NONPOINT SOURCE SUCCESS STORY

Tennessee

Agricultural Best Management Practices and Septic System Repairs Help Reduce *Escherichia coli* in the Sequatchie River

Waterbody Improved

In 2008 the main stem of Tennessee's Sequatchie River in Bledsoe and Sequatchie counties was listed as impaired by *Escherichia coli* bacteria due to pasture grazing. From 2013 to 2015, the Southeast Tennessee Resource Conservation and Development Council (SETN RC&D), with support from a Clean Water Act (CWA) section 319 grant, implemented urban and agriculture best management practices (BMPs) to assist with the restoration of the Sequatchie River. The Tennessee Department of Agriculture (TDA) also helped to install agricultural BMPs from 2004 through the present. In 2014, the joint effort between the SETN RC&D and its partners quickly paid dividends when a 23.1-mile segment of the Sequatchie River was determined by the Tennessee Department of Environment and Conservation (TDEC) to be fully supporting of all designated uses; it was removed from the impaired waters list in 2014.

Problem

The main stem of the Sequatchie River (TN06020004005–1000) flows through Bledsoe and Sequatchie counties in Tennessee and eventually empties into the Tennessee River in the southeastern part of the state (Figure 1). In 1982, 109 miles of the Sequatchie River in Marion, Sequatchie, Bledsoe, and Cumberland counties were included on the Nationwide Rivers Inventory for exceptional scenery, recreation, geology, fish, and wildlife outstandingly remarkable values (ORVs). The Sequatchie River is popular for its recreational uses such as paddling.

Samples collected between 2001 and 2006 showed that the average *E. coli* concentration at river mile 41.5 along the Sequatchie River was 503 colony-forming units (CFU) per 100 milliliters (mL). The maximum concentration observed was greater than 2,419 CFU/100 mL (i.e., greater than the analytical test's upper limit). State water quality criteria require that the geometric mean for the *E. coli* group shall not exceed 126 CFU/100 mL, and that no sample may exceed a maximum of 941 CFU/100 mL. As a result of exceedances in 2006, in 2008 TDEC included portions of the Sequatchie River on the state of Tennessee's CWA section 303(d) list for excessive *E. coli* levels due to pasture grazing. A total maximum daily load (TMDL) for *E. coli* in the Sequatchie River watershed was approved by the U.S. Environmental Protection Agency (Region 4) on December 18, 2008.

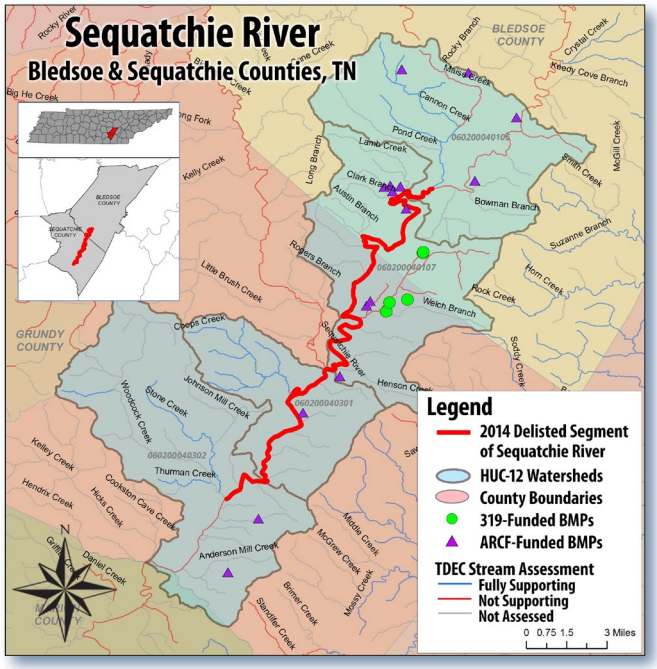

Figure 1. Multiple BMPs were installed throughout the Sequatchie River (TN06020004005-1000) watershed.

