	South Fork at Forks of Rivanna	
36	Carys Creek at 15	
37	Stockton Creek at 638	
38	Little Ivy Creek Trib at Kingston Rd	
39	Ivy Creek at 601	
40	Lickinghole Creek near Fairwinds Ln	
41	Quarter Creek in Twin Lakes	
42	Parker Branch at 633	▲ ⇘
43	Mechums River at 692	
44	Morey Creek south of Bellair	
45	Carroll Creek in Glenmore	▲
46	Fishing Creek west of Willwood Dr	
47	Lake Monticello Trib #1 into Jackson Cove	
48	Stanardsville Run upstream of N Ridge Way	
49	Meadow Creek west of Locust Lane Ct	
50	Moores Creek near Woolen Mills	

Biological Monitoring Protocol

1. At each site, monitors follow protocols approved by VA Department of Environmental Quality (VADAQ) to collect benthic macroinvertebrates using a kick net.

2. Volunteers sort, count, and identify the organisms to the family level. A minimum of 200 organisms are collected in each sample.

3. The number, types, pollution sensitivity, and diversity of organisms at each site are used to calculate a stream health score (0-100).


4 RCA analyzes three years of stream health scores to determine the overall rating for each site.

Streams within the Rivanna River watershed primarily score *Fair* or *Good*, with sites commonly switching between these two ratings from report to report. Data from 2022-2024 show that 46% of sites are still considered *Fair*, however, 15 sites moved to a higher stream health rating. The change in these sites can be attributed to the inclusion of new, higher-scoring data collected in 2023 and 2024. No sites moved to lower stream health ratings. All sites had a high level of assessment confidence, apart from Long Island Creek at 601 (#5) and Preddy Creek west of Rosewood Dr (#25), which had low confidence due to fewer samples collected during the assessment period.

Streams rated as *Very Good* and *Good* meet Virginia's water quality standard for aquatic life. Those rated as *Fair* or *Poor* fail to meet this standard.

From 2022-2024, 56% of streams sampled by RCA failed to meet this important benchmark.

10%
22%
22%
46%

● Very Good ● Good ● Fair ● Poor
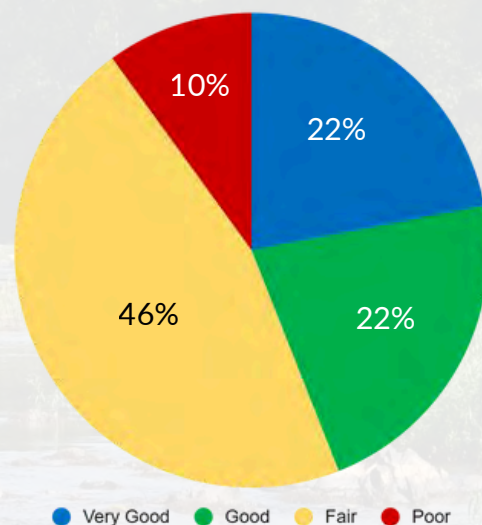
The color and direction of the arrows in the table (▲) show how ratings changed from the 2024 report. Trend arrows indicate sites where statistically significant positive (⇗) or negative (⇘) trends were observed from the 2025 long-term trends analysis. You can find past reports at **rivannariver.org**

BACTERIA MONITORING 2024

RCA's Level III Bacteria Monitoring Program analyzed *Escherichia coli (E. coli)* levels at 22 locations within the Rivanna River watershed in 2024. Water samples were collected monthly from March through November, and sites with high recreational use along the Rivanna River were tested weekly throughout the summer from Memorial Day to Labor Day. In addition, RCA collected weekly data at nine sites in the spring to evaluate their compliance with Virginia's revised recreational water quality standard, which requires more frequent sampling.

E. coli are naturally occurring bacteria found in the guts of humans and other animals. They signal the presence of waste pollution and suggest other pathogenic organisms may also be present. Heavy rainfall can temporarily elevate *E. coli* levels. When *E. coli* levels are too high, swimming and wading in the water are considered unsafe.

In an urban area like Charlottesville, sewer overflows, damaged sewer pipes, and animal waste are typically the most significant sources of bacteria contamination. RCA's bacteria monitoring helps protect public health and water quality by identifying these issues in our local waterways.

To view all of RCA's bacteria monitoring data, please visit **rivannariver.org/bacteria**.

