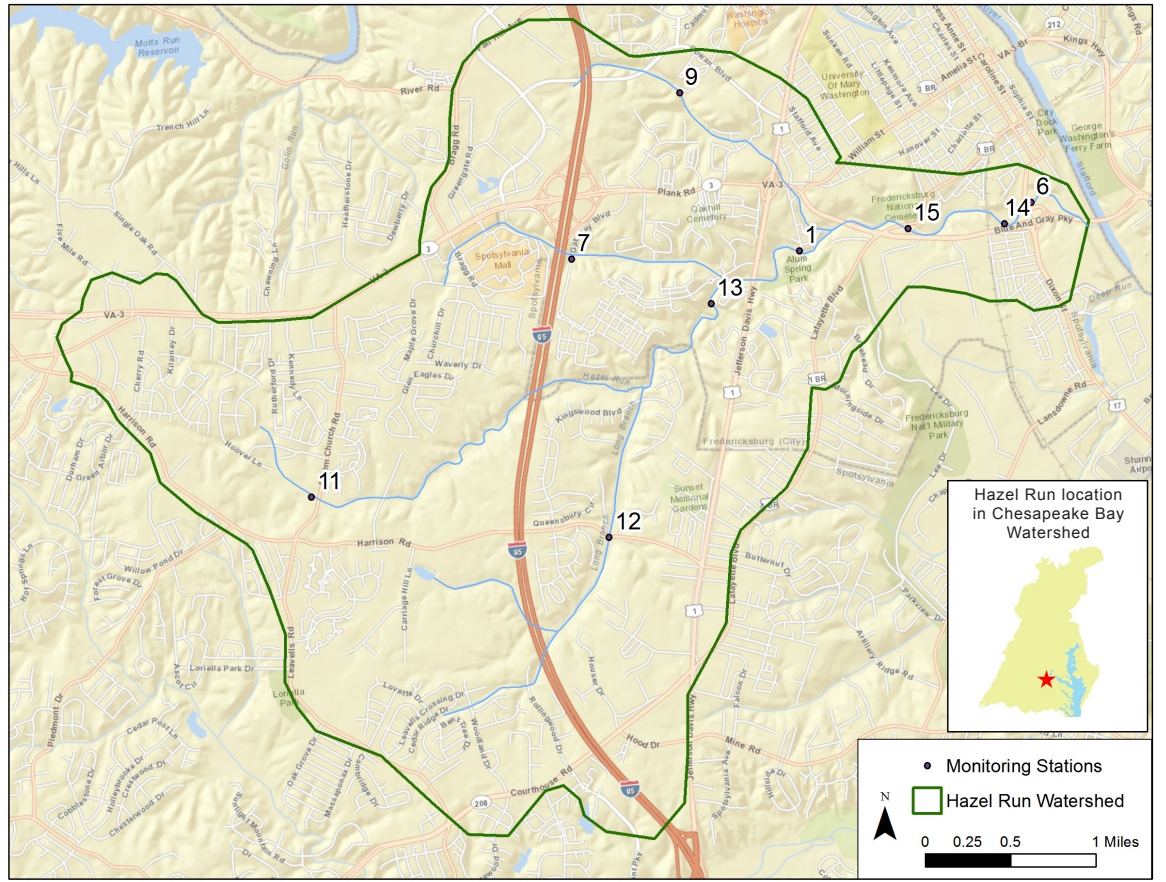


2011-2012 Hazel Run Report Card



Hazel Run, a tributary to the Rappahannock River, is a 17-square mile watershed that starts in Spotsylvania County and flows into the City of Fredericksburg. It is listed as impaired by the VA Department of Environmental Quality (DEQ) for bacterial contamination and degraded macroinvertebrate communities. Over time, due to urbanization, Hazel Run has seen significant increases in polluted runoff and erosion and a decline in biological diversity and water quality.

