



# NONPOINT SOURCE SUCCESS STORY

## Virginia

### Water Quality Improved after Implementing Best Management Practices in the Upper Robinson River Watershed

#### Waterbodies Improved

Sources of bacteria primarily from livestock, failing septic systems, pet waste and wildlife contributed to three segments of Virginia’s Robinson River violating the state water quality standards for bacteria. As a result, the Virginia Department of Environmental Quality (DEQ) added these segments (a total of 7.15 miles) to Virginia’s 2002 Clean Water Act (CWA) section 303(d) list of impaired waters for failing to attain the river’s primary contact recreation designated use. Improved water quality in the 2005–2010 and 2007–2012 assessment periods coincided with the installation of agricultural and residential best management practices (BMPs) in the watershed. As a result, Virginia removed three segments from the impaired waters list: two segments (3.42 miles and 0.73 miles long, respectively) in 2012 and a third segment (3 miles long) in 2014.

#### Problem

The Upper Robinson River watershed is in Madison County, Virginia (Figure 1). The 30,892-acre watershed includes forest land (84 percent), pasture/hayland (15 percent), cropland (1 percent), and residential land (1 percent). The Upper Robinson River drains into the Rapidan River, which joins Rappahannock River, a tributary of the Chesapeake Bay.

The impaired segments – 3.42 miles (VAN-E14R\_ROB01A06), 0.73 miles (VAN-E14R\_ROB01B06), and 3 miles (VAN-E14R\_ROB01C00) – were initially listed as impaired for fecal coliform in 2002 on the Commonwealth of Virginia’s Section 303(d) List of Impaired Waters. The segments were subsequently listed in 2006 for not supporting the state’s new *Escherichia coli* water quality standard for recreation/swimming designated uses. The impaired segments begin at the confluence of Rose River and continue downstream to the lower portion of the Upper Robinson River watershed.

Virginia’s bacteria standard requires that no more than 10 percent of samples taken during an assessment period (based on a minimum of 12 samples) may have *E. coli* levels exceeding 235 colony-forming units (cfu) per 100 milliliters (mL) of water. The water quality samples collected from 2003 to 2004 at monitoring station 3-ROB017.24 (for segments VAN-E14R\_ROB01A06 and VAN-E14R\_ROB01B06) showed

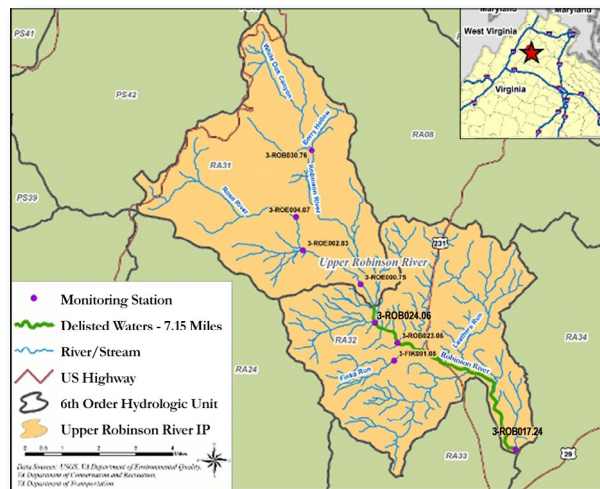


Figure 1. Robinson River is in north-central Virginia.

violations of the bacteria water quality standard 15 percent of the time. The samples collected at station 3-ROB024.06 (for segment VAN-E14R\_ROB01C00) showed violations of the water quality standard 40 percent of the time.

DEQ developed bacteria total maximum daily loads (TMDLs) in 2005 for impaired segments in the Upper Robinson River, Lower Robinson River and Little Dark Run watersheds. The Virginia Department of Conservation and Recreation (DCR) developed a TMDL implementation plan in 2011 to address implementation of the bacteria TMDLs in these watersheds.

The plan included input from federal, state and local government agencies, watershed stakeholders and residents.

