



NONPOINT SOURCE SUCCESS STORY

Oklahoma

Implementation of Voluntary Conservation Programs Reduces Bacteria in Fourteenmile Creek

Waterbody Improved

High bacteria levels resulted in the impairment of Fourteenmile Creek and placement on Oklahoma's Clean Water Act (CWA) section 303(d) list of impaired waters in 2002. Pollution from grazing lands contributed to this impairment. Farmers in the Fourteenmile Creek watershed implemented conservation practice systems (CPs) that promoted better agricultural land management, resulting in decreased *Escherichia coli* (*E. coli*) levels in the creek. As a result, Oklahoma removed Fourteenmile Creek from its 2008 CWA section 303(d) list for *E. coli*. Fourteenmile Creek now partially supports its primary body contact (PBC) designated beneficial use and fully supports all other assessed beneficial uses.

Problem

Fourteenmile Creek is a 25.45-mile stream that flows through Cherokee County, Oklahoma, before draining into Lake Fort Gibson (Figure 1). Land use in the 45,000-acre (ac) watershed is about 62 percent grazing lands and 33 percent forested. Approximately 4 percent of the watershed is developed land and less than 1 percent is cropland. Although only a few poultry houses are located in the watershed, Cherokee and neighboring counties support a significant poultry production industry with hundreds of facilities and millions of birds produced annually. As a result, landowners have ready access to poultry waste as a soil amendment and fertilizer on grazing lands, which can contribute to water quality degradation.

Challenges with grazing lands and animal waste management contributed to listing the stream as impaired for pathogens (including *E. coli*) in 2002, when 29 percent of individual samples violated the individual sample maximum of 406 colony forming units per 100 milliliters (CFU/100 mL) during the recreation season. In 2002, the PBC designated use was considered impaired if more than 10 percent of samples violated the individual sample maximum. The assessment method changed in 2008 and streams were considered impaired if the recreation season geometric mean exceeded 126 CFU/100 ml for *E. coli*. Oklahoma added Fourteenmile Creek (OK12160010100_00) to the 2002 CWA section 303(d) list for nonattainment of its PBC designated beneficial use.

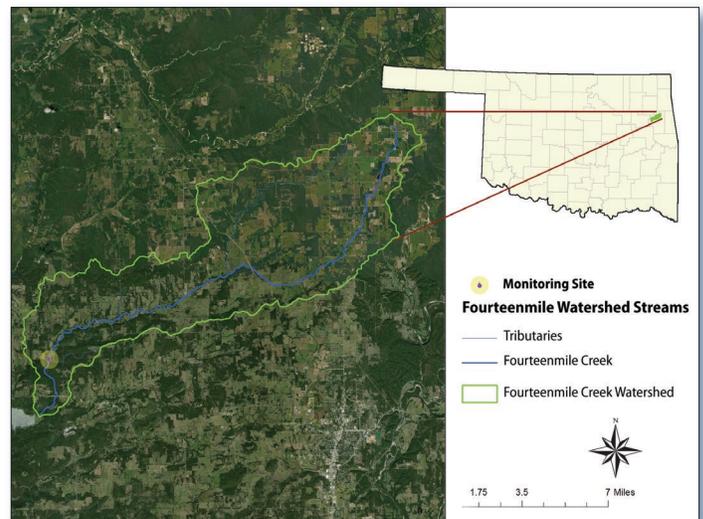


Figure 1. Fourteenmile Creek is in northeastern Oklahoma.

Story Highlights

Landowners in the watershed worked with the Cherokee County Conservation District, the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), and the Oklahoma Conservation Commission (OCC) to implement CPs through Oklahoma NRCS's Environmental Quality Incentives Program (EQIP), Conservation Stewardship Program (CSP), Grazing Lands Conservation (GLC) technical assistance, and general conservation technical assistance program, and Oklahoma's Locally Led Cost Share Program (LLCP).

Table 1. CPs installed in the Fourteenmile Creek watershed.

