



NONPOINT SOURCE SUCCESS STORY

Virginia

Installing Residential and Agricultural Best Management Practices Reduces Bacteria in Big Chestnut Creek

Waterbody Improved

High bacteria loadings led to violations of Virginia's water quality standard (WQS) for designated recreation (swimming) use in Big Chestnut Creek. As a result, the Virginia Department of Environmental Quality (DEQ) added the creek to its 2004 Clean Water Act (CWA) section 303(d) list of impaired waters. From 2007 through 2012, stakeholders installed various agricultural and residential practices in the Big Chestnut Creek watershed that decreased nonpoint source runoff. As a result, Virginia DEQ removed Big Chestnut Creek from its 2014 list of impaired waters based on attainment of the bacteria WQS.

Problem

The 39,205-acre Big Chestnut Creek watershed is in Franklin County, Virginia, and is a part of the Pigg River watershed. The watershed lies within the Roanoke River basin. The impaired segment extends from the confluence with Little Chestnut Creek to the confluence with the Lower Pigg River (Figure 1). The watershed's land cover is predominantly forest (77 percent), followed by pasture (20 percent). High-density residential and cropland account for the remainder of the land cover.

DEQ listed a 12.4-mile segment of Big Chestnut Creek (VAW-L15R-01) as impaired for fecal coliform bacteria on Virginia's 2004 CWA section 303(d) list because it failed to meet the state's fecal coliform bacteria-based WQS for its designated recreation (swimming) use at monitoring station 4ACNT001.32. The state changed its bacteria WQS to one based on *Escherichia coli* levels in mid-2003. The new WQS requires that samples not violate the single sample maximum value of 235 colony-forming units (cfu) per 100 milliliters (mL) of water more than 10 percent of the time, based on a minimum of 12 samples collected monthly or bi-monthly. In addition, if a minimum of four weekly samples are collected within any calendar month, a geometric mean must not exceed 126 cfu/100 mL. Because 2001–2004 data in the Big Chestnut Creek segment violated the *E. coli* WQS 50 percent of the time, DEQ subsequently listed the segment for *E. coli* impairment in the 2006 305(b)/303(d) Water Quality Assessment Integrated Report. Suspected bacteria sources included livestock, on-site sewage disposal systems, straight pipes, pet waste and wildlife.

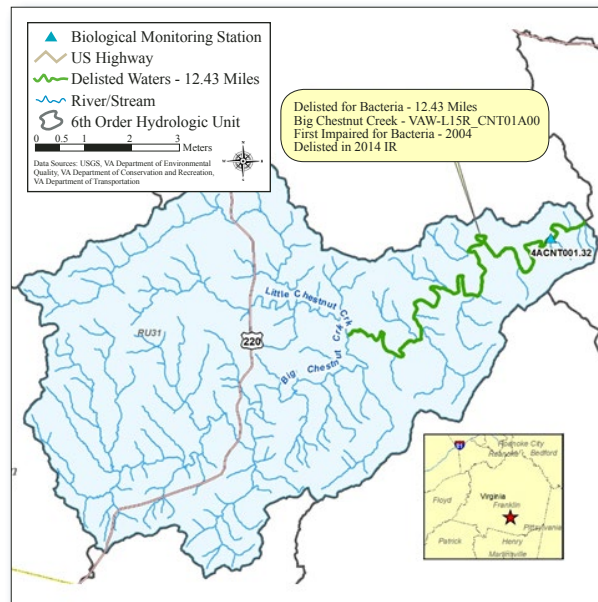


Figure 1. Big Chestnut Creek watershed, Virginia.

DEQ and the Virginia Department of Conservation and Recreation (DCR) developed a bacteria total maximum daily load (TMDL) study for the Pigg River and its tributaries in 2006. Although the 2006 TMDL did not explicitly define load allocations for the Big Chestnut Creek watershed, the load allocation for the entire Pigg River watershed included bacteria reductions for Big Chestnut Creek. In 2009 a TMDL implementation plan for Pigg River and tributaries, including Big Chestnut Creek, was developed by DEQ and DCR with input from federal, state, and local government agencies and watershed stakeholders.



