



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Virginia

Implementing Best Management Practices Improves Carter Run

Waterbody Improved

In 1998 the Virginia Department of Environmental Quality (DEQ) added Carter Run to the state's Clean Water Act (CWA) section 303(d) list of impaired waters for violating the state's bacteria standard. To reduce bacteria loadings, various agricultural and residential best management practices (BMPs) were installed through a total maximum daily load (TMDL) implementation project supported by federal, state, and landowner funds. Implementing BMPs significantly reduced in-stream bacterial concentrations, resulting in reduced *Escherichia coli* violation rates. As a result, DEQ expects that Carter Run will be removed from the state's CWA section 303(d) list of impaired waters in the near future.

Problem

Carter Run is in the Upper Rappahannock River Basin in the Chesapeake Bay watershed. The Carter Run watershed spans approximately 35,580 acres in northern Virginia's Fauquier County (Figure 1). The primary land uses are forest (63 percent), agricultural (35 percent), and residential (2 percent).

Virginia's current *E. coli* water quality criteria require that bacteria levels be less than a geometric mean concentration of 126 colony-forming units (cfu) per 100 milliliters (mL) based on all data collected during any calendar month, with a minimum of four weekly samples. If too few data points are available to calculate the monthly geometric mean, no more than 10 percent of the total samples in the assessment period may exceed 235 cfu/100 mL.

Of 17 water quality samples collected during the 1998 assessment period (1992–1996), five exceeded the bacteria water quality standard necessary to ensure support of the primary contact recreation designated use. DEQ placed a 3.55-mile segment of Carter Run (VAN-E02R-01) on the 1998 CWA section 303(d) list of impaired waters because it failed to meet the state's water quality standard for fecal bacteria. Monitoring data indicated that Carter Run continued to violate the bacteria standard during the 2002 and 2004 Virginia Integrated Report assessment periods (1996–2000 and 1998–2002). Biological source tracking data indicated that most of the in-stream fecal bacteria were from human, pet, livestock, and wildlife sources. To help identify and address the pollution problems, the state developed TMDLs for bacteria for Thumb Run (VAN-E01R-01) in 2002, Deep Run (VAN-E10R-01) in 2004, and Carter Run (VAN-E02R-01) and Great Run (VAN-E02R-02) in 2005.

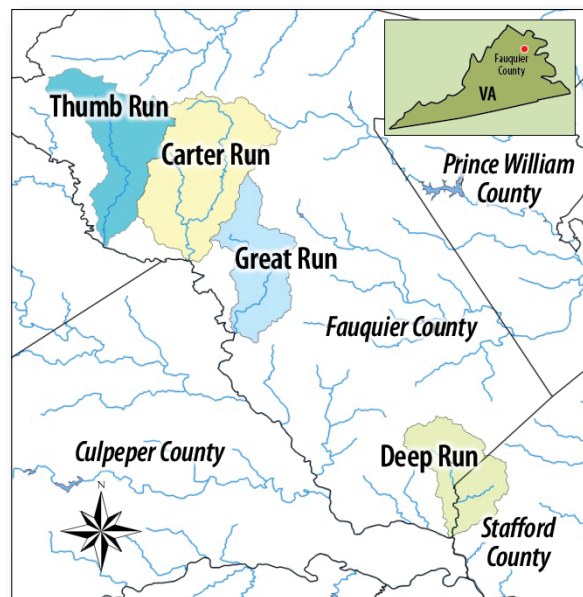


Figure 1. Carter Run watershed (yellow), one of several TMDL watersheds in Fauquier County.

Project Highlights

In 2006 the Virginia Department of Conservation and Recreation (DCR) and John Marshall Soil and Water Conservation District (JMSWCD), with input from other government agencies and stakeholders, completed a TMDL implementation plan for the four impaired waterbodies (Carter Run, Thumb Run, Deep Run, and Great Run) and began a CWA section 319 implementation project to restore them. As part of this project, JMSWCD joined with state and federal agencies, including DCR, DEQ, the Fauquier County Health Department (FCHD), and the U.S. Department

of Agriculture's Natural Resources Conservation Service (NRCS), to promote various agricultural and residential BMPs. The partners provided BMP tours, engaged in outreach activities for farmers and residents, and met with community members to discuss water quality improvement. Other outreach efforts included writing newspaper articles, mailing information to watershed landowners, and making presentations to community organizations.

