Implementing Best Management Practices and Other Restoration Efforts to Improve the Quality of Streams in the Upper Hazel Watershed

Impaired Waterbody Improved:

The Hazel River watershed covers approximately 225,990 acres and includes the Hughes, Rush, Thornton and Hazel Rivers (**Figure 1**). The Hazel River originates in Rappahannock County and continues downstream to its confluence with the Rappahannock River. The Virginia Department of Environmental Quality (DEQ) first listed the Hazel River and its tributaries on Virginia's 303(d) list of impaired waters for violations of the bacteria water quality standard in 2002 and 2004. A Total Maximum Daily Load (TMDL) study was completed to address these impairments in 2007. In June 2009, a TMDL Implementation Plan (IP) was completed, followed by a 319 grant funded implementation project that began in July 2009. Additionally, this project has been awarded a Section 319(h) funds for implementation through June 2019. To reduce bacteria loadings, various agricultural and residential best management practices (BMPs) have been employed; through a mix of 319(h) and other federal, state, landowner, and private foundation funds and incentives. Implementing agricultural and septic system BMPS on the ground and providing sewer service to approximately 98 households/businesses in the Rush River watershed has reduced bacterial inputs both from point and non-point sources. Stream quality is beginning to respond to these efforts, as can be seen in **Figure 2** and **Figure 3**.

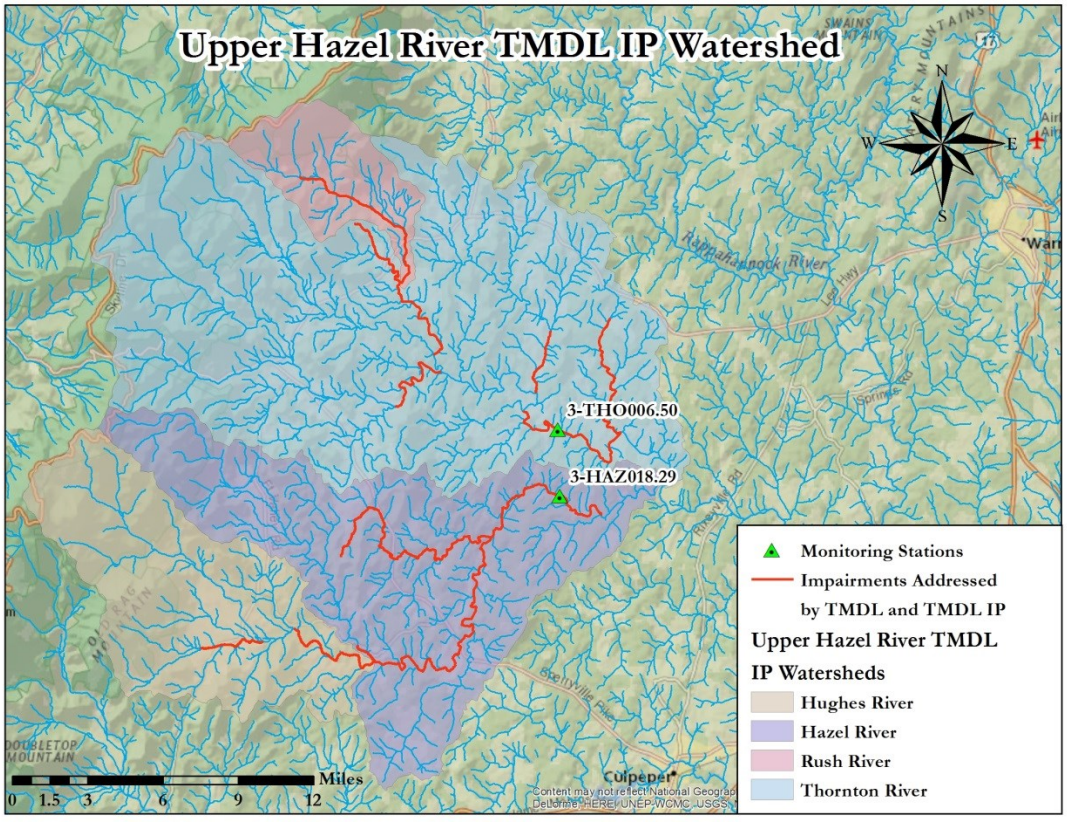

Figure 1. Map of the Upper Hazel River TMDL IP Watershed.

