



NONPOINT SOURCE SUCCESS STORY

Virginia

Addressing Agricultural and Residential Sources of Bacteria Improves Upper Clinch River Water Quality

Waterbody Improved Bacteria loadings from livestock, septic systems, pets and wildlife led to high bacteria counts in Virginia's Clinch River which violated water quality standards. As a result, the Virginia Department of Environmental Quality (DEQ) added a 5.38-mile segment of the Clinch River to Virginia's 2004 Clean Water Act (CWA) section 303(d) list of impaired waters for failure to attain its primary contact recreation designated use. Installing agricultural best management practices (BMPs) and constructing a public sanitary sewer collection system decreased bacteria levels in the Upper Clinch River. These measures allowed Virginia to remove the 5.38-mile segment of the Clinch River from its list of impaired waters in 2012.

Problem

The 115,000-acre Upper Clinch River watershed is in Tazewell County and is a part of the Clinch River watershed in southwestern Virginia. The land use is 68 percent forest and 19 percent pasture and hay; the remaining 13 percent consists of developed, mining and water land uses. Bacteria loadings from livestock, septic systems, pets and wildlife led to high bacteria counts in the Clinch River.

Before 2008, to meet bacteria standards, no more than 10 percent of samples (based on a minimum of 12 samples) could exceed a single sample maximum fecal coliform value of 400 colony-forming units per 100 milliliters of water (cfu/100 mL). The bacteria samples collected over the 1998–2002 assessment period at monitoring station 6BCLN321.13 violated this standard 29 percent of the time, leading to the 2004 CWA section 303(d) listing of segment VAS-P03R _ CLN02A00 in the Upper Clinch River for failure to attain its primary recreation designated use. This impaired segment extends from the confluence with Dry Branch downstream to the Raven-Doran raw water intake just upstream from Town Hill Creek (Figure 1).

The segment was subsequently listed again in 2008 for *Escherichia coli* when the bacteria standard changed to require that no more than 10 percent of samples (based on a minimum of 12 samples) can

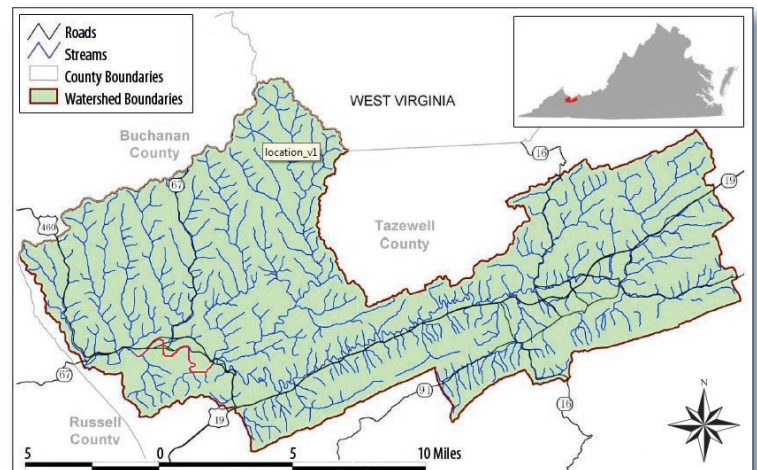


Figure 1. Segment VAS-P03R _ CLN02A00 (shown in red) is in the southwest corner of the Upper Clinch River watershed.

exceed a single sample maximum *E. coli* value of 235 cfu/100 mL. In the 5-year sampling period leading up to 2008, *E. coli* samples collected at monitoring station 6BCLN321.13 had a 24 percent violation rate of this standard.

DEQ developed a sediment total maximum daily load (TMDL) for the Upper Clinch River watershed in 2004 and an implementation plan for the sediment TMDL in 2007. DEQ finalized a bacteria TMDL for the Upper Clinch River in 2011.

