



Section 319 NONPOINT SOURCE PROGRAM SUCCESS STORY *Tennessee*

Livestock Management Improves Dissolved Oxygen in Big Sandy

Waterbody Improved

Polluted runoff from pasture-grazing cattle caused abnormally high pathogen levels and low dissolved oxygen concentrations in Big Sandy River. These problems led to the state placing a 7.3-mile river segment on its 303(d) list for impairments in both 2002 and 2004. Using section 319 funding, farmers installed a number of best management practices (BMPs) on pasturelands adjoining the river's impaired segments, including foundations to support cattle in heavy-use areas, grade stabilization structures, pasture and hay planting, critical area planting, livestock watering pipelines, and alternative watering structures. The BMPs resulted in water quality improvements in the 7.3-mile segment and its removal from the state's 2006 303(d) list for dissolved oxygen impairments.

Problem

The 7.3-mile river segment is in Carroll County where Big Sandy River becomes Maple Creek. The Big Sandy River is in the Kentucky Lake watershed in northwestern Tennessee in Ecoregion 65e, a predominantly forested watershed. Pastures, cropland, and hay fields cover approximately 22 percent of the area. The designated use classifications for Big Sandy River include fish and aquatic life, irrigation, livestock watering and wildlife, and recreation. Another designated use classification of Big Sandy River is as industrial water supply.

The 7.3-mile segment was listed as impaired on the 2004 303(d) list for low in-stream dissolved oxygen (DO) concentrations due to pasture grazing. Monitoring along Big Sandy River from 1999 to 2001 showed that the segment was not meeting criteria to support its most stringent designated use classification—recreation. It showed maximum *E. coli* individual sample values that were in violation of the state-established criteria protective of the recreation designated use classification, a maximum individual sample of 941 cfu/100 mL (Figure 1). In addition, fecal coliform values above the state-established criterion of 1,000 cfu/100 mL were observed at multiple sampling stations.

A TMDL study for pathogen loads in the Kentucky Lake watershed was established by the Tennessee Department of Environment and Conservation and approved by EPA in 2005. The study allocated a 44.8 percent reduction in pathogen loading into the Maple Creek branch of Big Sandy River.

Project Highlights

Using a combination of 319 funding and state funds obtained through the Agricultural Resources Conservation Fund (ARCF), the local Soil and Water Conservation District offices in Carroll and Henderson counties worked with local landowners to promote and install management practices and structures that would both reduce pathogen runoff into Big Sandy River and improve the landowners' operations (Figure 2). The Chickasaw-Shiloh Resource Conservation & Development Program (RC&D) and the Hatchie River Watershed Association provided additional technical assistance and support. The BMPs installed included (1) foundations to support cattle and soil in heavy-use areas, (2) grade stabilization structures to prevent stream bank failure, (3) pasture seeding and riparian zone planting along critical areas, and (4) the installation of pipelines and

other alternative water structures, including wells and ponds, designed to keep livestock out of streams.

The foundations and support for heavy-livestock-use areas (places where cattle gather for watering and feeding) were designed to reduce soil erosion caused by livestock usage. Critical stream bank areas were also protected. These water quality control measures also provide livestock health benefits and improve area aesthetics.

Local agriculture agency partners (from both USDA-RC&D and ARCF) advised landowners on the technical design and specifications of BMPs and provided oversight and expertise during the installation process. Landowners participated voluntarily, providing partial labor and funds for the BMPs. The BMPs were installed in the 2003–2005 period, and they continue to help meet the load reduction allocations in the 2005 TMDL.

Results

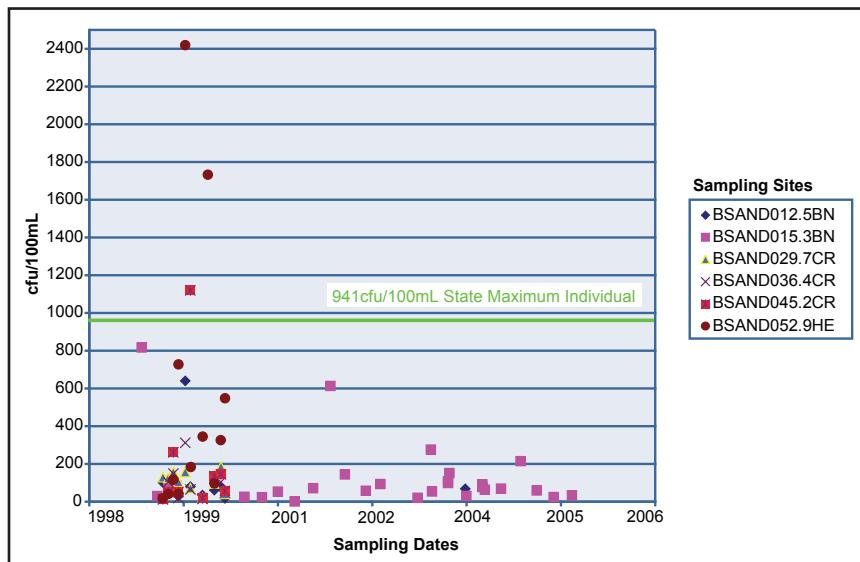
In the most recent Rapid Bioassessment Protocol III sampling of the 7.3-mile segment of Big Sandy River, state biologists found 12 EPT (pollutant-sensitive) genera and 47 total

genera of benthic macroinvertebrates. The Tennessee Stream Condition Index (TSCI) was used to compare subregions with a total possible score of 42. The TSCI Index score for the 7.3-mile segment was 40, which is in the "very good" range and much better than the regional goal of 32. In addition, a diurnal (daily) DO study was done in 2002 at mile 36.4. DO levels stayed above 7 mg/L, which is above the minimum standard of 5 mg/L, even during low-flow periods. The DO data, along with the high biological integrity scores, indicated that the stream is meeting water quality standards, and therefore the segment was delisted in the 2006 cycle for DO. However, the segment remains listed for *E. coli*.

Partners and Funding

Big Sandy River has benefited from \$461,566 of Clean Water Act section 319 funding. The Tennessee State ARCF also provided \$10,016. Key partners in this effort include the Carroll County and Henderson Soil Conservation Districts, Chickasaw-Shiloh RC& D, and the Hatchie River Watershed Association. Agents of these generous partners provided technical expertise and labor. Landowners in the Kentucky Lake watershed contributed in-kind labor hours and some funding.

Figure 1. *E. coli* values from 1998 to 2006.



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