Cleaning up the Hazel: The Actions of Many

Even before the IP was developed, diverse partnerships formed to address the impaired streams in the area. Groups including the Culpeper Soil and Water Conservation District (CSWCD), RappFLOW, Rappahannock County, Piedmont Environmental Council and the Virginia Department of Health (VDH) formed alliances early on to begin to address the bacteria impaired streams. Beginning in 2006, the Department of Conservation and Recreation's (DCR) Water Quality Improvement Fund (WQIF) issued several grants that aided in public education about homeowner actions like septic system maintenance and rain garden demonstrations. These grant projects, "Implementing the Strategy: The Rappahannock River Starts Here" and the "Clean Streams Initiative" in Rappahannock County supported the development of:

- A local stormwater ordinance;
- Enhancement of the local erosion and sediment control program;
- Identification of zoning and subdivision ordinance changes to better support water quality protection;
- Public seminars on various water quality topics; and
- The promotion of septic system maintenance and repairs county wide with several areas selected to receive cost-share for septic tank pump-outs and system repairs.

In 2008, Rappahannock County Government, with the assistance of the CSWCD and VDH administered the Rappahannock County Septic System Cost-Share Program Expansion through WQIF funding for septic system pump-outs, repairs, and/or replacements targeted to the Upper Hazel TMDL Watershed area. Emphasis was placed on septic repairs and replacements. The partner groups recognized the need for this program and were able to continue assisting homeowners using 319 funds once they were available for the entire IP area. Agricultural BMPs such as livestock exclusion from streams, stream buffers and permanent vegetation on cropland also gained popularity once the 319 project began in 2009 (see **Table 1**). In 2009, the Krebser Fund/Piedmont Environmental Council pledged $50,000 to reimburse landowners in Rappahannock County who installed stream exclusion fencing to protect water quality. In combination with state and federal incentive programs, this contribution made it cost-neutral for farmers to fence livestock out of streams and provided an incentive for new stream fencing participants. Between July 1, 2013 and June 30, 2015, 100% cost share was offered by the Department of Conservation and Recreation for stream exclusion practices including watering systems. The Culpeper SWCD administers the agricultural and residential BMP programs and continues to be active in the Upper Hazel water quality improvement efforts. Recently, residential septic program activity has increased greatly, and additional incentive funding from the Krebser Fund has again made agricultural conservation practices more attractive to area producers.

The TMDL IP addresses failing and failed septic systems by assigning a goal for repairing and/or replacing these systems. Phase 1 of the TMDL IP has a goal of addressing failing or failed septic systems for 1,346 homes. In the Town of Little Washington within the Rush River watershed, 98 residences and business were connected to the new municipal waste water treatment system

in April 2010. For many years, the historic village – nestled in the heavily wooded and rolling hills near the Shenandoah National Park – experienced problems with malfunctioning septic systems due to aging systems and poorly drained soils. As well, with a footprint much the same as that established by George Washington in 1749, including small lots and little room for reserve septic drainfields, it was determined that the wastewater system would provide the best protection to local ground and surface waters. Although connections to sewer were not originally listed as a practice in the IP, this action meets 7% of the goal of addressing failed or failing systems.

Practice*	Needed	Installed by 8/30/18	%	Units
Stream Exclusion Fencing	2,307,360	267,853	11.6%	Linear Feet
Stream Exclusion Systems	1,072	93	8.7%	System
Riparian Buffer on Cropland	283	95	33.6%	Acres
Septic Tank pumpout	0	331	n/a	Homes
Total Failing/Failed or straight pipes addressed	1346	208	15.5%	Homes
- Septic System Repair	443	90	20.3%	Homes
- Septic System Installation	673	41	6.1%	Homes
- Alternative Onsite Waste Sewage System	230	2	1%	Homes
- Conversion to Sewer		98	n/a	Homes

Table 1 Non-point source pollution reduction progress
*Information pulled from DCR Tracking Program 7/1/2007 to 8/30/2016, with the exception of conversion to sewer. Does not include unreported best management practices

Results

Following the extensive implementation of BMPs outlined in the sections above, water quality data from 2007 through 2017 was analyzed to determine the impact of BMPs on the annual trend in bacteria water quality standard violation rates. The bar graphs (**Figure 2** and **Figure 3**) show the percent violation rate for samples collected annually that did not meet the 235 cfu/100ml water quality criteria. The number of samples collected each year is shown in the denominator of the violation rates above each bar. The graph shows a decreasing trend in violation rates over the sampling period, indicating improvements in water quality in the Upper Hazel Watershed. This along with the continued interest in the CSWCD's programs and community educational efforts suggests that progress is being made towards the goals set in the implementation plan and that citizens are well on the way to restoring the headwaters of the Rappahannock River.

