NONPOINT SOURCE SUCCESS STORY

Virginia

Implementing Control Measures Reduced Bacteria Loading and Improved Biological Health in South Fork Back Creek

Waterbody Improved

A 6.84-mile segment of South Fork Back Creek was listed on Virginia's 2002 Clean Water Act (CWA) Section 303(d) list of impaired waters. The impairment was due to not attaining the Commonwealth's water quality General Standard for aquatic life. The segment was further listed in 2012 for exceeding Virginia's bacteria water quality standards (WQS) for designated recreation (swimming) use. A total maximum daily load (TMDL) study identified the primary pollutant sources for each category. The control measures installed under an implementation plan helped reduce bacteria and sediment loadings and improved the biological health of the South Fork Back Creek. As a result, the segment was removed from the impaired waters list in Virginia's 2018 CWA section 305(b)/303(d) Water Quality Assessment Integrated Report (Integrated Report).

Problem

The South Fork Back Creek watershed (HUC 02070005, VAV-B31R_BSK01A10) is in Augusta County in western Virginia (Figure 1). South Fork Back Creek is in the South River watershed in the headwaters of the Shenandoah River, which ultimately flows into the Potomac River. The watershed contributing to the impairment is approximately 26,665 acres, with forest as the primary land use (85 percent), followed by residential (7.8 percent), pastureland (5.2 percent). The watershed also includes cropland and water/wetland land uses.

Biological assessments were conducted for a 6.84-mile segment of the creek at station 1BBCK000.78 under Virginia Department of Environmental Quality's (DEQ) probabilistic monitoring program. The biological integrity scores (Virginia Stream Condition Index, or VSCI) were found to be less than the minimum threshold score of 60 for the 1995–2000 assessment period, indicating impairment. The segment was subsequently placed on Virginia's 2002 CWA section 303(d) list of impaired waters for not attaining the water quality General Standard for aquatic life use.

In addition, water quality samples were collected under DEQ's ambient monitoring program. Data for the 2005–2010 assessment period indicated that two out of nine samples (22 percent) exceeded WQS for *Escherichia coli* bacteria. Based on a greater than

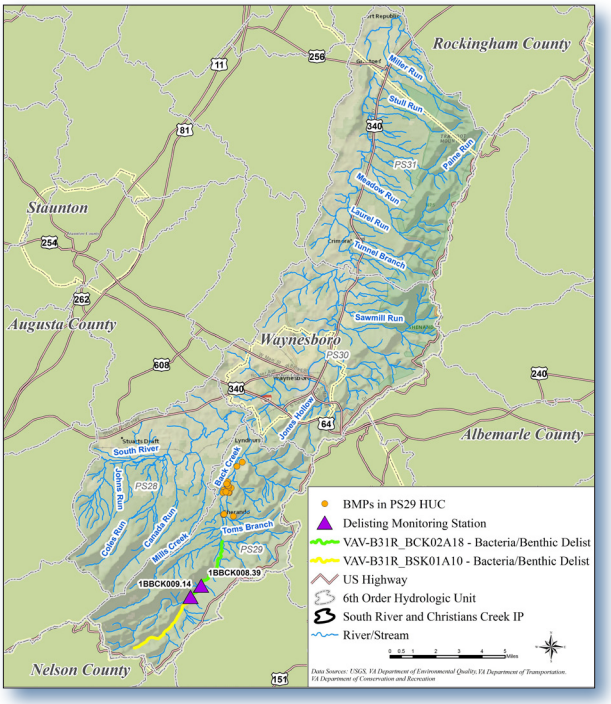

Figure 1. South Fork Back Creek is in western Virginia.

10 percent exceedance criteria, this segment was placed on Virginia's 2012 CWA section 303(d) list of impaired waters for the additional bacteria impairment.

