



NONPOINT SOURCE SUCCESS STORY

Oklahoma

Conservation Practices Result in Improved Bacteria Levels in Walnut Creek

Waterbody Improved

Walnut Creek was impaired for *Escherichia coli* (*E. coli*) bacteria and was added to Oklahoma's Clean Water Act (CWA) section 303(d) list of impaired waters in 2006. Due in part to practices associated with cattle and hog production, the impairment was addressed through implementation of a system of conservation practices (CPs) that focused on improving grazingland and excluding livestock from riparian areas. This effort led to a sustained decrease in bacteria in the creek, resulting in removal of Walnut Creek for *E. coli* impairment from Oklahoma's CWA section 303(d) list in 2014.

Problem

Twenty-eight-mile-long Walnut Creek (OK520610030010_00) flows through McClain County in central Oklahoma (Figure 1). The majority of the land in the 129,852-acre watershed is used for wheat and cattle production. Many hogs are also produced, in addition to corn, sorghum and soybeans. Erosion of both cropland and grazingland, coupled with improper management of livestock wastes and direct livestock access to streams, were potentially the largest nonpoint source (NPS) problems in the watershed, contributing to high levels of fecal bacteria in the stream. In the 2006 water quality assessment, *E. coli* bacteria levels exceeded the state criterion, with a geometric mean of 179 colony forming units/100 milliliters (CFU). The primary body contact recreation designated use is considered impaired if the geometric mean exceeds 126 CFU for *E. coli*.

Project Highlights

Landowners implemented numerous CPs with support from Oklahoma Conservation Commission's (OCC's) Locally Led Cost Share (LLCS) program and funds from the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) general technical assistance programs and the Environmental Quality Incentives Program. The focus of most CPs in this watershed was proper grazing management, including fencing livestock out of streams, and improved pasture and rangeland quality, as runoff from poor quality land can carry both sediment and fecal bacteria into waterbodies.

From 2009 to 2012, landowners installed 30,619 linear feet of fence and implemented

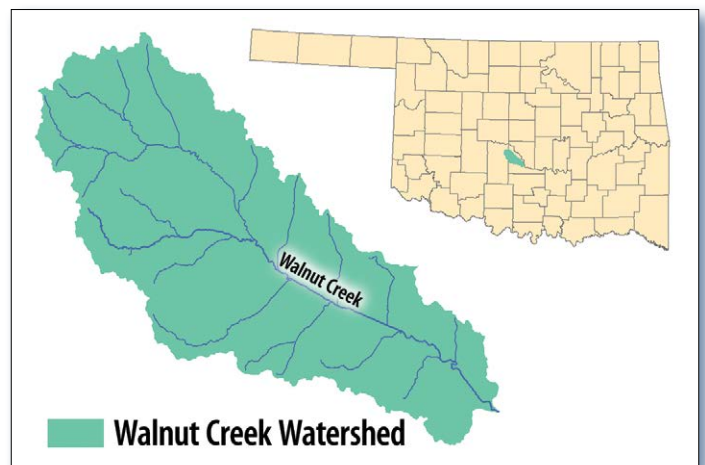


Figure 1. The Walnut Creek watershed flows through McClain County in central Oklahoma.

10,837 acres of prescribed grazing. Sixteen new ponds provided alternative water supplies for livestock after cross-fencing to optimize grazingland usage. Landowners also cooperated in nutrient management planning on nearly 9,000 acres. Brush management on more than 1,200 acres helped improve pasture and range quality, as did 1,500 acres of supplemental biomass and critical area planting and 7,330 acres of pest management. Cover crops increased the soil health of more than 1,800 acres of pasture and range, and no-till or reduced till methods were used in these areas. To reduce erosion from sloped areas, producers installed grassed waterways, terraces, diversions and grade stabilization structures. Upland wildlife habitat management practices were implemented on 149 acres, and stream habitat improvement and management CPs were conducted over 89 acres.

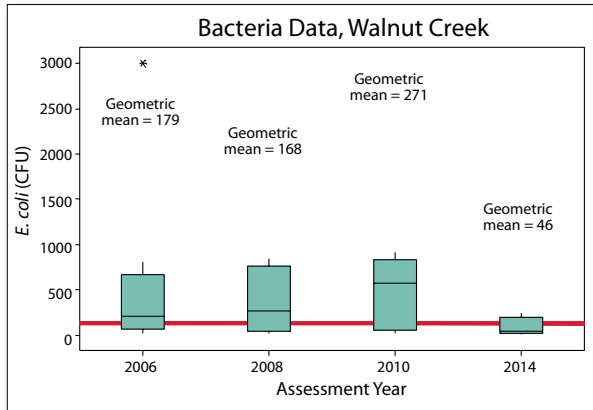


Figure 2. Boxplots indicate the interquartile range (25th-75th percentile) and median of the data for assessment years 2006, 2008, 2010 and 2014. A stream meets criteria for *E. coli* if the geometric mean, based on no more than five years of data preceding the assessment year, is less than 126 colony forming units/100 mL (CFU).

Oklahoma's NPS education program, Blue Thumb, held several volunteer monitoring trainings in the area. A local high school teacher and her students monitored Walnut Creek for a year, and another group of citizens collected water quality, benthic macroinvertebrates and fish data for two years.

Landowners installed additional CPs from 2013 through 2014 that have enhanced the initial improvements. CPs included prescribed grazing management (4,570 acres), nutrient management (159 acres), grazing management (4,122 acres), supplemental vegetation planting (285 acres) and fencing practices (3,700 linear feet).

Results

The OCC's statewide NPS ambient monitoring program documented improved water quality in Walnut Creek due to conservation efforts (Figures 2 and 3). The installed grazingland and nutrient management CPs worked to decrease erosion and reduce bacteria loading. CPs designed to improve pasture and rangeland resulted in denser vegetation and fewer bare spots, which reduced runoff of soil, nutrients and bacteria from animal wastes into waterbodies. In the 2014 assessment, monitoring data showed that the geometric mean of *E. coli* had decreased to 46 CFU, which is significantly below the state standard of



Figure 3. The OCC Rotating Basin Monitoring Program documented improved water quality in Walnut Creek, seen here in 2015.

126 CFU. Hence, Walnut Creek was removed for *E. coli* impairment from the 2014 CWA section 303(d) list and is in partial attainment of the primary body contact recreation use. With continued good management, the waterbody is expected to fully attain its primary recreation designated use.

Partners and Funding

The improvement in water quality in Walnut Creek was documented by OCC's statewide NPS ambient monitoring effort known as the Rotating Basin Monitoring Program (RBMP). The RBMP is funded in part with U.S. Environmental Protection Agency (EPA) CWA section 319 funds at a total annual cost of \$1 million. This funding supports personnel, supplies, lab analyses and other associated costs. Sampling efforts comprise 20 water quality collections at approximately 100 sites every five weeks per five-year cycle. Instream habitat, fish and macroinvertebrate samples are also collected during this period. Statewide educational efforts through OCC's Blue Thumb Program are also funded by EPA section 319 at a cost of approximately \$600,000 annually. These funds support costs associated with volunteer monitoring at nearly 100 sites, volunteer trainings and many outreach activities. The OCC LLCs program provided \$60,000 in state funding for CP implementation in this watershed through the McClain Conservation District with landowners contributing \$43,148 in match. The NRCS spent a little over \$1 million through its financial assistance programs for CP implementation in McClain County from 2009 through 2012 (pre-listing period). Implementation is still ongoing, with NRCS spending an additional \$500,000 since 2013.



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