Project Highlights

Pasture grazing was identified as the primary pollutant source for the Sequatchie River. The SETN RC&D worked with landowners to implement BMPs to better manage livestock, including installing cross-fences for new rotational grazing management systems and

Figure 2. New fences prevent livestock from accessing the Sequatchie River and its tributaries.

adding riparian-area fences to exclude livestock from streams (Figure 2). The SETN RC&D recognized that failing wastewater collection systems also contributed to the pathogen problem; therefore, the SETN RC&D assisted with the repair of two failing septic systems in this portion of the watershed.

Results

The Sequatchie River (TN06020004005-1000) was included on the 2008 CWA section 303(d) list based on *E. coli* sampling performed by TDEC, the Tennessee Valley Authority, and the city of Dunlap Water Treatment Plant from 2001 through 2006. At river mile 41.5, the geometric mean of five samples collected in April and May of 2006 (before project implementation) was 424.6 CFU/100 mL, which violated standards.

During TDEC's 2010–2011 sampling cycle (after project implementation), the *E. coli* concentration had fallen to 121.1 CFU/100 mL, which met water quality standards and showed that the stream had improved (Figure 3). As a result, TDEC removed this segment of the Sequatchie River from the state's 2014 impaired waters list; it was deemed fully supporting of all designated uses.

Partners and Funding

The SETN RC&D was awarded a CWA section 319 grant totaling $190,000 in fiscal year 2011. From that grant, the SETN RC&D provided $5,058 in cost-share for the BMPs directly adjacent to segment TN06020004005-1000; the remaining grant funds were used to support BMPs and education throughout other portions of the Sequatchie River Basin. In addition, SETN RC&D has assisted with dozens of additional agricultural BMPs installations and septic system repairs along other still-impaired portions of the Sequatchie River and its tributaries. Along the delisted stretch of the Sequatchie River, the total investment from the CWA section 319 grant is $5,058, while cooperators provided $3,583 in matching funds. To date, the state of Tennessee's Agricultural Resources Conservation Fund (ARCF) has also contributed $43,983 in cost-share assistance for the implementation of 33 agricultural BMPs, including exclusion fencing, alternative watering facilities, and heavy use areas for livestock. Cooperators assisted by ARCF program provided an additional $33,460 in matching funds.

Key partners with SETN RC&D for the CWA section 319 grant include the University of the South; TDEC (Division of Water Resources and Division of Groundwater Protection); the soil conservation districts (SCDs) in Bledsoe, Grundy, Marion, and Sequatchie counties; U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS); and the Tennessee Wildlife Resources Agency. Partners with TDA that installed BMPs through ARCF include NRCS and various SCDs.

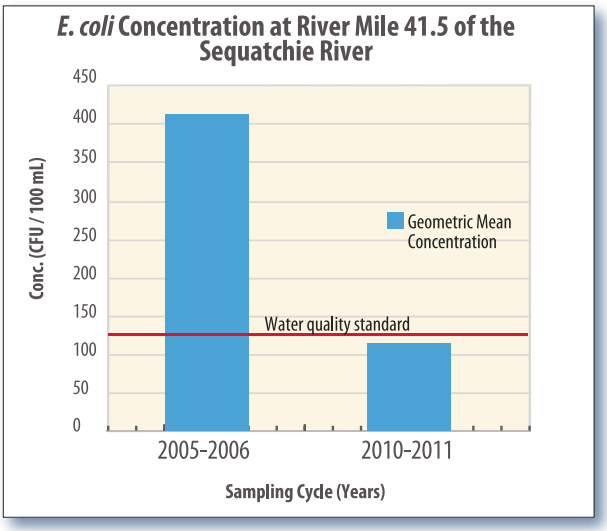

Figure 3. *E. coli* concentration at river mile 41.5 of the Sequatchie River.

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