Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
Virginia

Implementing Management Practices Reduces Bacteria

Waterbodies Improved

Failing septic systems and runoff from agricultural lands contributed high counts of fecal coliform bacteria to Virginia's Willis River, impairing recreational uses. As a result, the Virginia Department of Environmental Quality (DEQ) added portions of the Willis River to Virginia's 1996 Clean Water Act (CWA) section 303(d) list of impaired waters. Through the joint efforts of the Virginia Department of Conservation and Recreation (DCR) and the Peter Francisco Soil and Water Conservation District (PFSWCD) and other stakeholders, landowners implemented various agricultural and residential best management practices (BMPs) as part of a total maximum daily load (TMDL) implementation project. Water quality improved, prompting DEQ to remove three segments (34.71 miles total) of the Willis River from Virginia's CWA section 303(d) list of impaired waters in 2006 and 2008.

Problem

The Willis River flows through Virginia's Buckingham and Cumberland counties (Figure 1), approximately 60 miles west of Richmond, and empties into the James River. The Willis River's watershed land uses consist of forest (75 percent), agricultural (21 percent), urban (1 percent), wetlands (2 percent) and water (1 percent).

In 1996 DEQ placed the Willis River on Virginia's 1996 CWA section 303(d) list because of violations of the fecal coliform water quality standard. The original 1996 impaired segment of the Willis River stretched from the confluence with the James River upstream to Reynolds Creek (14.53 miles). The segment was extended in 2004 to include the entire Willis River from the headwaters to the mouth (61.34 miles). The fecal coliform TMDL for the Willis River was completed in 2002. In 2005 DCR and PFSWCD, with input from other stakeholders, completed a TMDL implementation plan and began a 5-year implementation project to reduce fecal coliform levels in the river by implementing agricultural and residential BMPs.

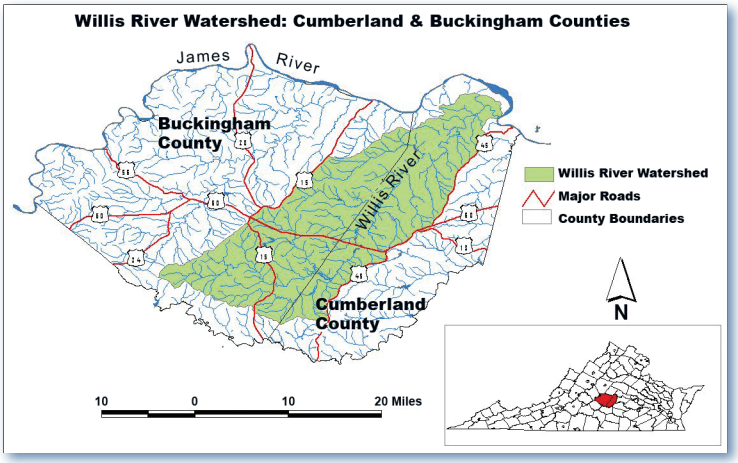

Figure 1. Map of the Willis River watershed.

Project Highlights

Residential and agricultural conservation successes have largely been the result of partnerships between the PFSWCD and several agencies including DCR, DEQ, Virginia Cooperative Extension, Farm Bureau, Cattlemen's Association, and the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS). The partners held numerous tours promoting the agricultural and residential BMPs offered under the TMDL implementation plan, presented at civic clubs throughout the watersheds, mailed postcards advertising the program, made personal contacts with farmers and residents, and hosted meetings updating the community about water quality improvements.

Since the beginning of the project in July 2005 (through June 30, 2009), landowners installed 54 agricultural practices (Figure 2). Practices installed include a dairy loafing lot management system,

Figure 2. Willis River landowners installed numerous BMPs, such as stream crossings (top) and alternative water sources (bottom).

alternative water systems, composting facilities, animal waste storage, livestock stream exclusion with grazing land protection systems, and riparian buffers. For example, landowners added 168,960 feet (32 miles) of fencing that created more than 129 acres of buffers and prevented approximately 3,944 head of livestock from accessing streams or farm ponds. Landowners also improved approximately 1,780 acres of pastureland. For the residential BMP program, PFSWCD helped homeowners implement numerous septic projects to date, including 14 septic tank pump outs, four septic system repairs, and four septic system replacements. Of the four replacements, one is complete and three more are under contract.

Results

Partners estimate that the new BMPs installed in the Willis River watershed significantly reduced nonpoint source pollution loads reaching the Willis River (Table 1). In addition, DEQ monitors water quality at several stations throughout the watershed as part of the agency's ambient monitoring program. Analysis of data from several sites has shown that implementing BMPs reduced bacteria levels, allowing three stream segments, totaling 34.71 miles, to attain water quality standards for primary contact recreation.

Before 2008, the bacteria standard required that fecal coliform bacteria levels be less than 400 colony forming units (cfu) per 100 milliliters (mL) of water and that less than 10.5 percent of all samples exceed 400 cfu/100 mL. For the assessment period 2000–2004, data from a monitoring station at the mouth of the Willis River show that the river attained the applicable fecal coliform bacteria standard. On the basis of those results, DEQ removed two segments (18.03 miles total) from the 2006 list of impaired waters for fecal coliform.

Table 1. Total load reductions* of bacteria, sediment and nutrients in the Willis River for July 2005 through June 2009 (years 1 through 4 of the TMDL implementation project)

Parameter	Fecal coliform (cfu/100 mL)	Sediment (tons)	Phosphorus (pounds)	Nitrogen (pounds)
Estimated load	1.135E+16	20.79	612.0	1,592.4

* The load reductions in this table are considered *edge-of-field* and are not indicative of in-stream load reductions

In 2008 the bacteria standard changed. The new standard requires that *Escherichia coli* bacteria levels in single sample results must be less than 235 cfu/100 mL of water and that no more than 10.5 percent of all samples may exceed 235 cfu/100 mL. DEQ reviewed recent data using the new standard and found that samples now meet the water quality standard for *E. coli* on another 16.68-mile segment of the Willis River. As a result, DEQ removed that additional segment from the 2008 impaired waters list for *E. coli*.

Partners and Funding

The PFSWCD agreed to oversee both the agricultural and residential programs during the TMDL implementation project. PFSWCD received funding for a full-time staff position to work with landowners in the project area. Several partners contributed to the success of the project including PFSWCD, DCR, DEQ and the NRCS. Almost $1.6 million supported the project for the first four years. That included approximately $1,023,608 in U.S. Environmental Protection Agency CWA section 319 funds administered by DCR—$100,000 of which funded staff who manage the implementation project and $923,000 of which supported installing BMPs. Other funds included $158,903 from the USDA Environmental Quality Incentive Program (EQIP), another $60,079 from a combination of state cost-share and EQIP funds, and $56,578 from the USDA Conservation Reserve Enhancement Program. In addition to federal funds, the farmers and residents contributed an estimated $317,000 as their share of the cost to install BMPs.

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