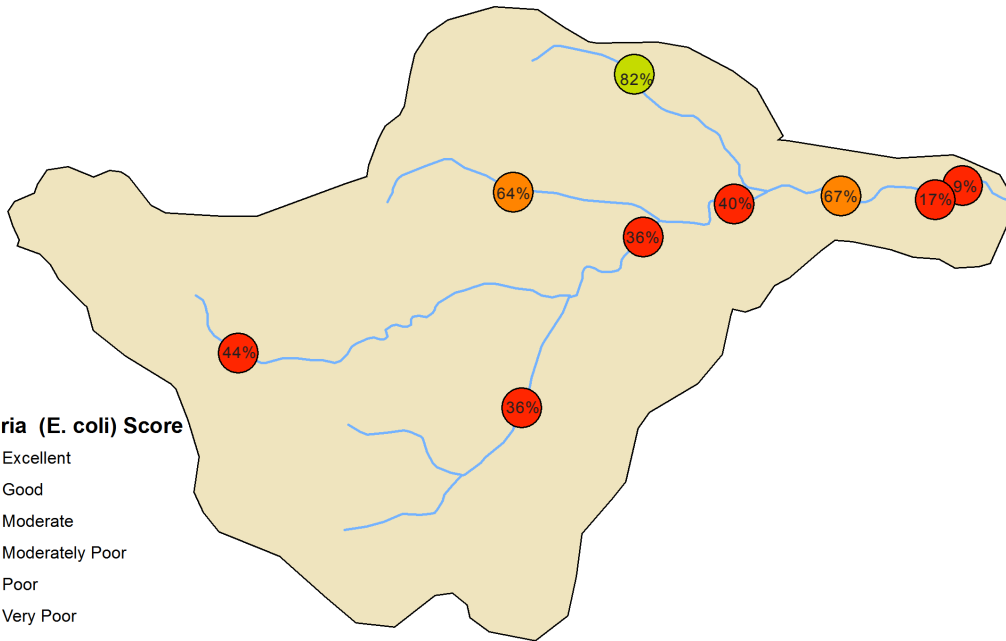


Site	Ecological Health Indicators				Human Health Indicator	
	DO	pH	TN	TP	Bacteria	
1	100% A+	100% A+	95% A+	93% A	40%	Very Poor
6	n/a	n/a	95% A+	63% B-	9%	Very Poor
7	96% A+	64% B-	80% A-	68% B	64%	Poor
9	100% A+	94% A	93% A	90% A	82%	Moderate
11	n/a	n/a	97% A+	67% B	44%	Very Poor
12	n/a	n/a	98% A+	78% B+	36%	Very Poor
13	n/a	n/a	98% A+	75% B+	36%	Very Poor
14	n/a	n/a	n/a	n/a	17%	Very Poor
15	n/a	n/a	n/a	n/a	67%	Poor

This report card summarizes water quality results based on data collected from January 2011 to August 2012. Ecological Health Indicators, which characterize the health of the system for aquatic life, scored relatively high. An overall Ecological Health Indicator grade was not given because the data was spatially and temporally limited. Further testing, including benthic macroinvertebrate monitoring, is required to establish a holistic view of Ecological Health.

Bacteria, which is further featured in this report card, is used as a Human Health Indicator because this data evaluates how safe water is for swimming. Bacteria colonies were abundant, resulting in very low grades and making the waterway unsafe for recreational use.

Bacterial Contamination Significantly Impacts Water Quality



Escherichia Coli is a type of bacteria that occurs only in the intestines and feces of warm blooded mammals. It is used as an indicator species to determine the level of fecal waste contamination which can also carry other bacteria, viruses and protozoans that can cause illnesses in humans. Causes of fecal contamination include: livestock (feeding or slaughter operations), on-site treatment systems (septic), solid waste storage facilities, leaky municipal sanitary sewer lines, urban runoff/storm sewers, and waste from pets, waterfowl and other wildlife.