Bacteria Monitoring Protocol

1. At each site, volunteers follow VADEQ-approved protocols to collect water samples using sterile bottles. The samples are returned to RCA's certified lab for testing.
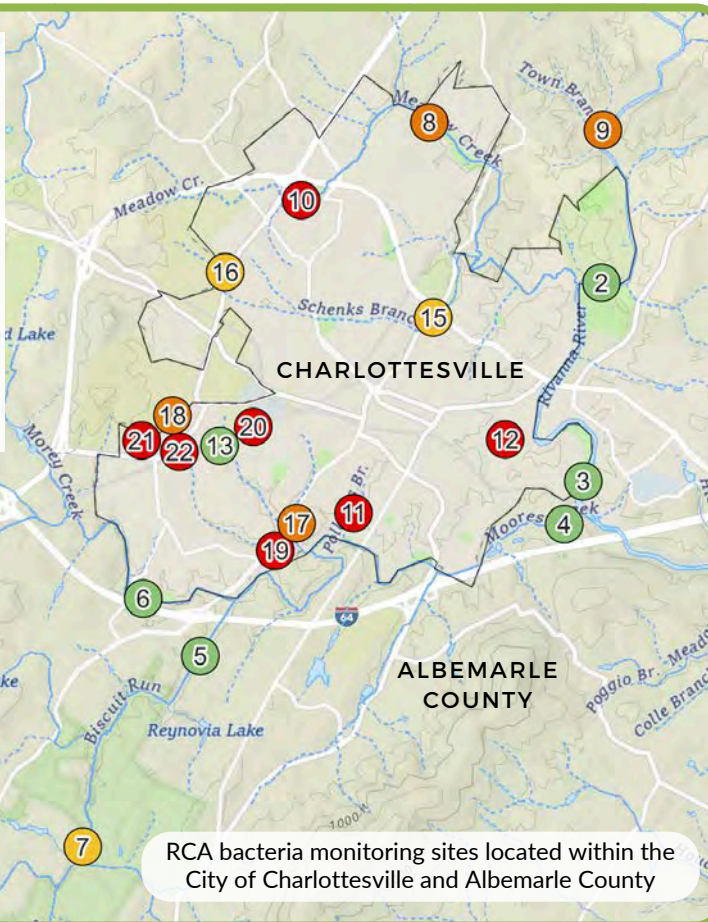

2. The samples are processed using Colilert (IDEXX), an EPA-approved method that accurately quantifies *E. coli* levels in water samples.
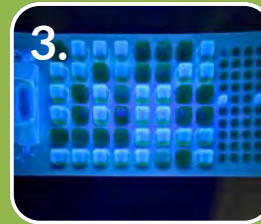
3. After the samples are incubated for 24 hours, *E. coli* results are read under UV light and recorded as the **Most Probable Number (MPN)** of *E. coli* per 100 mL of water.


Percent of samples with *E. coli* levels under 410 MPN per 100 mL

- 100% — Excellent
- 90-99% — Good
- 80-89% — Moderate
- 70-79% — Moderately Poor
- 60-69% — Poor
- 0-59% — Very Poor

RCA bacteria monitoring sites located within the City of Charlottesville and Albemarle County

In freshwater, VADEQ considers *E. coli* concentrations under **410 MPN per 100 mL** to be safe for recreation.