Practice name	Amount installed
Fence	26,388 ft
Brush management	949 ac
Composting facility	1
Pond	19
Nutrient management	1,979 ac
Conservation crop rotation	210 ac
Cover crop	0.1 ac
Seasonal high tunnel system	672 ft ²
Watering facility	9 tanks
Livestock pipeline	3,367 ft
Forage harvest management	1,379 ac
Prescribed grazing	8,772 ac
Comprehensive nutrient management plan	7
Waste storage facility	2
Herbaceous weed treatment	372 ac
Groundwater testing	2 wells
Seasonal residue management	92 ac
Livestock well	3
Waste recycling	298 ac
Heavy use area protection	18 ac
Upland wildlife habitat management	1,132 ac
Integrated pest management	6,387 ac

Through the installation of CPs between 2002 and 2015, landowners focused on reducing erosion and pollutant runoff from grazing lands in the watershed (Table 1). In addition, over 3,000 ac were enrolled in CSP, which encouraged additional management improvements over those initially implemented through the EQIP program. CSP focused on nutrient management, soil health, grazing management, and improved energy efficiency.

Results

The OCC documented improved water quality in Fourteenmile Creek due to landowners implementing CPs. The CPs worked to decrease the runoff of fecal bacteria and other pollutants to downstream waterbodies. Monitoring data compiled for the 2002

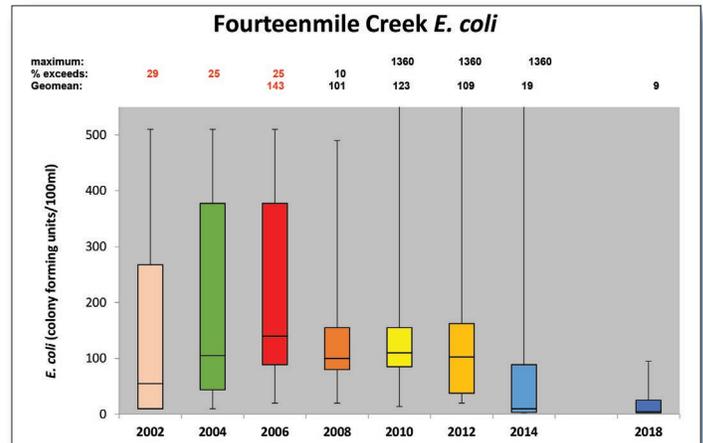


Figure 2. *E. coli* bacteria concentrations decreased in Fourteenmile Creek with installation of CPs.

integrated report showed that Fourteenmile Creek *E. coli* levels had violated state standards (29 percent of the recreation season samples exceeded the individual sample maximum of 406 CFU/100 mL). The stream was delisted for *E. coli* in 2008 when concentrations decreased to violating the individual sample maximum less than 10 percent of the time and when the *E. coli* geometric mean of 101 CFU/100 mL was less than the standard of 126 CFU/100 mL (Figure 2). Based on these data, Fourteenmile Creek was removed from the Oklahoma CWA section 303(d) list for *E. coli* in 2008. Although the stream remains listed for Enterococcus and therefore is only partially supporting its PBC, the stream fully supports all other assessed beneficial uses.

Partners and Funding

The OCC monitoring program is supported by U.S. Environmental Protection Agency's (EPA) CWA section 319 funds at an average annual statewide cost of \$1 million. Approximately \$500,000 in EPA section 319 funds support statewide water quality educational efforts through Blue Thumb. Approximately \$188,000 of these federal and state matching funds have been devoted to Fourteenmile Creek. From 2002 to 2015, NRCS supplied approximately \$50,000 for implementation of CPs in the watershed through EQIP. Additional funds were provided through NRCS for CSP. The state LLC provided \$22,218, which was matched by \$29,797 from landowners. In addition, many practices were funded by landowners based on recommendations through NRCS GLC, general technical assistance and conservation planning.



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