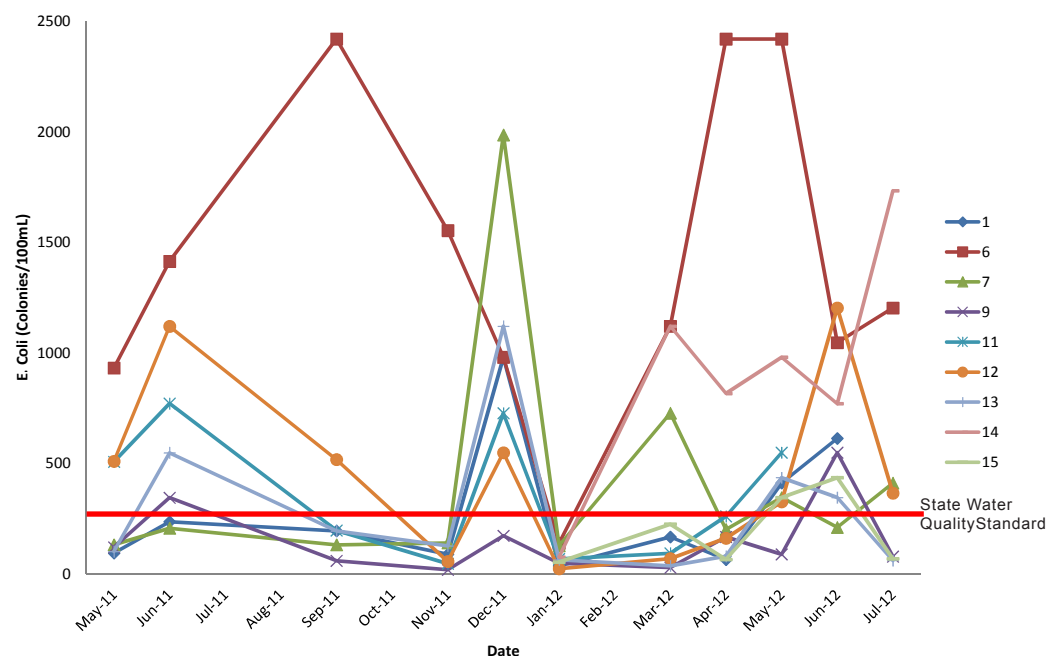
The segment of Hazel Run between the Route I-95 crossing and the confluence of the Rappahannock River is listed as impaired by the VA Department of Environmental Quality on their 305(b)/303(d) Water Quality Assessment Integrated Report. It is cited as impaired for having *E. coli* counts that exceeded state standards on multiple events at multiple stations sampled by VA DEQ. The state standard for *E. coli* for recreational use is 235 colonies/100mL. This level of impairment requires a cleanup plan (referred to in the regulations as "Total Maximum Daily Load") which is due in 2016.

For this study, sampling was performed at 9 stations distributed throughout the watershed. Our findings reinforced VA DEQ's findings with all stations exceeding the state standard on multiple occasions. Exceedance levels varied however, counts were particularly high in the lower watershed with findings of over 2000 colonies/100mL on multiple occasions.

Sites near the confluence frequently had high levels regardless of rainfall indicating that the source may be a septic or sewer system leak or other source that is affecting the base flow and not necessarily coming from surface runoff. Sites in the upper watershed tended to have higher levels during times of higher rainfall indicating that the source is related to surface runoff.

Using this data along with field surveys and an analysis of local land use, sewer line placement and pipe outflows into the stream, pollution "hot spots" have been located. This source identification data is being provided to local jurisdictions in an effort to aid the cleanup of Hazel Run.