In summer 2024, all Rivanna River sites had *E. coli* levels under this threshold more than 80% of the time, with Rivanna River - Palmyra (#1) being under this threshold 100% of the time.
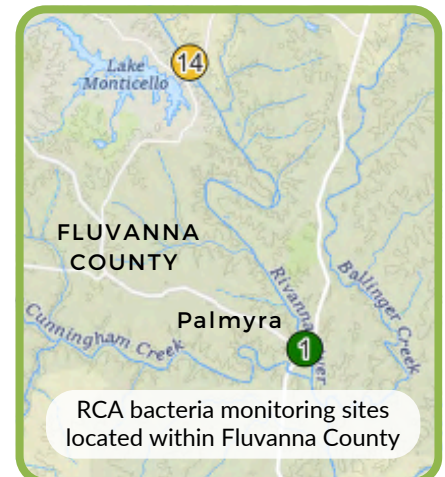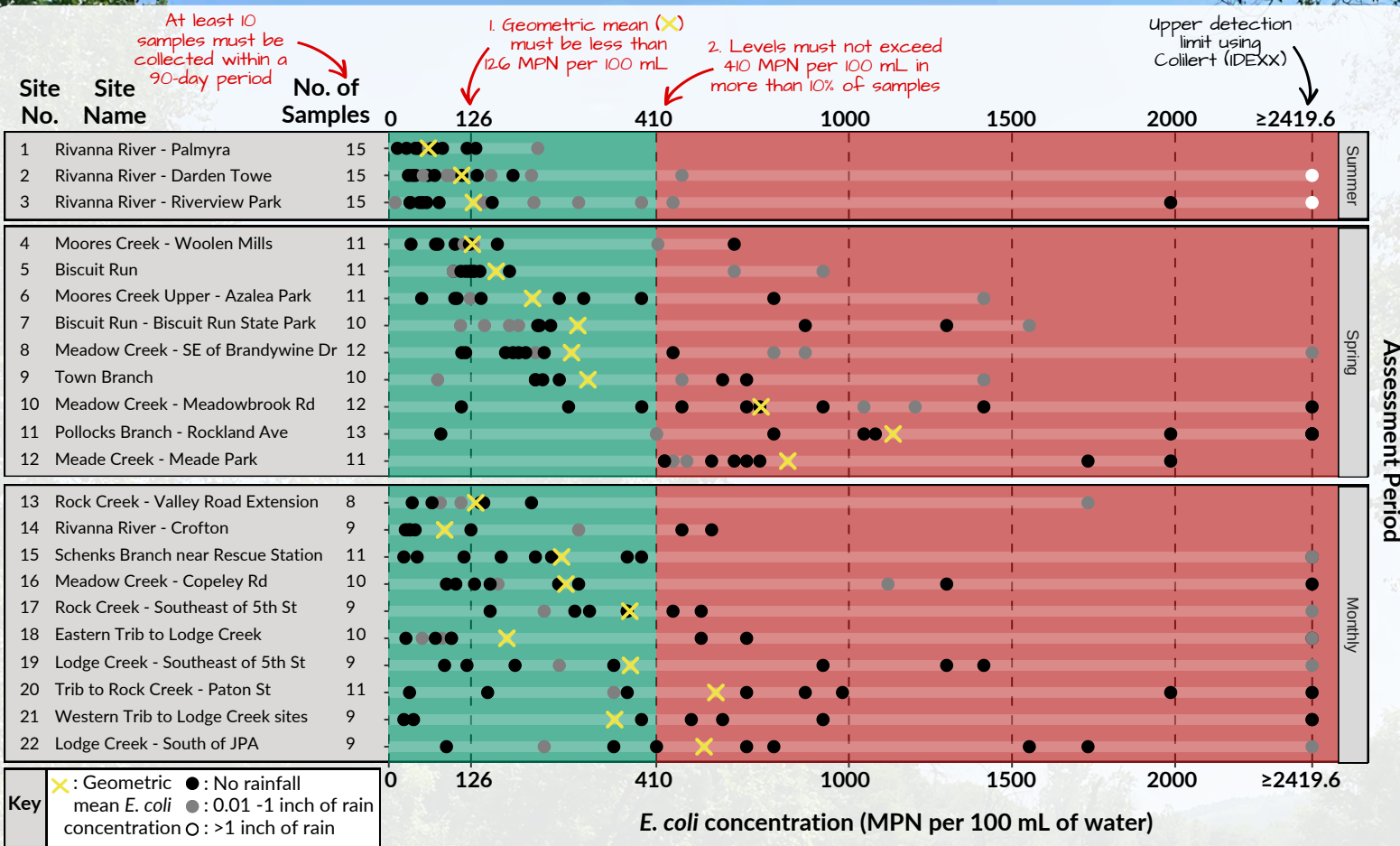

RCA bacteria monitoring sites located within Fluvanna County

VADEQ uses specific criteria to determine if a site meets or "supports" Virginia's revised recreational water quality standard (shown in red text below). Sites support the standard if 10 or more samples are collected in a 90-day period and both of the following hold:

1. The geometric mean *E. coli* concentration does not exceed 126 MPN per 100 mL.
2. *E. coli* levels do not exceed 410 MPN per 100 mL more than 10% of the time.

When fewer than 10 samples are collected in a 90-day period, a site will fail to meet the standard if *E. coli* levels exceed 410 MPN per 100 mL in two or more samples. If sites have fewer than two exceedances, more data is needed to assess their compliance.

During spring and summer, 10 or more samples were collected within 90 days at 12 RCA monitoring sites. Rivanna River - Palmyra (#1) was the only site in 2024 to support Virginia's revised standard, having a geometric mean *E. coli* concentration of 61 MPN per 100 mL and no samples exceeding 410 MPN per 100 mL. The other 11 sites (#2-#12) had two or more exceedances and therefore failed to meet the standard. All monthly monitoring sites had fewer than 10 samples collected in a 90-day period. One monthly site (#13) had fewer than two exceedances but had insufficient data to determine compliance with the standard. Nine sites (#14-#22) had two or more exceedances and therefore failed to meet the standard.

