NONPOINT SOURCE SUCCESS STORY

Oklahoma

Conservation Reserve Program Supports Improved Water Quality in Buffalo Creek Watershed (Harper County)

Waterbodies Improved

High bacteria levels resulted in impairment of Buffalo Creek and placement on Oklahoma's Clean Water Act (CWA) section 303(d) list of impaired waters in 2002. Pollution from grazing and crop lands contributed to these impairments. Implementing conservation practice systems (CPs) to promote better land management decreased *Escherichia coli (E. coli)* levels in the watershed. As a result, Oklahoma removed the *E. coli* impairment from its 2016 CWA section 303(d) list. Buffalo Creek now partially supports its primary body contact (PBC) designated beneficial use.

Problem

The Buffalo Creek Watershed extends over 170,395 acres (ac) in Harper County in northwest Oklahoma (Figure 1). The creek flows southeast through the arid Rolling Red Hills Ecoregion and empties into the Cimarron River. Land use in the watershed is about 72 percent hay and grazing lands and 23 percent cropland. The small town of Buffalo lies in the center of the watershed (population 1,302). Oil and gas activity has increased in recent years in the western portion of the watershed. The watershed also contains a large cattle feeding operation near the town of Buffalo.

Challenges with grazing and crop land management contributed to listing a 49.75-mile segment of the stream as impaired by *E. coli* when at least 17 percent of samples exceeded the individual sample maximum of 406 colony-forming units per 100 milliliters (CFU/100 mL) during the recreation season (May 1 – September 30). In 2002, the PBC designated use was considered impaired if more than 10 percent of samples exceeded individual sample maximum. The assessment method changed in 2008 and streams were considered to violate the standard if the recreation season geometric mean exceeded 126 CFU/100 mL for *E. coli*. Based on these results, the Oklahoma Conservation Commission (OCC) added segment OK620920050010_00 to the 2002 CWA section 303(d) list of impaired waters for nonattainment of the PBC designated beneficial use.

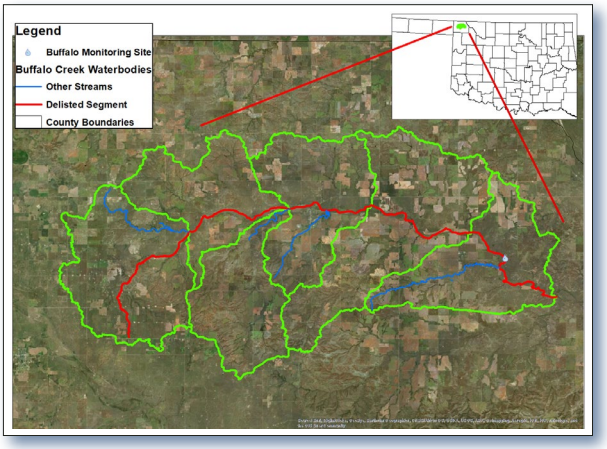

Figure 1. Buffalo Creek is in northwestern Oklahoma.

Story Highlights

Landowners in the watershed worked with the Harper County Conservation District, the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) and Farm Services Agency (FSA), and the OCC to implement CPs through Oklahoma NRCS's Environmental Quality Incentives Program (EQIP) and general conservation technical assistance program, FSA's Conservation Reserve Program (CRP), and OCC's Locally Led Cost Share Program (LLCP). From 1991 to 2018, landowners improved thousands of acres of pasture, hay meadows, and cropland, which reduced runoff of bacteria and other pollutants by decreasing

erosion and better utilizing available grazing lands. Much of this implementation was focused on limiting livestock grazing access to vulnerable grass and former croplands through the enrollment of over 11,000 acres in the CRP program. Additional practices focused on reducing pollutant runoff from cropland through terraces (1,058,647 feet [ft]), diversions (41,160 ft), reduced tillage (no-till: 6,105 ac; reduced-till: 4,438 ac) operations and other improvements.

Landowners implemented other CPs, including pest management (4,142 ac), nutrient management (2,463 ac), forage harvest management (733 ac), brush management (2,863 ac), and upland wildlife habitat management (19,912 ac). Landowners also implemented livestock access control (11,666 ac) and installed pipeline (50,980 ft), a pumping plant, water wells (23), watering tanks (25), and ponds (17). They adopted irrigation water management across 208 ac, including adding a sprinkler system and pipeline (634 ft). They installed five grade stabilization structures and three animal waste treatment lagoons. Additional CPs include cover crops (3,694 ac), conservation cover (11,781 ac), conservation crop rotation (534 ac), prescribed grazing (6,947 ac), critical area planting (94 ac), forage/biomass planting (1,370 ac), deep tillage (1,088 ac), prescribed burning (934 ac), animal waste recycling (233 ac), field border (76,266 ft), fencing (48,041 ft), riparian planting (31 ac), range planting (4,566 ac), grassed waterways (115 ac), and windbreak/shelter belts (3,165 ft).

Results

The OCC documented improved water quality in Buffalo Creek due to installation of CPs through its statewide nonpoint source Rotating Basin Ambient Monitoring Program. Data compiled for the 2002 integrated report showed that *E. coli* levels exceeded the individual sample maximum of 406 CFU/100 mL at least 17 percent of the time (Figure 2). The standard changed in 2008 such that streams were considered to violate the criteria if the geomean of recreation season samples exceeded 126 CFU/100 mL. As shown in Figure 2, Buffalo Creek continued to exceed the applicable standard through 2012. However by 2016, the geomean had dropped to 17 CFU/100 mL. Based on these data, Oklahoma removed Buffalo Creek from the CWA section 303(d) list for *E. coli* in 2016. Buffalo Creek now partially supports its PBC beneficial use.

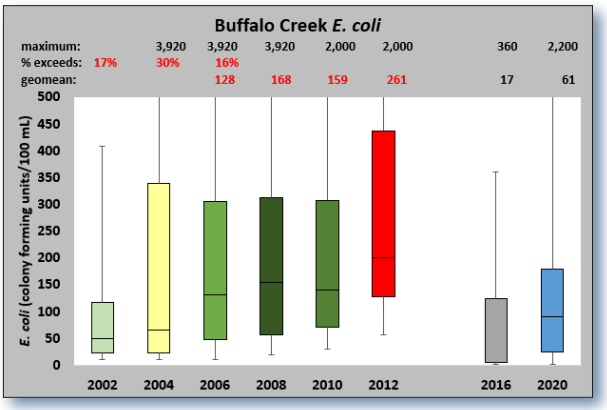

Figure 2. *E. coli* concentrations in Buffalo Creek declined as CPs were installed.

Partners and Funding

The OCC monitoring program is supported by U.S. Environmental Protection Agency's (EPA) CWA section 319 funding 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 $289,870 of these federal and state matching funds have been devoted to Buffalo Creek. From 1991 to 2018, NRCS and FSA supplied more than $2.2 million for CP implementation in Oklahoma through EQIP and CRP. In addition, many practices were funded by landowners based on recommendations through NRCS general technical assistance. Finally, the OCC, Harper County Conservation District, and landowners funded more than $624,908 worth of conservation practices, at least $313,475 of which was funded by landowners through the LLCP.

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