



# Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

## Tennessee

### Implementing Best Management Practices Reduces Bacteria Levels

#### Waterbodies Improved

Polluted runoff from agricultural lands led to high levels of *Escherichia coli* and sediment in the Nolichucky River. As a result, the Tennessee Department of Environment and Conservation (TDEC) added three segments of the Nolichucky River to Tennessee’s 2002 Clean Water Act (CWA) section 303(d) list of impaired waters. Local farmers entered into the state’s voluntary cost share program and installed various agricultural best management practices (BMPs). Water quality improved, prompting TDEC to remove the three Nolichucky River segments from the CWA section 303(d) list of impaired waters in 2008.

#### Problem

The Nolichucky River watershed drains portions of North Carolina (616 square miles) and eastern Tennessee (1,128 square miles). Major land uses in the Nolichucky River watershed are forest (61.2 percent) and pasture (28.1 percent). High levels of *E. coli* and sediment in the Nolichucky River prompted TDEC to add three segments (Figure 1) of the Nolichucky River to the CWA section 303(d) list of impaired waters in 2002.

The first segment (TN06010108001-2000) is 7.7 miles long and extends from Flat Creek to Bent Creek in Cocke and Hamblen counties. TDEC added this segment to the impaired waters list for *E. coli* from pasture grazing.

The second segment (TN06010108005-1000) is 9.4 miles long and extends from Little Chucky Creek to Evans Island in Greene County. TDEC added this segment to the CWA section 303(d) list as impaired for biological integrity from siltation.

The third segment (TN06010108005-2000) is 6.6 miles long and extends from Evans Island to Pigeon Creek in Greene and Cocke counties. TDEC added this segment to the impaired waters list for *E. coli* and biological integrity from siltation.

Bacteria levels in all three segments exceeded Tennessee’s water quality standard for *E. coli*, which requires that no individual sample exceed 941 colony forming units (cfu) per 100 milliliters (mL) or 126 cfu/100 mL as a geometric mean based on a collection of five samples over a period.

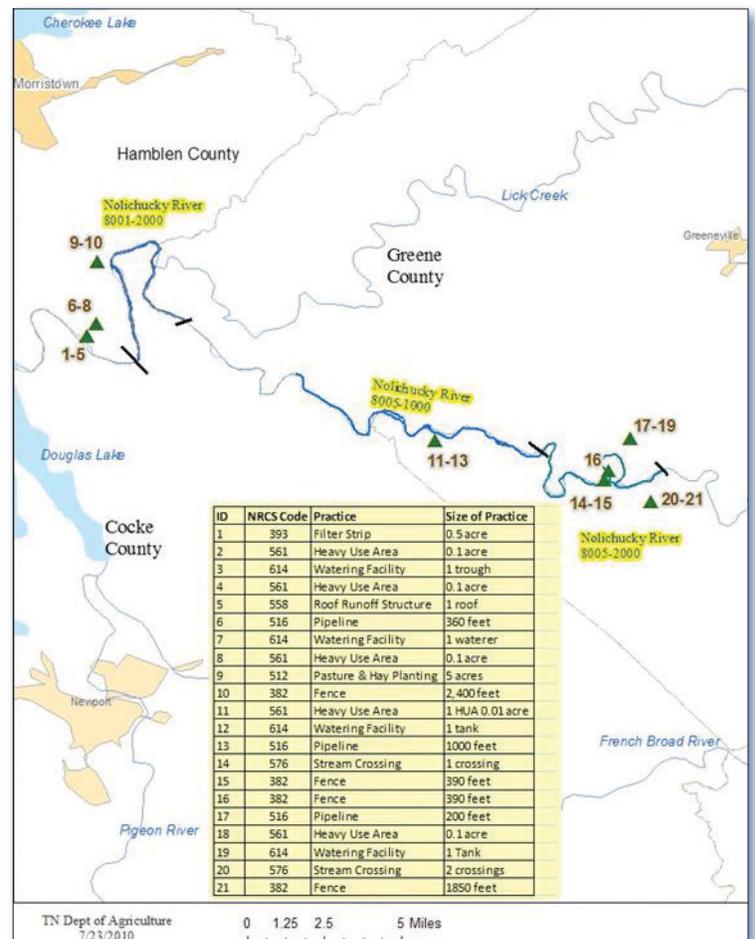


Figure 1. These three impaired Nolichucky River segments (8001-2000, 8005-1000 and 8005-2000) have been the focus of several BMP implementation projects.



Figure 2. Landowners installed heavy use area protections such as this one which prevents erosion at a stream crossing.



Figure 3. A landowner installed fencing to prevent livestock from accessing the stream and surrounding riparian areas.



Figure 4. A landowner installed this roof runoff structure (gutters and piping) to prevent stormwater from running across the bare earth of the work area.

## Project Highlights

Local landowners installed numerous agricultural BMPs (see Figure 1) along all three segments of the Nolichucky River. The BMPs included planting 10 acres of pasture and hay, protecting heavy use areas (Figure 2), adding filter strips, installing fencing to exclude livestock from stream areas (Figure 3), establishing runoff structures (Figure 4) and building alternative watering facilities.

## Results

Monitoring data collected from several stations along the river after BMP implementation showed *E. coli* levels to be below the state standard. For example, data collected along the 7.7-mile segment TN06010108001-2000 showed a geometric mean of 5.3 cfu/100 mL. On the basis of the data, TDEC removed the segment TN06010108001-2000 from the 2008 CWA section 303(d) list of impaired waters.

In addition, TDEC established a Semi-Quantitative Single Habitat Assessment (SQSH) to monitor the effects of the restoration activities on biological integrity. SQSH assessment is a tool used to recognize stream impairment as judged by species richness measures, emphasizing the presence or absence of indicator organisms without regard to relative abundance. The principal metrics used are the total macroinvertebrate families (or genera) and the number of families of mayflies, stoneflies and caddisflies (collectively referred to as EPT,

which is short for the order names Ephemeroptera, Plecoptera and Trichoptera). Implementing agricultural BMPs reduced siltation and improved habitat, allowing macroinvertebrate populations to rise. Within the 9.4-mile-long segment TN06010108005-1000, SQSH documented 7 EPT genera, 16 total genera, and a habitat score of 152 out of 200, which is classified as good. Those improvements in biological integrity and attainment of fish and aquatic life uses resulted in TDEC removing the segment from the 2008 CWA section 303(d) list.

Within the 6.6-mile-long segment TN06010108005-2000, the SQSH documented 11 EPT genera and 21 total genera. Furthermore, water quality monitoring data showed that *E. coli* levels met standards, with a geometric mean of 20.8 cfu/100 mL for 13 samples and zero values exceeding 941 cfu/100 mL. A combination of low bacteria levels and improved macroinvertebrate population counts prompted TDEC to remove the segment from the 2008 CWA section 303(d) list.

## Partners and Funding

Multiple funding sources helped support BMP implementation efforts. From 2003 through 2008, Tennessee contributed approximately \$20,000 through its Agricultural Resources Conservation Fund. Cocke, Greene and Hamblen county soil conservation districts used \$13,813 in CWA section 319 funding. Landowners contributed \$9,118 in matched cost-share funding.



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