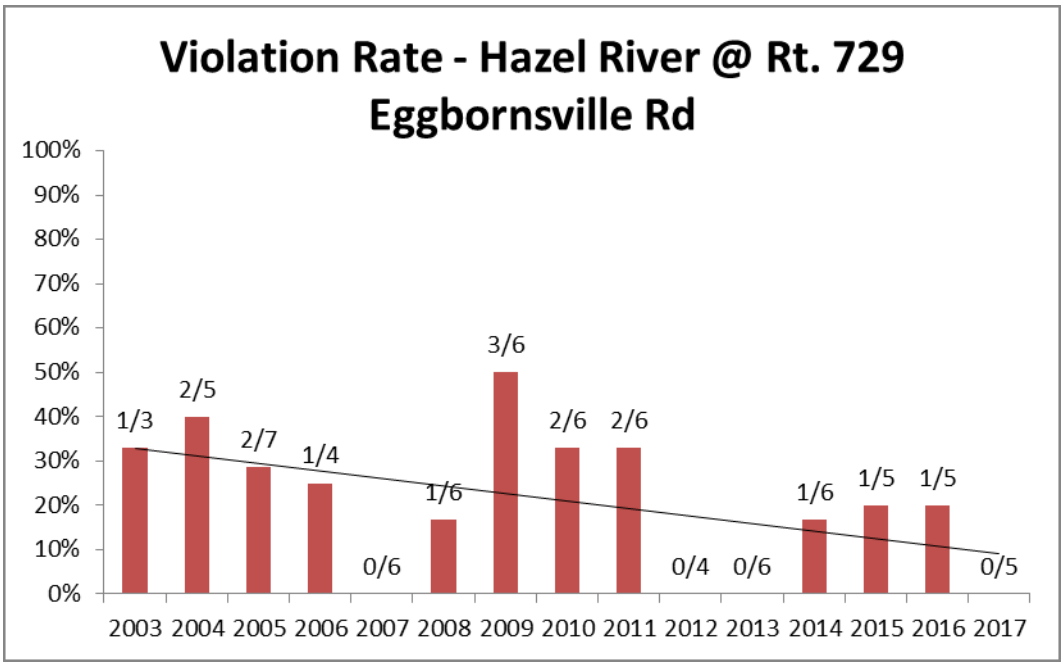

Figure 2. Annual percent violation rates for Hazel River DEQ Monitoring Station 3-HAZ018.29

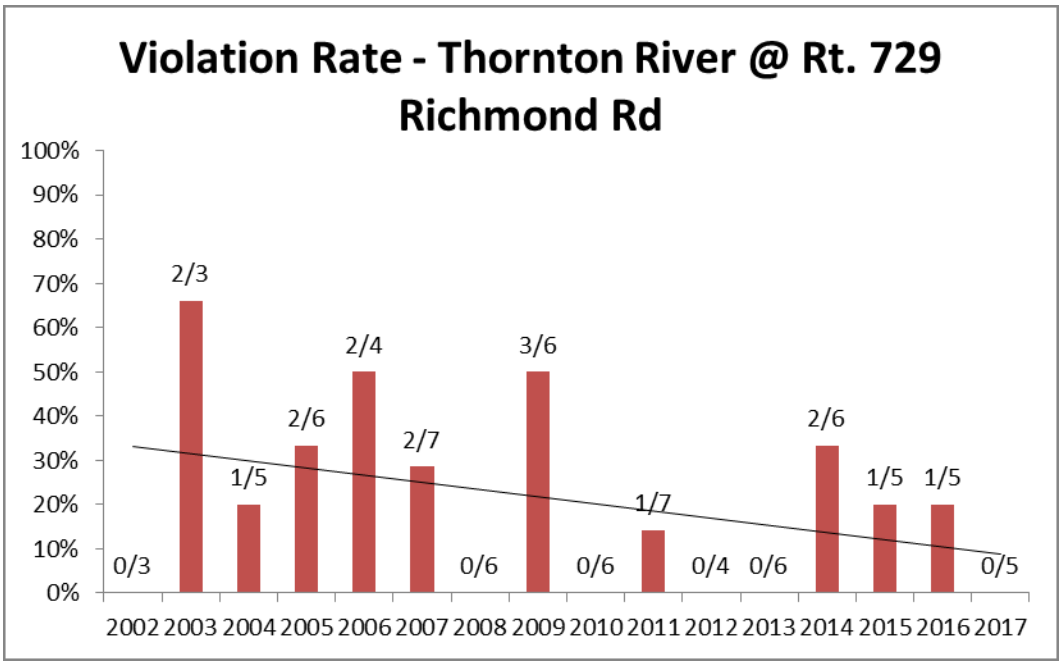

Figure 3. Annual percent violation rates for Thornton River DEQ Monitoring Station 3-THO006.50

Figure 4. Stream exclusion practice – Covington River-Thornton River-Hazel River