A bacteria and benthic TMDL for the Upper South River and Middle River watersheds was developed in

2004 (and revised in 2012). The TMDL identified the primary pollutant categories as agriculture and urban runoff/stormwater. The TMDL also identified the sources of the bacteria impairment (land application of animal waste, direct manure deposition by cattle, failing septic systems, pets and wildlife) and the sources of the benthic impairment (sediment and phosphorous transport through stream flows, stream bank scour and sediment deposition). In 2012, the Virginia Department of Conservation and Recreation (DCR) developed an implementation plan with input from federal and state government agencies, the Headwater Soil and Water Conservation District (HWSWCD) and watershed stakeholders.

Story Highlights

Agricultural best management practice (BMP) projects, administered by HWSWCD and the Natural Resources Conservation Service (NRCS), were executed with integrated efforts of federal, state and local agencies and stakeholders, including DCR, DEQ, Virginia Cooperative Extension (VCE), and Rockingham County Farm Bureau. Outreach activities included watershed visits, local farm fairs and meetings, and mailing informational brochures to watershed residents.

Various BMPs were installed through a series of 19 projects completed in 2000–2016. These projects included 24,290 linear feet of stream exclusion fencing with grazing land management, 47 acres of small grain and mixed cover crop, and 46 acres of riparian forest buffer planted under the Conservation Reserve Enhanced Program (CREP). In addition, 35 acres of woodland buffer filter area and 43 acres of fescue conversion and wildlife options were completed, and approximately 2,570 linear feet of stream fencing was repaired to maintain their effectiveness. As a result of stream fencing and buffer installations, 30 beef cows and 80 sheep were excluded from the stream (Figure 2).

Results

BMP implementation resulted in water quality improvement, which was reflected in decreased bacteria exceedances and increased VSCI scores. Of 12 water quality samples collected during the 2011–2016 assessment period at the upstream monitoring station 1BBCK009.14 (segment VAV-B31R_BSK01A10), none exceeded the *E. coli* standards, indicating full support of designated recreation (swimming) use. In addition,

Courtesy: HWSWCD

Figure 2. Stream livestock exclusion fencing.

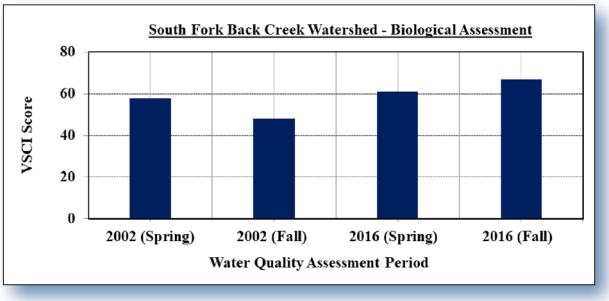

Figure 3. VSCI scores for 2002 (includes 1995–2000 data) and 2016 (includes 2011–2016 data).

the benthic and macroinvertebrate samples collected at an upstream monitoring station (1BBCK008.39) during the 2011–2016 assessment period showed VSCI scores exceeding the threshold value of 60, indicating a fully supporting status (Figure 3). Based on these improvements, the bacteria and benthic impairments for 6.48 miles of South Fork Back Creek were removed from DEQ's 2018 Integrated Report.

Partners and Funding

The water quality improvements in South Fork Back Creek watershed are a result of integrated efforts of the HWSWCD and several state and federal agencies, including DCR, DEQ, NRCS, VCE Services and local stakeholders. Total funding of BMPs installations from 2000 through 2016 period was $186,065. This includes state contributions to CREP ($75,659), the Virginia Department of Game and Inland Fisheries Quail Action Plan ($12,625), and $91,447 from Virginia Agricultural Cost-Share Program (VACS). The VACS funds included money from the Chesapeake Bay cost-share fund ($39,428) and the Water Quality Improvement Fund ($32,259). DEQ's nonpoint source staff coordinated the implementation projects.

U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-21-001H
June 2021

For additional information contact:

Sara Bottenfield
Virginia Department of Environmental Quality
540-574-7800 • Sara.Bottenfield@DEQ.Virginia.Gov
John Kaylor
Headwater Soil and Water Conservation District
540-248-0148 • Jkaylor@CO.Augusta.VA.US