Watershed stakeholders installed a total of 143 agricultural and residential projects in the Carter Run watershed from 2007 to 2012. The agricultural practices included 156,266 feet (29.6 miles) of livestock stream exclusion fencing, 81 acres of permanent vegetative cover on cropland, 58 acres of riparian forest buffer, and 93 acres of harvestable cover crops. The residential practices completed in the watershed included 86 septic tank system pump-outs, 24 septic system repairs, and six septic system installations or replacements.

Results

DCR maintains a BMP-tracking database and computes pollutant reductions for BMPs installed. When DCR staff compared pollutant reductions in the periods before and after the Carter Run implementation project began, they identified significant reductions in bacteria, nitrogen, phosphorus, and sediment loadings (Table 1).

As part of an ambient monitoring program, DEQ collected Carter Run *E. coli* data for 2002–2012 at a long-term-trend monitoring station. Figure 2 shows the number of *E. coli* samples collected and the rate of violation of the bacteria single-sample maximum criterion of 235 cfu/100 mL annually. Violation rates declined from a rate of 50 percent in 2006 (at the start of the implementation project) to 0 percent in both 2010 and 2012. For the 2014 assessment period (2007–2012), DEQ identified an overall violation rate of 18 percent, still exceeding the 10 percent threshold. The monotonic trend line drawn through the violation rates on Figure 2 shows a decreasing correlation (*E. coli* violation rate versus sampling year), indicating that violation rates have significantly decreased. As a result, DEQ expects that Carter Run

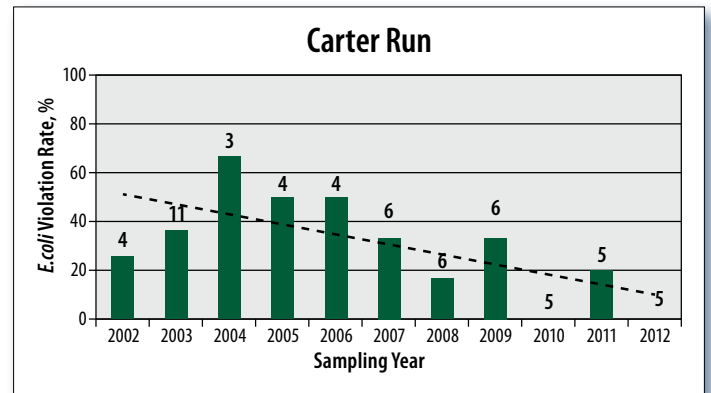


Figure 2. *E. coli* violation rates (exceeding 235 cfu/100 mL standard) in Carter Run. The numbers above the bars indicate the number of samples collected annually.

will be removed from the state's CWA section 303(d) list of impaired waters in the near future.

Partners and Funding

JMSWCD led the implementation of the agricultural BMP program. FCHD managed the technical assistance and educational outreach parts of the residential BMP program. NRCS and the Virginia Cooperative Extension Service also assisted with the agricultural components of this project by providing financial and technical support. Several other partners, including DCR and DEQ, contributed to the project's success. Technical staff support within JMSWCD and FCHD was funded by CWA section 319 grants. The total cost of installing BMPs in the Carter Run watershed was \$783,626; funding sources included \$261,417 in CWA section 319 funds, \$366,949 in state DCR cost-share funds (including state Conservation Reserve Enhancement Program and other cost-share programs), and \$45,262 in federal NRCS Conservation Reserve Enhancement Program funds. Farmers and residents in the watershed provided the remaining \$109,998 (approximately 14 percent of the total BMP installation costs). Since 2005 JMSWCD and FCHD have received approximately \$186,181 in CWA section 319 funding to provide technical assistance with BMP design and implementation, as well as educational outreach in the Carter Run watershed.

Table 1. Pollutant Reductions (Edge-of-Field) Before and After Implementation

Project	Time period	Bacteria (cfu)	Nitrogen (pounds)	Phosphorus (pounds)	Sedimentation/Siltation (tons)
Carter Run Watershed	2002–2006	0.00 E+00	10,849	1,596	1,994
	2007–2012	7.93 E+15	56,914	8,232	10,290



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