



# NONPOINT SOURCE SUCCESS STORY

## South Carolina

### Installing Best Management Practices and Educating Stakeholders Improves Water Quality in the Enoree River Watershed

**Waterbodies Improved** Agricultural practices and failing septic systems contributed high levels of fecal coliform (FC) bacteria to South Carolina's Enoree River watershed. Data showed that numerous sites in the watershed failed to meet water quality standards. As a result, the South Carolina Department of Health and Environmental Control (SCDHEC) added six sites to the Clean Water Act (CWA) section 303(d) list (five sites in 1998 and one site in 2002) for FC bacteria impairment. Landowners installed numerous BMPs and replaced failing septic systems. Bacteria levels have dropped at all six sites. Assessments for the 2014 CWA section 303(d) list showed that two of the sites, B-024 and B-231, now meet water quality standards for FC bacteria and fully support their recreational use.

#### Problem

The 731.3-square-mile Enoree River watershed drains portion of Greenville, Spartanburg, Union, Laurens and Newberry counties in northwest South Carolina. Monitoring data collected in the 1990s indicated that numerous sites in the Enoree River watershed (at monitoring stations BE-024, B-231, B-053, B-246 and B-072) did not meet water quality standards for FC bacteria; as a result, these were listed on the state's CWA section 303(d) list of impaired waters for not supporting their primary contact recreation designated use (Figure 1). Station B-041 was added to the impaired waters list in 2002. SCDHEC suspected that the primary bacteria sources affecting these stations included runoff from grazing pastures, improper land application of animal wastes, livestock operations, livestock with access to waterbodies, failing septic systems and urban runoff.

The water quality standard for FC bacteria requires that FC levels will not exceed a geometric mean of 200 colony-forming units (CFU)/100 milliliters (mL), based on five consecutive samples during any 30-day period; nor will more than 10 percent of the total samples during any 30-day period exceed 400 CFU/ml.

SCDHEC re-assessed the Enoree River watershed stations for the state's 2002 CWA section 303(d) water quality assessment. At that time, none met the second part of the water quality standard (Table 1). The violation rate must be less than 10 percent for the water to be considered unimpaired. SCDHEC developed a total maximum daily load (TMDL) for FC bacteria in the Enoree River watershed in 2004.

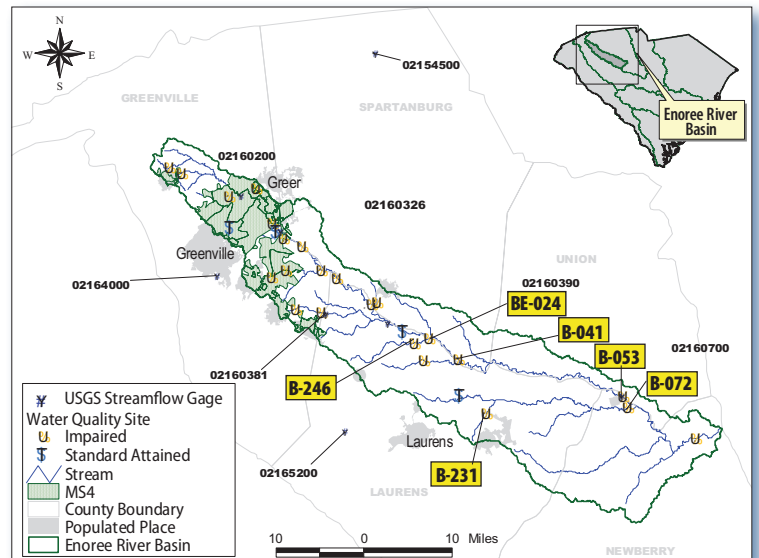


Figure 1. Many sites in the Enoree River watershed are impaired for fecal coliform. Yellow boxes indicate the sites detailed in this success story.

#### Project Highlights

Partners implemented a CWA section 319-funded Enoree River TMDL implementation project in 2006 in the lower Enoree River watershed. The implementation project area includes portions of Laurens, Spartanburg and Union counties and encompasses approximately 195,417 acres.

Project partners focused on recruiting livestock farmers to develop farm plans and implement BMPs to reduce FC bacteria loading from animal waste. During the 3-year project period, local landowners

**Table 1. Enoree River Watershed Monitoring Station CWA Section 303(d) Assessment Data**

Station ID	Station Location	Year First Listed as Impaired for FC	Percent of Samples Exceeding Water Quality Standards (<10% = not impaired, >10%<25% = partial support, >25% = impaired)	
			2002 303(d) Assessment <sup>1</sup>	2014 303(d) Assessment
BE-024	Enoree River at US 221	1998	17% (2008)	3%
B-231	Beards Fork Creek at US 276	1998	21%	0%
B-041	Enoree River at SC 49	2002	20%	14%
B-053	Enoree River at SC 72, 121, and US 176	1998	33%	11%
B-246	Beaver dam Creek at S-30-97	1998	58%	22%
B-072	Duncan Creek at US 176	1998	56%	24%

<sup>1</sup> Based on FC bacteria collected 1996–2000 (except station BE-024 assessment, which was based on 2008 data).

installed the numerous BMPs with the assistance and technical expertise of U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS) personnel using CWA section 319 grant funds. BMPs included installing 29,577 feet of fence that excluded livestock from streams; adding 40,554 square feet of heavy-use area around water tanks, or for stream crossings using geo-textile fabric, geo-web and crusher run gravel; and developing alternative water sources, which required installation of 8,850 feet of waterline with 11 concrete water tanks, one water well, four water taps, one pond ramp, two stream ramps and two stream crossings (Figure 2). In addition, nine failing septic systems were repaired.

Through local community organizations (non-profit organizations, churches, etc.), the Clemson University Cooperative Extension shared information with homeowners about septic system maintenance needs and cost-share opportunities for septic system repairs. In addition, Extension reviewed existing aerial photographs and maps of septic system pump-out occurrences, and worked with septic pumping contractors to identify potential failing septic systems and high-risk communities. Extension agents worked with the Enoree River Educational Board to implement education and outreach programs, including the 4-H2O Pontoon Classroom/River Adventure, storm drain stenciling and Adopt-A-River.



Figure 2. This stream crossing protects the stream bed while offering cattle access for drinking.

## Results

SCDHEC collected data and re-assessed the Enoree River watershed stations for the state’s 2014 CWA section 303(d) water quality assessment (see Table 1). All stations show water quality improvement. Two of the stations, BE-024 (Enoree River at US 221) and B-231 (Beards Fork, Creek at US 276) now meet water quality standards and are classified as fully supporting (not impaired) for recreational use.

Data show that the water quality standard violation rates at four other Enoree River watershed stations (B-041, B-053, B-246 and B-072) have declined. These stations are now listed as partially supporting their primary contact recreation designated use. These waters will remain on the state’s list of impaired waters until the rates fall below 10 percent.

## Partners and Funding

Numerous partners provided technical and financial support for planning and implementing the Enoree River TMDL watershed project. SCDHEC provided \$255,593 in U.S. Environmental Protection Agency CWA section 319 grant funds and provided project oversight. Numerous partners provided technical support and other in-kind services (worth \$85,682), including Clemson University Extension (project management); USDA NRCS; the Spartanburg, Laurens and Union soil and water conservation districts; and the Spartanburg, Laurens and Union Cattlemen’s Associations. Landowners contributed \$104,939 in cash and in-kind services to install BMPs.



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