



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Oklahoma

## Best Management Practice Implementation Results in Improved Bacteria Levels in Big Creek

### Waterbody Improved

Big Creek was impaired for *Escherichia coli* (*E. coli*) bacteria due in part to practices associated with cattle, crop, and poultry production, prompting Oklahoma to add the creek to the state's 2008 Clean Water Act (CWA) section 303(d) list of impaired waters. Implementing best management practices (BMPs) to improve cropland, grazing land, and nutrient management reduced the runoff of bacteria into the creek. As a result, Big Creek has been removed from Oklahoma's 2012 CWA section 303(d) list for *E. coli* bacteria impairment.

### Problem

Big Creek flows 35 miles through Nowata and Craig counties in northeastern Oklahoma, draining an area of 108,357 acres (Figure 1). The majority of the land in the watershed is used for cattle production, although some wheat, corn, and soybeans and more than 1.5 million chickens a year are also grown. Erosion of both cropland and grazing land, coupled with improper management of cattle and poultry wastes, was potentially the largest nonpoint source problem in the watershed, contributing to high levels of fecal bacteria in the stream. In the 2008 water quality assessment, *E. coli* bacteria levels exceeded the state criterion, with a geometric mean of 160 colonies/100 milliliters (mL). The primary body contact recreation use is considered impaired if the geometric mean exceeds 126 colonies/100 mL for *E. coli*.

### Project Highlights

Landowners implemented numerous BMPs with support from Oklahoma's locally led cost-share program and funds from the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) conservation technical assistance programs, the Environmental Quality Incentives Program (EQIP), and the Wetlands Reserve Program (WRP). From 2008 to 2011, landowners implemented prescribed grazing on 16,190 acres, nutrient management on 187 acres, and forage harvest management practices on 31 acres. 9,247 linear feet of fencing was installed to improve pasture and range quality and to establish 448 acres of access limited

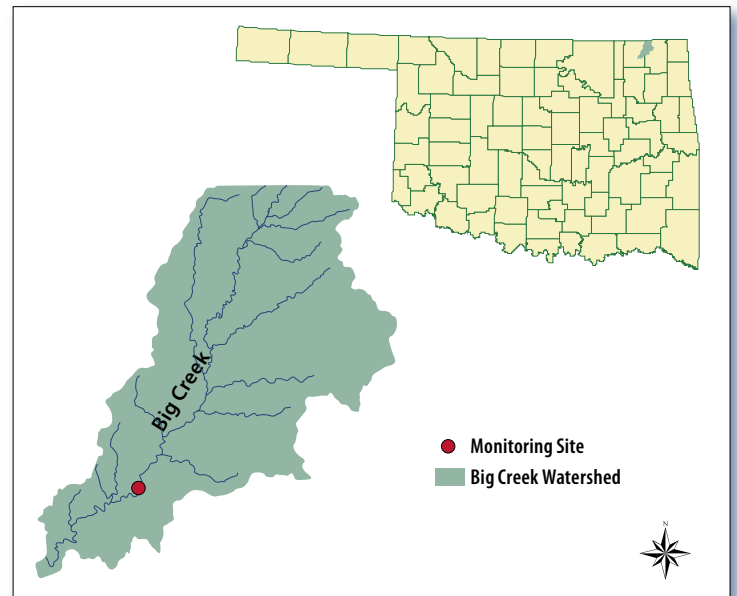


Figure 1. The Big Creek watershed is in northeastern Oklahoma.

areas. Four grade stabilization structures, one diversion, and one grassed waterway helped to reduce erosion from pastures and rangeland. Seventeen ponds provided alternative water sources for livestock. Landowners planted vegetation on 26 critical area acres, trees on 41 acres, and supplemental forage/biomass on 70 acres. Proper management of 576 acres of wetland wildlife habitat and 2,223 acres of upland wildlife habitat occurred in the watershed during this time, which provided greater potential for filtering of sediment and wastes.

Landowners have continued to install additional BMPs that have enhanced the initial improvements. BMPs implemented in 2012 included 4,311 acres of prescribed grazing, 79 acres of forage harvest management, 348 acres of conservation crop rotations and residue/tillage management, construction of three ponds, 16,737 linear feet of fencing, and 2,711 acres of upland wildlife habitat management.

## Results

The Oklahoma Conservation Commission's Rotating Basin Monitoring Program, a statewide nonpoint source ambient monitoring program, documented improved water quality in Big 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.

Monitoring data showed that the geometric mean of *E. coli* in the 2012 assessment was 90 colonies/100 mL, below the state standard of 126 colonies/100 mL (Figure 2). On the basis of these data, Big Creek (WBID OK121510030010\_00) was removed from Oklahoma's 2012 CWA section 303(d) list for *E. coli* bacteria impairment and is in partial attainment of the primary body contact recreation use (Figure 3).

## Partners and Funding

The improvement in water quality in Big Creek was documented by the Oklahoma Conservation Commission's statewide nonpoint source ambient monitoring program. The Rotating Basin Monitoring Program is supported by EPA's CWA section 319 funding at an average annual cost of \$1 million. Monitoring costs include personnel, supplies, and lab analyses for 18 parameters from samples collected every 5 weeks at about 100 sites for a total of 20 episodes per 5-year cycle. In-stream habitat, fish, and macroinvertebrate samples are also collected. Statewide educational efforts through Blue Thumb are also supported by CWA section 319 at a cost of approximately \$600,000 annually. These costs include supplies for monthly monitoring of

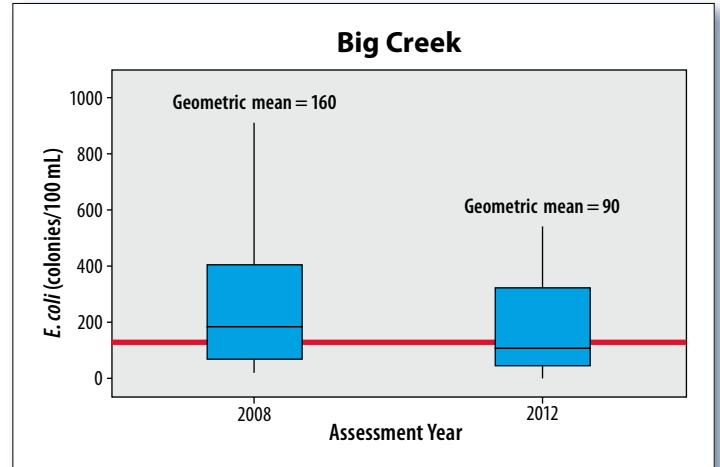


Figure 2. Data show a decrease in *E. coli* counts between 2008 and 2012. Boxplots indicate the interquartile range (25th-75th percentile) and median of the data for assessment years 2008 and 2012.



Figure 3. Oklahoma's Big Creek after restoration.

100 sites, as well as trainings and other outreach activities. The Oklahoma cost-share program provided \$10,073 in state funding for BMPs in this watershed through the Nowata County and Craig county conservation districts, and landowners contributed \$6,012 through this program. NRCS spent approximately \$1,863,150 for implementation of BMPs in the area from 2008 through 2011.



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