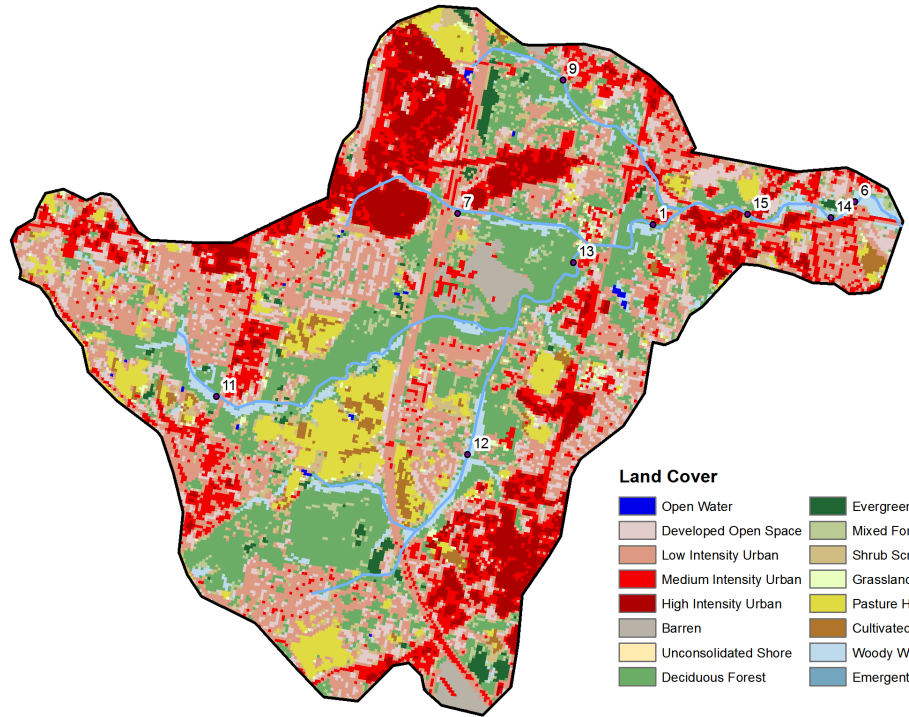
Bacteria (E. coli) in Hazel Run



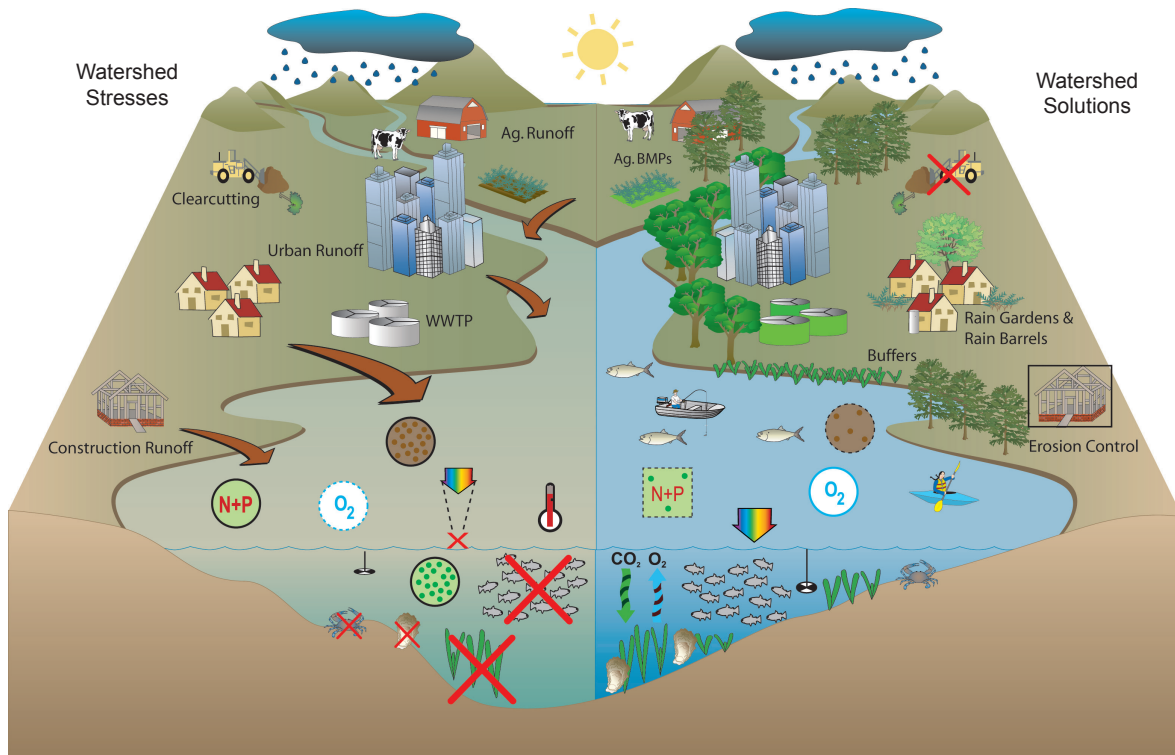
Urban Areas Contribute to Runoff

The Hazel Run watershed is about 55% urbanized and about 24% forested. Impervious cover (i.e. parking lots, buildings, and roads) in urbanized areas increases the potential of stormwater runoff. Stormwater runoff carries pollutants such as excess nutrients (Total Nitrogen and Total Phosphorus), sediments, and bacteria, to streams. These pollutants degrade the water quality in the stream, sometimes to a point where fish and other aquatic life cannot survive (see "Watershed Stresses" in the diagram below).

Property owners can install practices that help capture stormwater runoff, thus decreasing the amount of pollutants that reach the stream. For example, a rain garden, which is a planted depression with permeable soils, allows stormwater runoff to soak into the garden, where it is filtered by the plants and soil. Forested buffers along streams also provide infiltration and filtering of stormwater runoff.



2006 National Land Cover Dataset Classifications in the Hazel Run Watershed



- | | |
|------------------------|------------------------------------|
| Nitrogen & Phosphorus | Healthy Nitrogen & Phosphorus Load |
| Sediment | Healthy Sediment Load |
| Algae Bloom | High Dissolved Oxygen |
| Low Dissolved Oxygen | Sunlight for plants |
| Reduced Water Clarity | Good Water Clarity |
| No sunlight for plants | Photosynthesis for SAV growth |

Conceptual diagram of stormwater runoff impacts on watershed systems (Watershed Stresses) and ways to help reduce stormwater runoff (Watershed Solutions). Symbols courtesy of the Integration and Application Network. (ian.umces.edu/symbols)

Help Make Hazel Run Cleaner



A rain garden at a home in Spotsylvania County.

Everyone can help clean up Hazel Run!

- Reduce fertilizer and pesticide use.
- Pick up your pet's waste.
- Discourage the feeding of geese and other waterfowl.
- Install a rain barrel or rain garden and plant native species to keep stormwater on your property.
- Watch (and smell) for sewage overflows and contact your city or county.
- If you have a septic system, have it inspected and pumped regularly.
