



# NONPOINT SOURCE SUCCESS STORY

## Tennessee

### Implementing Agricultural Best Management Practices Improved Stock Creek

#### Waterbody Improved

Runoff from agricultural areas in the Stock Creek watershed contributed silt that degraded water quality and biological integrity, and prevented the creek from supporting its fish and aquatic life designated use. As a result, the Tennessee Department of Environment and Conservation (TDEC) added the entire Stock Creek watershed to Tennessee's 2002 Clean Water Act (CWA) section 303(d) list because of impairments caused by siltation, habitat alterations and pathogens. Best management practices (BMPs) implemented in the watershed improved water quality. Data show that a 3.77-mile segment of Stock Creek now supports its fish and aquatic life designated use, prompting TDEC to remove the segment from the state's 2010 CWA section 303(d) list for its siltation and physical substrate habitat alteration impairments.

#### Problem

Stock Creek is a tributary to the Little River in the Watts Bar Lake watershed and is in Knox County, south of Knoxville, Tennessee (Figure 1). The Stock Creek watershed retains a largely rural character with almost two-thirds of the watershed comprised of rolling pasture and forest. The pastoral setting and low population density has attracted recent new residential and commercial development among the farms and forested areas.

Although the Stock Creek watershed is mostly pasture and forest, it has experienced water quality problems due to agricultural practices (pasture grazing), channelization and failing septic systems. A 1998 macroinvertebrate survey of Stock Creek yielded a biological reconnaissance (biorecon) index score of *poor*. Biorecon is one 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 biorecon index is scored on a scale from 1 to 15. A score of less than 5 is considered *very poor*. A score over 10 is considered *good*.

In 2000, TDEC established a Semi-Quantitative Single Habitat Assessment (SQSH) to monitor biological integrity in Stock Creek. SQSH scores must be at least 32/42 to pass as unimpaired. The SQSH score for Stock Creek in 2000 was 26. As a result of these data, TDEC placed the entire watershed on the CWA section 303(d) list of impaired waters in 2002 because of siltation and habitat alteration.

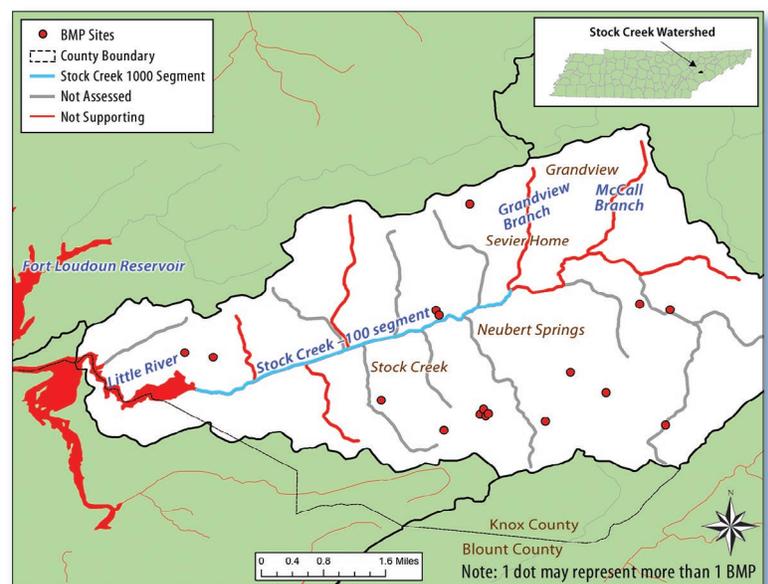


Figure 1. The Stock Creek watershed is in eastern Tennessee. Landowners implemented more than 60 BMPs at sites (represented by red dots) around the watershed.

To allow more targeted watershed restoration efforts, TDEC divided the Stock Creek watershed segment into three separate segments in 2004. A 3.77-mile segment of Stock Creek (TN06010201066-1000), which flows from a tributary known as Grandview Branch to the mouth at Little River, was included on the state's CWA section 303(d) list beginning in 2004. The listed impairments included a loss of biological integrity caused by siltation, physical substrate habitat alteration and elevated *Escherichia coli* levels.

## Project Highlights

To address water quality impairments in the Stock Creek watershed, stakeholders installed more than 60 agricultural BMPs between 1999 and 2012 (Table 1). BMPs included installation of heavy-use areas, critical area planting, pipeline and grassed waterways, and exclusion fencing and alternative watering facilities to prevent livestock from entering streams and trampling streambanks (Figure 2).

As part of the Knox County Adopt-A-Watershed Program, Ecology classes at South Doyle High School monitored the biological, physical and chemical aspects of Stock Creek in fall and spring of 2007 and 2008. In addition, the Stock Creek Task Force (SCTF)—a consortium of agencies, universities and utilities that joined forces in 2001 to protect and improve Stock Creek—have worked to educate students, the agricultural community and residents of the Stock Creek watershed about septic repair and water quality issues.

## Results

The BMPs implemented along Stock Creek have helped reduce siltation, which has allowed the biological integrity of the stream to steadily improve. A bioecon assessment by the Tennessee Valley Authority conducted in 2004 yielded a perfect score of 15. However, to confirm this improvement, the TDEC conducted a second SQSH survey in 2007, which showed a score of 34, above the score of 32 needed to pass. As a result of these data, TDEC removed the siltation and habitat alteration impairments from the 3.77-mile segment of Stock Creek on the state's 2010 CWA section 303(d) list. The segment remains listed as impaired by *E. coli*.

## Partners and Funding

Many federal and state agencies, local organizations and individual landowners worked together to improve water quality in the Stock Creek watershed. Key partners included the Knox County Soil Conservation District, the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), the Tennessee Department of Agriculture's Nonpoint Source Program, TDEC, Tennessee Valley Authority, Ijams Nature Center, the Water Quality Forum, SCTF, Knox County Adopt-A-Watershed Program, the South Doyle Middle and High schools, and local farmers.

**Table 1. BMPs installed in the Stock Creek watershed**

Practice	Total Units
Alternative Watering System Spring Source	7 systems
Critical Area Planting	15 acres
Fence	17,415 feet
Floodwater Diversion	1 diversion
Grade Stabilization Structure	1 structure
Grassed Waterway	21 acres
Heavy Use Area	11 areas
Pasture and Hay Planting	25 acres
Pipeline	7500 feet
Riparian Herbaceous Cover	80 feet
Roof Runoff Structure	175 feet
Spring Development	1 spring
Stock Trails and Walkways	205 feet
Stream Crossing	1 crossing
Watering Facility	10 systems
Well	1 well

Funding sources for Stock Creek watershed improvements included the CWA section 319 program, the state's Agricultural Resources Conservation Fund (created through Tennessee's real estate transfer tax), NRCS Farm Bill funding programs and matching funds from landowners. A CWA section 319 grant of \$20,000 was awarded to the Ijams Nature Center for the Stock Creek Watershed Restoration Plan. Funding for BMPs included CWA section 319 grant pool funds (\$30,550 in cost share, \$21,833 of which was contributed by landowners), the Agricultural Resources Conservation Fund (provided \$17,036 in cost share), and landowners (\$23,140).



**Figure 2. A farmer installed fencing to prevent livestock from accessing this Stock Creek tributary.**



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## For additional information contact:

**Sam Marshall**  
Tennessee Department of Agriculture  
615-837-5306 • Sam.Marshall@tn.gov