Site No.	Site Name	No. of Samples
1	Rivanna River - Palmyra	15
2	Rivanna River - Darden Towe	15
3	Rivanna River - Riverview Park	15
4	Moores Creek - Woolen Mills	11
5	Biscuit Run	11
6	Moores Creek Upper - Azalea Park	11
7	Biscuit Run - Biscuit Run State Park	10
8	Meadow Creek - SE of Brandywine Dr	12
9	Town Branch	10
10	Meadow Creek - Meadowbrook Rd	12
11	Pollocks Branch - Rockland Ave	13
12	Meade Creek - Meade Park	11
13	Rock Creek - Valley Road Extension	8
14	Rivanna River - Crofton	9
15	Schenks Branch near Rescue Station	11
16	Meadow Creek - Copeley Rd	10
17	Rock Creek - Southeast of 5th St	9
18	Eastern Trib to Lodge Creek	10
19	Lodge Creek - Southeast of 5th St	9
20	Trib to Rock Creek - Paton St	11
21	Western Trib to Lodge Creek sites	9
22	Lodge Creek - South of JPA	9

Annotations on chart:
At least 10 samples must be collected within a 90-day period
1. Geometric mean (X) must be less than 126 MPN per 100 mL
2. Levels must not exceed 410 MPN per 100 mL in more than 10% of samples
Upper detection limit using Colilert (IDEXX)

Assessment Period: Summer, Spring, Monthly

X-axis: 0 126 410 1000 1500 2000 ≥2419.6
E. coli concentration (MPN per 100 mL of water)

Key
X : Geometric mean *E. coli* concentration
● : No rainfall
● : 0.01 -1 inch of rain
○ : >1 inch of rain

This plot illustrates the *E. coli* concentration of each water sample collected at RCA's 22 monitoring sites in 2024. Each sample is represented by one dot, but some dots overlap. Each dot is shaded according to the amount of rainfall recorded within 24 hours prior to sampling. Monitoring sites are grouped into their assessment periods: Summer, Spring and Monthly. Summer and Spring samples were collected over a 90-day period. Monthly samples were collected once a month from March to November.

2024 Data Collected by the Following Volunteer Monitors:

Carol Baber*
Chris Baca*
Greer Baca
Rick Barnett
Andrew Begley
Hadley Booth
Peter Boucher*
Rick Bowers
Tammy Bowers*
Lindsay Bragg*
Nick Bragg
Samuel Brandt*
Jenn Bridges
Isabel Brown*
Cali Busch*

Tony Busch
Tina Colom*
Deirdre Curran
Maura Duffy
Holly Duke
Philip Dupont
Sam Dupont*
Aly Dwight
Ken Fizer
Mark Foley*
Alice Frei*
Andrew Gneiting*
Lauren Grace
Jill Greiner*
Allen Hammer

Ned Harris*
Devon Hathaway*
Gareth Hunt
Dakota Hunter
Shaina Huynh*
Carly Koura*
Beth Kuhn*
Holly Lafferty*
Willow Lovecky
Keggie Mallett
Courtney McLaughlin
Neil Means*
Sarah Medley*
Vicki Metcalf*
Sharon Meth*

Brit Minor
Maggie Morris
Bob Morris
Alex Muirhead
Jim Nix*
Jeff Pacelli*
Liz Palmer
Dan Pelletier
Autumn Pembleton
Anne Poland
Joe Poland
Dot Preis*
Jennifer Price
Cay Lee Ratliff*
Maya Ratliff*

Kristina Reid Black*
Liz Reynolds
Grace Ricciardi*
Ami Riscassi*
Meredith Robinson
Andrea Sahli*
Dave Saylor
Steve Sayre*
Llyn Sharp
Karen Siegrist*
David Smith*
Marilyn Smith*
Steve Spence*
Kim Swartz
Esa Taylor

Bob Troy*
Laura Troy*
Carmen Vlasis
Janet Walker*
Laura Whitaker
Bobbie Williams
Peyton Williams
Laurel Williamson*
Jessica Wood
Mike Yuhas
Jane Zimmerman
Jimmy Zunka

Certified Monitor

The Rivanna River watershed drains ~766 square miles of land from Shenandoah National Park to the confluence with the James River at Columbia, Virginia. The Rivanna River is an invaluable asset to the communities in the watershed, providing drinking water and contributing to our local culture, economy, and recreational and environmental resources. The Rivanna also has regional importance as a tributary to the James River and the Chesapeake Bay.

RIVANNA CONSERVATION ALLIANCE

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