Figure 2. Livestock exclusion stream fencing.

Project Highlights

Watershed stakeholders installed numerous agricultural and residential best management practices (BMPs) in the Big Chestnut Creek watershed from 2007 through 2012. BMPs included 48,886 linear feet (approximately 9.3 miles) of livestock exclusion stream fencing (Figure 2), funded through the state Water Quality Improvement Fund (WQIF), Virginia Natural Resources Commitment Fund (VNRFCF) and the U.S. Department of Agriculture's (USDA's) Conservation Reserve Enhancement Program (CREP). Other BMPs installed included 53 acres of afforestation on erodible crop and pasture land, 18 acres of small grain and mixed cover crops, and 7 acres of permanent vegetative cover on critical areas. Additionally, three septic systems were replaced at watershed residences. Watershed stakeholders coordinated BMP site visits and distributed informational brochures to local farmers and residents to promote the water quality benefits of agricultural and residential BMPs.

Results

Installing BMPs reduced bacteria loadings to surface water, which decreased *E. coli* bacteria levels in Big Chestnut Creek. DEQ's ambient monitoring program recorded an 8 percent violation rate of the *E. coli* WQS (n = 12) for samples collected from January 2007 to December 2012 at monitoring station 4ACTN001.32. This violation rate is significantly lower than the 50 percent violation rate in the 2001–2004 period (Figure 3). On the basis of this water quality improvement, DEQ removed a 12.43-mile segment of Big Chestnut Creek from the impaired waters list for bacteria on the 2014 Final 305(b)/303(d) Water Quality Assessment Integrated Report.

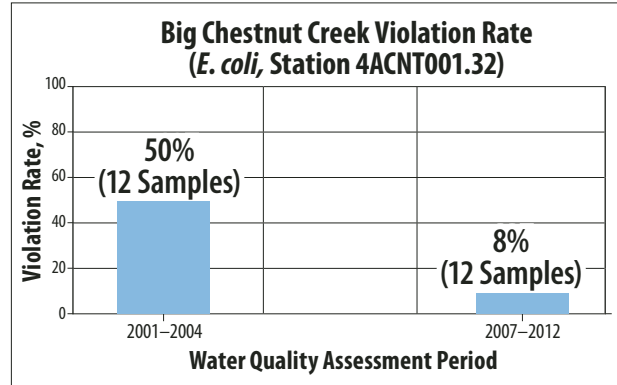


Figure 3. Improvement in bacteria levels in Big Chestnut Creek after BMP implementation.

Partners and Funding

The water quality improvement in the Big Chestnut Creek watershed has primarily been the result of partnerships between the Blue Ridge Soil and Water Conservation District (BRSWCD) and several federal and state agencies, including USDA's Natural Resources Conservation Service (NRCS), DCR, DEQ, Virginia Department of Health, Virginia Cooperative Extension Service and Franklin County government. DEQ monitored water quality through its ambient monitoring program. DCR and NRCS provided outreach and technical assistance. The Blue Ridge SWCD administered the TMDL implementation project, which included providing cost-share funding, offering technical assistance to implement agricultural and residential BMPs in the watershed, and leading public participation efforts (i.e., mailing BMP brochures, establishing local contacts with residents, leading watershed tours and giving presentations at community events).

The state WQIF, VNRFCF and the USDA-CREP provided \$249,444 and \$6,757, respectively, to BRSWCD towards BMP cost-share funding. DCR provided BRSWCD approximately \$55,000 per year (2007–2012) of state general funds in the form of technical assistance.

Although no EPA CWA section 319(h) funds were used directly for this project, section 319 funds supported the nonpoint source and TMDL program staff who provided technical assistance and resources to administer the TMDL implementation program to BRSWCD for the period 2007–2012.



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