## Project Highlights

Implementing agricultural and residential BMPs was administered by the Culpeper Soil and Water Conservation District (CSWCD) in conjunction with other federal, state and local agencies. Partners contacted landowners to encourage them to install agricultural and residential BMPs in the watershed. They conducted one-on-one meetings with individual farmers, residents and stakeholders and explained the benefit of water quality improvement on livestock health, in particular, and on the watershed environment, in general.

The outreach efforts have resulted in a variety of BMP installations. Based on data retrieved from DCR's BMP Tracking Database (2003–2012), landowners have installed agricultural and residential BMPs in the Upper Robinson River watershed. The agricultural practices include installing approximately 23,530 linear feet (4.5 miles) of livestock stream exclusion fencing, 2,418 acres of small grain and mixed cover crop, and 352 acres of harvestable cover crop. The residential practices include 22 septic system pumpouts and two alternate waste treatment system installations.

## Results

Agricultural BMPs helped reduce bacteria loadings from manure deposited from grazing livestock on pasture and surface water runoff from cropland. Progress in reducing the bacteria loadings and water quality improvements in the impaired segments was evident by the decreasing violation rates seen in the bacteria levels at monitoring stations at river miles 17.24 and 24.06 (Figure 2). DEQ personnel collected bacteria samples from various water quality monitoring stations under the ambient water quality monitoring program.

Of 32 water samples collected from January 2005 through December 2010 at monitoring station 3-ROB017.24 (segments VAN-E14R\_ROB01A06 and VAN-E14R\_ROB01B06), only two samples (6 percent) exceeded the *E. coli* standard (Figure 2). Also, out of 10 samples collected during January 2007 through December 2012 at monitoring station 3-ROB024.06

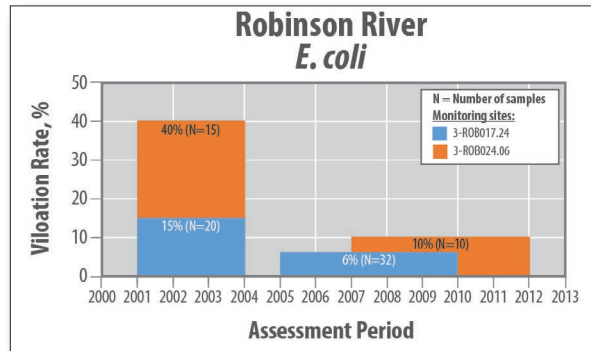


Figure 2. Bacteria violation rate (%) at two monitoring stations in the Upper Robinson River watershed.

(segment VAN-E14R\_ROB01C00), only one sample (10 percent) exceeded the *E. coli* standard (Figure 3). The decreasing violation rates show significant improvement in water quality conditions for all three impaired segments listed above. As a result, Virginia DEQ removed three segments (a total of 7.15 miles) from the impaired waters list: two segments (3.42 miles and 0.73 miles long, respectively) in 2012 and a third segment (3 miles long) in 2014.

## Partners and Funding

The water quality improvement and delisting of three impaired segments in the Upper Robinson River watershed has primarily resulted from the outreach and financial and technical assistance administered by CSWCD, and several state and federal agencies including DCR, DEQ and the U.S. Department of Agriculture (USDA) Natural Resource Conservation Service. Funding for the agricultural and residential BMP cost share was provided through the state Water Quality Improvement Fund and Virginia Natural Resources Conservation Fund (\$67,478), the USDA Farm Service Agency's Conservation Reserve Enhancement Program (\$3,685), and the Chesapeake Bay Livestock Exclusion Initiative (\$65,223). CSWCD received technical assistance funding from state general funds at an average of \$50,000–\$100,000 per year for all operations. Virginia also provided \$1,696 in the form of tax credits issued to farmers implementing BMPs. No designated CWA section 319(h) funds were provided directly to CSWCD for the Upper Robinson River. The Virginia 319(h) program funded the TMDL Implementation Coordinator and other nonpoint source TMDL staff that worked with CSWCD during this time and provided technical services for TMDL implementation.



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