



# Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Tennessee

## Implementing Best Management Practices Reduces Sediment in Gallagher Creek

**Waterbody Improved** Runoff from pasture grazing contributed high levels of sediment to Gallagher Creek in Blount County, Tennessee.

As a result, the Tennessee Department of Environment and Conservation (TDEC) placed Gallagher Creek on the state's 2002 Clean Water Act (CWA) section 303(d) list of impaired waters for siltation. Best management practices (BMPs) implemented in the watershed successfully improved water quality in Gallagher Creek and allowed for removal of the 13.2-mile stream from the state's CWA section 303(d) list of impaired waters in 2010.

### Problem

Gallagher Creek, in Blount County Tennessee, is a 13.2-mile stream that flows through the town of Friendsville near the city of Maryville. The creek empties into Fort Loudoun Reservoir (also known as Fort Loudon Lake) and is a part of the the larger Watts Bar Lake and the Tennessee River watersheds of eastern Tennessee (Figure 1). Land use in the Gallagher Creek watershed is primarily agriculture (62.79 percent) and residential (32.8 percent).

A biological survey conducted by the Tennessee Valley Authority (TVA) in 1997 indicated that the waterbody failed to support its livestock watering and wildlife, irrigation, fish and aquatic life, and recreation designated uses. The 1997 survey by TVA showed seven families of mayflies, stoneflies, and caddisflies (collectively referred to as EPT—short for the order names Ephemeroptera, Plecoptera, and Trichoptera) and 15 total families, a *poor* score. Similarly, a TVA habitat survey at river mile 3.2 in 1997 yielded a fish Index of Biotic Integrity (IBI) score of 26, a *very poor* score. In 2003 TDEC established a monitoring site at river mile 2.6 of Gallagher Creek known as the Unitia Road Bridge site near Friendsville. At this site, biological surveys were performed on the stream; one *Escherichia coli* (*E. coli*) sample was over 2,419 colony-forming units per 100 milliliters (cfu/100 mL), exceeding Tennessee's standard, which requires that samples not exceed 941 cfu/100 mL.

On the basis of these data, TDEC placed Gallagher Creek (Waterbody ID TN06010201022-1000) on the 2002, 2004, 2006, and 2008 CWA section 303(d) lists of impaired waters for siltation due to pasture grazing activities. Siltation or sedimentation is the major cause of stream impairment in Tennessee,

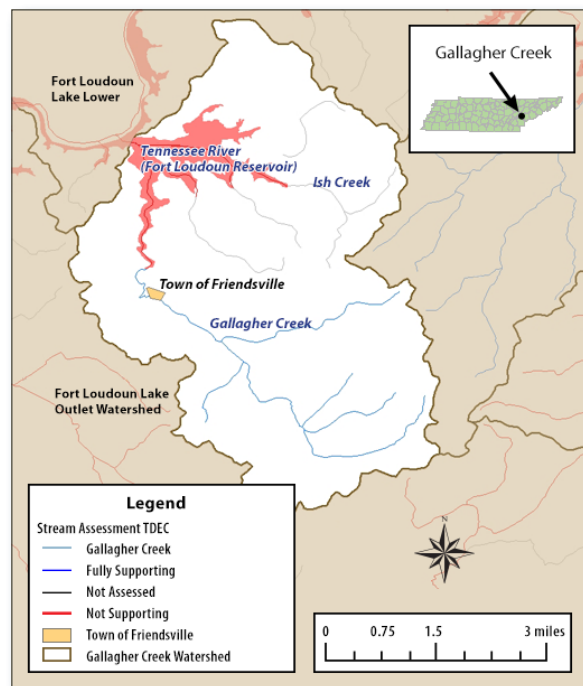


Figure 1. The Gallagher Creek watershed is in eastern Tennessee.

and excessive sediment loading can adversely affect fish and aquatic life in streams. The criteria for Tennessee's fish and aquatic life use requires that no turbidity should affect fish and aquatic life in a stream and that total suspended solid levels, macroinvertebrate surveys, and habitat surveys should not be substantially different than conditions found in reference streams. A total maximum daily load (TMDL) to address siltation was developed for Fort Loudoun Lake, which includes Gallagher Creek. The U.S. Environmental Protection Agency (EPA) approved the TMDL in 2006.

## Project Highlights

Between 2000 and 2011, best management practices (BMPs) were installed in the Gallagher Creek watershed to reduce siltation and other runoff. The BMPs, including exclusion fencing and alternative watering facilities, prevent livestock from entering streams and trampling streambanks (Figures 2 and 3). Other BMPs installed in the watershed included septic improvements, critical area planting, one pond, fencing for livestock exclusion, heavy-use areas and fencing for heavy-use areas, fencing for rotational grazing, pasture and hay planting, cropland conversion, one pipeline, one stream crossing, and multiple watering facilities, including one spring-based watering system and one well.

## Results

The BMPs installed in the watershed helped reduce siltation and improve water quality. Follow-up habitat surveys were conducted in 2003 and 2007. Tennessee's state habitat scores vary by ecoregion and season. For Gallagher Creek and its ecoregion at the time of survey, habitat scores were required to be greater than or equal to 130 to meet the state criterion. IBI habitat scores met the state criterion in both 2003 (IBI=147) and 2007 (IBI=130). The habitat score is derived from adding 10 parameter scores obtained from field study of the stream. Three of the parameters—bank stability, vegetative protection, and riparian vegetative width—have separate scores for left bank and right bank.

Both TVA and TDEC collected Semi-Quantitative Single Habitat (SQSH) samples in 2007 at biological stations near Friendsville. The principal metrics used were the total macroinvertebrate families (or genera); the number of EPT families and the number of pollution-intolerant families found in a stream. Scores for the biological surveys at river mile 2.6 from TDEC were eight EPT, 20 total genera, and a SQSH index score of 36 out of a possible 42 on the Tennessee Macroinvertebrate Index. TVA's SQSH assessment results were 11 EPT families, three intolerant families, and 23 total families.

Biological reconnaissance (biorecon) is one tool used to recognize stream impairment as judged by species richness measures. The biorecon index is scored on a scale from 1 to 15, where a score of less than 5 is considered *very poor*, and a score of more than 10 is considered *good*. The biorecon score during TVA's 2007 sampling was 13, which is considered *good* for this area. Later in 2007, TDEC and TVA performed additional biological monitoring on Gallagher Creek and found it to have *good*



Figure 2. A farmer installed this livestock watering facility using cost-share money from the state's Agricultural Resource Conservation Fund.



Figure 3. A farmer installed this fence to prevent livestock from accessing and eroding streambanks.

habitat scores. On the basis of these data, TDEC removed all 13.2 miles of Gallagher Creek from the state's CWA section 303(d) list in 2010.

## Partners and Funding

Many federal and state agencies, local organizations, and individual landowners worked together to improve water quality in the Gallagher Creek watershed. The project was supported by \$73,384 in EPA CWA section 319 funds and \$18,180 in matching funds from the state's Agricultural Resources Conservation Fund (ARCF), a fund created through Tennessee's real estate transfer tax. The funding from CWA section 319 and ARCF helped landowners to cost share for BMPs that were installed on their land. Other partners included TDEC, Little River Watershed Association, Smoky Mountain Resource Conservation and Development Council, Blount County Soil Conservation District, and local farmers. U.S. Department of Agriculture Farm Bill funds also supported installation of practices from 2004 to 2011.



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

EPA 841-F-14-001QQ  
July 2014

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