



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Tennessee

Implementing Agricultural Best Management Practices Improves Water Quality in Cloyd Creek

Waterbody Improved

Pasture grazing activities and livestock in the stream along Tennessee's Cloyd Creek contributed to silt runoff and physical substrate habitat alterations that degraded water quality. As a result, the Tennessee Department of Environment and Conservation (TDEC) added the creek to the state's 2002 Clean Water Act (CWA) section 303(d) list of impaired waters due to siltation and physical substrate habitat alterations. Landowners installed numerous agricultural best management practices (BMPs) along Cloyd Creek, including fencing for livestock exclusion, heavy-use areas with watering facilities for livestock, and cropland conversion. Water quality improved, prompting TDEC to remove Cloyd Creek from Tennessee's list of impaired waters for siltation and physical substrate habitat alterations in 2010.

Problem

Cloyd Creek is an 11.3-mile stream in the Fort Loudoun Lake Outlet watershed (Figure 1), which is a part of the larger Fort Loudoun Lake/Watts Bar watershed. The Fort Loudoun area is very historic. The fort was built in 1756 to help defend the Cherokee and British settlers during conflict with French soldiers. The Fort Loudoun Lake watershed lies within the Blue Ridge Mountains and Ridge Valley; this area contains seven Level IV ecoregions. Cloyd Creek is in ecoregion 67f of the Fort Loudoun Lake watershed in the Southern Limestone/Dolomite Valleys (low rolling ridges and valleys). The predominant land uses in the watershed are forest (63.6 percent) and agriculture (19.2 percent). Urban areas represent approximately 10.9 percent of the total drainage area. Pasture grazing activities created siltation problems and altered physical substrate habitat in Cloyd Creek.

Biological reconnaissance (biorecon) is one tool used to recognize stream impairment using 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 principal metrics used are the total number of macroinvertebrate families found in a stream.

Results from 1999 monitoring sites on the creek showed five macroinvertebrate families, zero pollution-intolerant species, and a biorecon score of 5. This location also received a habitat score of 90, falling below the 131 habitat goal set for

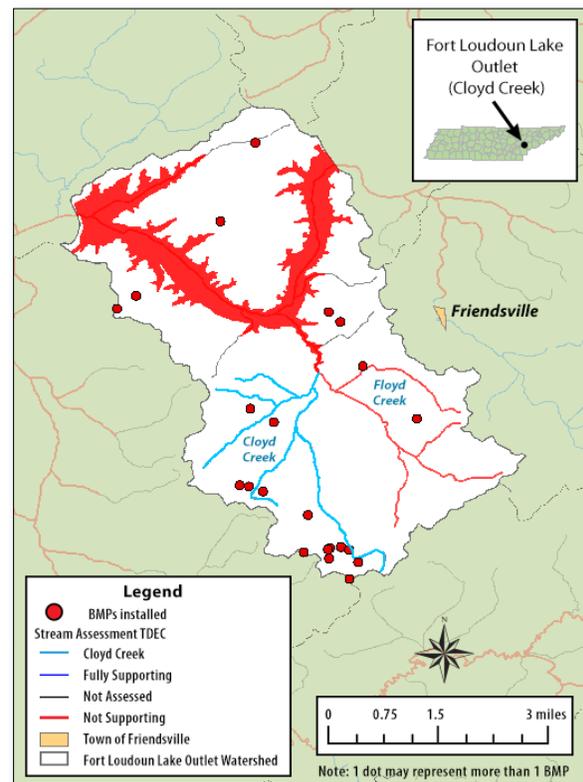


Figure 1. Cloyd Creek is in the Fort Loudoun Lake Outlet watershed. The dots indicate the locations of BMPs installed.

this subecoregion. As a result, TDEC added Cloyd Creek (Waterbody ID TN060102011015-1000) to Tennessee's 2006 CWA section 303(d) list of



Figure 2. Landowners installed BMPs like this watering system for livestock, which includes exclusion fencing and heavy-use area protection.



Figure 3. Fencing restricts livestock access to this pond when the water is not clean. A heavy-use area ramp helps to reduce sedimentation.

impaired waters for siltation and physical substrate habitat alterations. The waterbody was also listed as impaired for *Escherichia coli* bacteria. TDEC developed total maximum daily loads (TMDLs) for the larger Fort Loudoun Lake watershed, including one for pathogens (including *E. coli*) in 2005 and one for siltation and habitat alteration in 2006.

Project Highlights

BMPs were installed along Cloyd Creek and in the surrounding watershed from 1999 through 2011 to reduce siltation and physical substrate habitat alterations. BMPs installed within the watershed included 2.5 acres of critical area planting, one pond, 2,000 feet of fence, 3,762 feet of fencing for livestock exclusion, 4,540 feet of fencing for rotational grazing systems, one grade stabilization structure, 62 acres of pasture and hay planting, 20 acres of cropland conversion, 43 acres of pasture renovation, 5,936 feet of pipeline, 13 heavy-use areas, a stream crossing, and 13 watering facilities (Figures 2 and 3). Figure 1 shows the location of the BMPs installed along the creek.

Results

After the installation of BMPs in the watershed, the Tennessee Valley Authority (TVA) performed a bioecon study on Cloyd Creek. Cloyd Creek scored 13 out of a possible 15, a *very good* score in this ecoregion. In addition to TVA's monitoring, TDEC performed a Semi-Quantitative Single Habitat Assessment (SQSH) at mile 1.5 of Cloyd Creek. The SQSH test measures water quality compliance for fish and aquatic life in a stream. The monitoring station scored 38 on the Tennessee Macroinvertebrate

Index, with 10 macroinvertebrate genera and 30 total macroinvertebrates. The habitat score was 132, a *good* score. As a result of the water quality improvements in Cloyd Creek, an 11.3-mile portion of the stream was removed from Tennessee's CWA section 303(d) list for siltation and physical substrate habitat alterations in 2010. Water quality in Cloyd Creek has improved, but the stream remains listed as impaired for *E. coli* bacteria.

Partners and Funding

Many federal and state agencies, local organizations, and individual landowners worked together to improve water quality in the Cloyd Creek watershed. Key partners for the project include the Loudon County Soil Conservation District, the Blount County Soil Conservation District, TDEC, the Tennessee Valley Authority, and the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) and landowners in the watershed. NRCS staff consulted with landowners and provided BMP design and verification to ensure that NRCS conservation practice standards for BMPs were met, except where justification was provided for different standards.

Funding for Cloyd Creek BMPs included \$28,885 in CWA section 319 grant pool funds, with local matching funds of \$13,637. Local landowners contributed \$10,574 to the project. The Agricultural Resources Conservation Fund (a fund created through Tennessee's real estate transfer tax) provided another \$26,994 in cost-share funds to help Tennessee landowners install BMPs. U.S. Department of Agriculture Farm Bill funds also supported installation of practices from 2004 to 2011.



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