

LONG-TERM TRENDS ANALYSIS

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.

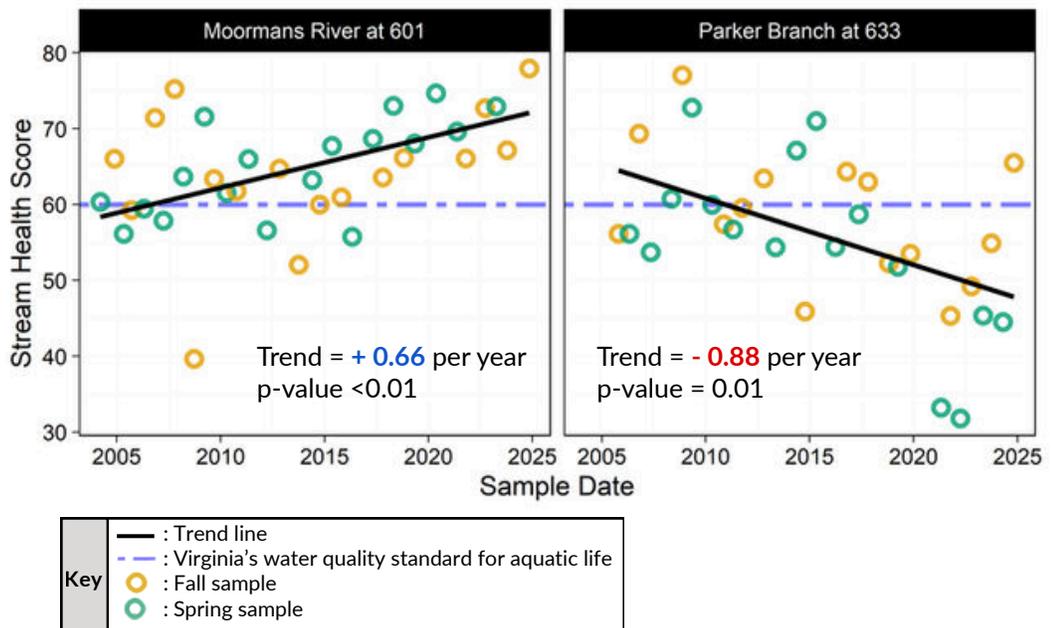
In 2019, RCA conducted its first long-term trends analysis on approximately 15 years of benthic data from all 50 sites. Results are shown in the table below (full report can be found at rivannariver.org/long-term-monitoring-program).

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 *
Moore's 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 $p < 0.01$.



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