Project Highlights

Watershed landowners, led by the Tazewell Soil and Water Conservation District (SWCD), began implementing agricultural BMPs as part of the sediment TMDL implementation project (2007–2012). Many of the BMPs identified to curb erosion on agricultural lands, such as excluding livestock from streams and planting riparian buffers, also helped to reduce bacteria. The Virginia Department of Conservation and Recreation (DCR) maintains a BMP tracking database that contains records of agricultural and residential septic BMPs installed in watersheds statewide through DCR and DEQ grant funds. Based on database records from 2006 to 2012, agricultural practices installed in the Upper Clinch River watershed included 12.3 miles of livestock stream exclusion fencing installed, 10 acres of harvestable cover crop planted, and 28 acres of riparian forest buffer implemented. An off-site alternate livestock watering system was also installed. To increase project participation, the Tazewell SWCD conducted outreach efforts in the watershed, including mailing flyers, coordinating field trips and giving presentations to community members.

To address ongoing problems with failing septic systems, in 2011 the town of Richlands constructed a public sanitary sewer collection system that delivers wastewater to the Richlands Regional Wastewater Treatment Plant. Although the Clinch River is outside the service area (approximately one mile north of the northern area boundary), the project served to highlight problems with leaking/failing septic systems, addressed public health concerns associated with failing private wastewater treatment and disposal systems, and helped mitigate existing surface water problems in tributaries to the Clinch River. Installing both agricultural BMPs and constructing a public sanitary sewer collection system resulted in reduced bacteria levels and improved water quality in the Upper Clinch River.

Results

Progress in reducing the bacteria loadings in the impaired watershed was reflected by decreasing violation rates of the bacteria standard. Based on data from the DEQ ambient monitoring program, of 45 bacteria samples collected from January 2005 through December 2010 at monitoring station 6CBCLN321.13, only three samples exceeded

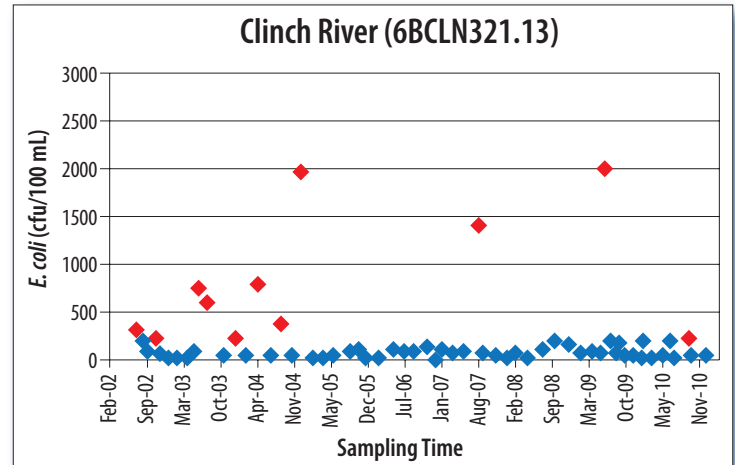


Figure 2. *E. coli* data collected for sampling period 2002–2006 (24 percent violation rates in 2008 assessment period) and for 2005–2010 (less than 10 percent in 2012 assessment period exceeding 235 cfu/100 mL, single sample maximum criterion). Red markers indicate samples exceeding water quality standard.

the *E. coli* standard—a 6.7 percent violation rate, which meets the water quality standard requiring that no more than 10 percent of samples exceed 235 cfu/100 mL (Figure 2). Based on these results, Virginia removed the 5.38-mile segment from the impaired waters list in 2012 and classified it as attaining the bacteria standard in the 2012 *Final 305(b)/303(d) Water Quality Assessment Integrated Report*.

Partners and Funding

The water quality improvement in the Upper Clinch River watershed has primarily been the result of partnerships between Tazewell SWCD, Virginia DCR and the U.S. Department of Agriculture's Natural Resource Conservation Service. The Tazewell SWCD coordinated the sediment TMDL implementation plan and administered cost-share funding, outreach and technical assistance to implement agricultural BMPs. The funding for the BMP cost-share (\$533,406) was provided through the state Water Quality Improvement Fund and the Virginia Natural Resource Commitment Fund. Landowners contributed another \$133,350. Virginia's State General Funds supported the project at \$25,000 per year (or \$125,000 over 5 years) for technical assistance provided by Tazewell SWCD. General TMDL implementation guidance was provided by CWA section 319 grant-funded state staff.



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