- Support sewage treatment plant and septic system upgrades.
- Farmers can implement Best Management Practices (BMPs): plant cover crops and fence livestock out of streams.
- Businesses can use green practices that are protective of water quality.
- Leave or plant tree buffers on stream banks.
- Volunteer with or form a community watershed organization.

How the Grades are Calculated

Report card grades are based on data collected by RiverTrends citizen scientists. Volunteers are trained according to procedures outlined in our DEQ approved Quality Assurance Project Plan (QAPP), which sets standards for data collection that assure the data are comparable to data collected by universities and government agencies. Nutrient and *E. coli* data were analyzed at a state certified lab.

Grades were calculated using the Mid-Atlantic Tributary Assessment Coalition's "Sampling and data analysis protocols for Mid-Atlantic non-tidal tributary indicators". Data was collected from January 2011 to August 2012, however the data was spatially and temporally limited. While DO and pH data was collected for the full time frame, it was only collected at 3 sites. TN and TP data was collected from September 2011 to August 2012, while bacteria data was collected from May 2011 to August 2012. Thus, an overall watershed health grade was not calculated.



Citizen Scientists Sara Hagan and Janet Wright collect water samples at Site 15.

This report was funded by a Chesapeake Bay Restoration Fund grant to the Alliance for the Chesapeake Bay (Alliance). The Alliance coordinates RiverTrends, a regional volunteer water quality monitoring program. Friends of the Rappahannock participates in the RiverTrends program and coordinates monitoring on Hazel Run and at other sites in the Rappahannock watershed. For more water quality data collected through these efforts, please visit the Alliance's Database at <http://www.alliancechesbay.org/monitoring/data/site.cfm>. To find out how to become a water quality monitor, visit www.allianceforthebay.org. For more information on the Hazel Run and the Rappahannock, please visit www.riverfriends.org.



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