NONPOINT SOURCE SUCCESS STORY

Virginia

Installing Control Measures Reduces Bacteria Loading and Improves Water Quality in Indian Creek

Waterbodies Improved

Two segments (13.67 miles) of Indian Creek failed to meet the Commonwealth of Virginia's water quality standards for designated recreation (swimming) use. As a result, the Virginia Department of Environmental Quality (DEQ) listed the segments as impaired for bacteria on Virginia's 2008 Clean Water Act (CWA) section 303(d) list of impaired waters. A total maximum daily load (TMDL) study identified livestock, failing septic systems, pets and wildlife as primary pollutant sources. The control measures installed under an implementation plan reduced bacteria loading, thereby improving the water quality of Indian Creek. As a result, DEQ removed both segments from the impaired waters list in Virginia's 2018 CWA section 305(b)/303(d) Water Quality Assessment Integrated Report (Integrated Report).

Problem

The Indian Creek watershed, a segment of the Upper Clinch watershed, is part of the Tennessee–Big Sandy River Basin in Tazewell County, Virginia (Figure 1). The Upper Clinch River watershed is approximately 115,000 acres, with forest and woodlands as the predominant land use (68 percent), followed by pasture and hay land (19 percent).

Two segments of Indian Creek, VAS-P02R_IDI01A00 (9.07 miles) and VAS-P02R_IDI02A04 (4.61 miles), were listed as impaired for not meeting their designated uses. The impaired segments are on the main stem; they begin at the Greasy Creek confluence with Harman Creek and then stretch downstream to the Clinch River's confluence with Cedar Bluff.

Water quality samples were collected under DEQ's ambient monitoring program. Data for the 2002–2006 assessment period indicated 10 of 24 samples (42 percent) exceeded water quality standards for *Escherichia coli* bacteria. Based on a greater than 10 percent exceedance criterion, these segments were initially identified as impaired on Virginia's 2008 CWA section 303(d) list of impaired waters. To meet the water quality goals, *E. coli* samples must not violate the single sample maximum value of 235 colony-forming units per 100 milliliters (cfu/100 mL) more than 10 percent of the time based on a minimum of

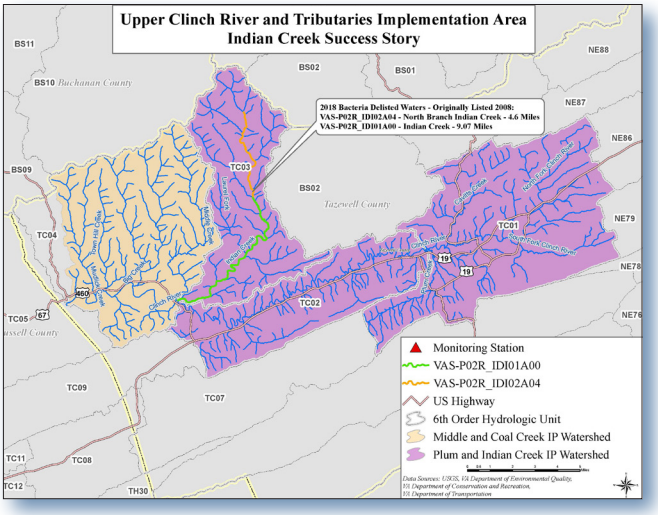

Figure 1. Location of two impaired segments and a bacteria monitoring station in the Indian Creek watershed in southwestern Virginia.

12 samples. If multiple samples are collected within a 30-day period, a geometric mean must be equal to or less than 126 cfu/100 mL.

In 2011, DEQ developed a bacteria TMDL for the Upper Clinch River watershed, which identified the primary pollutant sources causing the bacteria impairment as agriculture, livestock, pets, failing septic systems and wildlife.

Story Highlights

In 2017, DEQ developed an implementation plan for bacteria with inputs from federal, state and local government agencies; the Tazewell Soil and Water Conservation District (TSWCD); and watershed stakeholders. TSWCD and the Natural Resources Conservation Service (NRCS) administered control measures through 18 different projects, with the combined efforts of federal, state and local agencies and stakeholders, including the Virginia Department of Conservation and Recreation (DCR), Virginia Cooperative Extension (VCE), and Tazewell County Farm Bureau. The outreach activities included conducting local farm tours, holding farmers' meetings, and distributing informational brochures on the importance of water quality improvement in the watershed.

Control measures installed in 2006–2016 included 16,460 linear feet of stream exclusion fencing with grazing land management, 9 acres of woodland buffer and filter area, and 9 acres of riparian forest buffer planted under the Conservation Reserve Enhanced Program (CREP) program. As a result of stream fencing and buffer installations, 30 beef cows and 20 goats were prevented from accessing the stream.

Results

Installing control measures resulted in water quality improvement and decreased bacteria exceedances in Indian Creek. Eleven water quality samples collected from 2011 through the 2016 assessment period at monitoring station 6BIDI001.49 showed one sample exceedance of the *E. coli* standards (Figure 2). Exceedances were less than 10 percent of collected bacteria samples, resulting in full support of the designated recreation (swimming) use. Based on this improvement, both segments (13.67 miles total) of Indian Creek were removed from DEQ's list of impaired waters in the 2018 Integrated Report.

Partners and Funding

The water quality improvement in Indian Creek is a result of joint efforts by the TSWCD, NRCS and state and federal agencies, including DCR, VCE Services and local stakeholders. The funding of control measures installation (2006–2016 period) totaled $267,334. This includes $90,937 from Virginia Agricultural Cost-Share Program, $118,798 from state contributions to CREP and state tax credits, and the remainder from the Virginia Water Quality Improvement Fund.

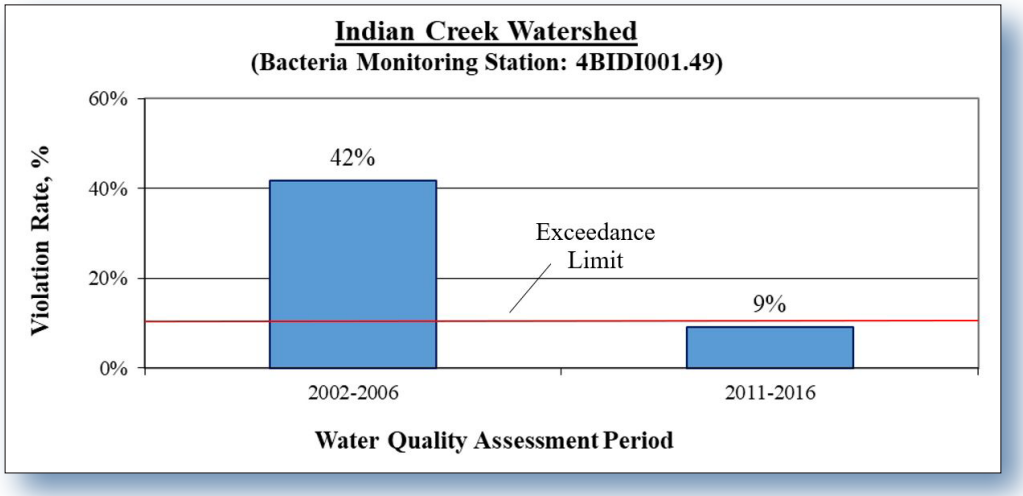

Figure 2. *E. coli* violation rates (percent of samples exceeding the 235 cfu/100 mL water quality standard) in Indian Creek.

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