



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Oklahoma

BMP Implementation Results in Improved Turbidity and Bacteria Levels

Waterbody Improved

Bull Creek was impaired for turbidity and bacteria due in part to practices associated with crop, cattle, and poultry production, prompting Oklahoma to add the creek to the state's 2002 Clean Water Act (CWA) section 303(d) list of impaired waters. Implementing best management practices (BMPs) to improve cropland, grazing land, and nutrient management led to decreased sediment and bacteria in the creek. As a result, Bull Creek has been nominated for removal from Oklahoma's 2010 CWA section 303(d) list for turbidity and *E. coli* impairments.

Problem

The 17-mile-long Bull Creek flows through Rogers, Mayes, and Wagoner counties in northeastern Oklahoma (Figure 1). The majority of the land in the area is used for crop production, primarily wheat and corn, and for cattle and poultry production. Erosion of both cropland and grazing land, coupled with improper management of cattle and poultry wastes, were potentially the largest nonpoint source problems in the watershed, contributing to high turbidity and bacteria in the stream.

In the 2002, 2004, and 2008 water quality assessments, monitoring showed that 29, 35, and 25 percent, respectively, of Bull Creek's seasonal baseflow water samples exceeded 50 nephelometric turbidity units (NTU). A stream is considered impaired by turbidity if 10 percent or more of the seasonal base flow water samples exceed 50 NTU (based on no more than 5 years of data before the assessment year). On the basis of the assessment results, Oklahoma added the entire length of Bull Creek to the 2002 and subsequent CWA section 303(d) lists for nonattainment of the fish and wildlife propagation designated use due to turbidity impairment.

In addition, *E. coli* bacteria levels exceeded the state criterion for several years, with geometric means of 317 colonies/100 milliliters (mL) in 2004 and 250 colonies/100 mL in 2008. The primary body contact recreation use is considered impaired if the geometric mean exceeds 126 colonies/100 mL for *E. coli*.



Figure 1. Bull Creek is located in Rogers, Mayes, and Wagoner counties in northeastern Oklahoma.

Project Highlights

Landowners implemented numerous BMPs with support from Oklahoma's locally led cost-share program and funds from Natural Resources Conservation Service (NRCS) general technical assistance programs, the Environmental Quality Incentives Program (EQIP), and the 2008 Conservation Stewardship Program (CSP). One of the primary goals of the project was to improve grazing land quality. From 2004 to 2007, landowners planted supplemental rangeland forage on 106 acres and supplemental pasture grasses on 63 acres, managed brush on 908 acres, and managed pests (weeds) on 838 acres. To further improve pasture and range quality in the watershed, the landowners implemented prescribed grazing on 3,860 acres, nutrient management on 209 acres, and forage harvest management practices on 32 acres. A total of 4,171 linear feet of fencing was installed to improve pasture and range quality, and 10 ponds were constructed. To reduce erosion from cropland, producers implemented conservation crop rotations on 216 acres and conservation tillage methods on 108 acres.

Landowners installed additional BMPs from 2008 to 2010 that have enhanced the initial improvements. BMPs included adopting nutrient management plans for 417 acres, grazing management plans for approximately 3,576 acres, forage harvest management on 249 acres, and weed management plans for 2,593 acres. Conservation crop rotations have been implemented on 516 acres, 324 acres have adopted residue and tillage management, and 12,550 feet of terraces were installed to reduce erosion.

Results

The Oklahoma Conservation Commission's Rotating Basin Monitoring Program, a statewide nonpoint source ambient monitoring program, documented improved water quality in Bull Creek due to landowners implementing BMPs. The installed cropland, grazing land, and nutrient management BMPs work to decrease erosion and reduce bacteria loading. BMPs designed to improve pasture and rangeland result in denser vegetation and fewer bare spots, which equates to less potential runoff of soil, nutrients, and bacteria from animal wastes into waterbodies. In the 2010 water quality assessment, monitoring showed that only 6 percent of baseflow turbidity values in Bull Creek exceeded the 50 NTU state standard, prompting Oklahoma to nominate the 17-mile segment for removal from the 2010 section 303(d) list for turbidity (Figure 2). Bull Creek now partially attains its fish and wildlife propagation designated use. In addition, monitoring showed that the geometric mean of *E. coli* in

the 2010 assessment was 123 colonies/100 mL, below the state standard of 126 colonies/100 mL (Figure 3). Hence, Bull Creek has been nominated for removal from the 2010 CWA section 303(d) list for *E. coli* impairment and is in partial attainment of the primary body contact recreation use.

Partners and Funding

The improvement in water quality in Bull Creek was documented by the Oklahoma Conservation Commission's statewide nonpoint source ambient monitoring program. The Rotating Basin Monitoring Program, which now includes a probabilistic component, is funded through the U.S. Environmental Protection Agency (EPA) CWA section 319 program at an average annual cost of \$1 million. Monitoring costs include personnel, supplies, and lab analysis for 19 parameters from samples collected every five weeks at about 100 sites for a total of 20 episodes per five year cycle. In-stream habitat, fish, and macroinvertebrate samples are also collected. Statewide educational efforts through Blue Thumb are also funded by EPA CWA section 319 at a cost of approximately \$600,000 annually. These costs include supplies for monthly monitoring of 100 sites, as well as trainings and other outreach activities. The Oklahoma cost-share program provided \$14,085 in state funding for BMPs in this watershed through the Wagoner County, Rogers County, and Mayes County Conservation Districts, and landowners contributed \$16,528 through this program. The NRCS spent approximately \$277,936 for implementation of BMPs in the area from 2004 through 2010.

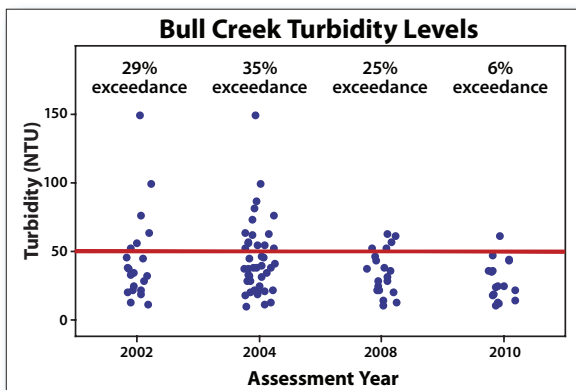


Figure 2. Monitoring data show a consistent decline in turbidity levels.

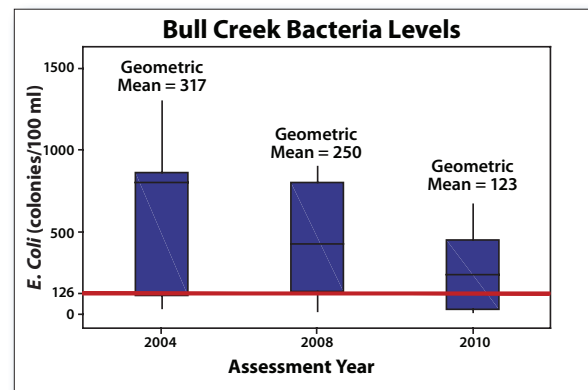


Figure 3. Bacteria concentrations have declined and now meet water quality standards.



U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-11-001Q
March 2011

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