

NONPOINT SOURCE SUCCESS STORY

Enhanced Grassland Management Improves Water Quality in Salt Creek

Waterbody Improved

High Escherichia coli (E. coli) concentrations and poor fish community structure resulted in impairment of Salt Creek and placement on Oklahoma's Clean Water Act (CWA) section 303(d) list of impaired waters in 2006

klahoma

(fish) and 2010 (E. coli). Pollution from grazing lands contributed to this impairment. Implementing conservation practice systems (CPs) to promote better land management decreased runoff of bacteria and other pollutants and resulted in improved fish communities. As a result, Oklahoma removed the E. coli and fish impairments from its 2016 CWA section 303(d) list. Salt Creek now partially supports its primary body contact (PBC) and warm water aquatic community (WWAC) designated beneficial uses.

Problem

The Salt Creek Watershed covers approximately 152,700 acres in Pottawatomie and Seminole counties in the Cross Timbers Environmental Protection Agency (EPA) level III ecoregion in Oklahoma (Figure 1). Land use in the watershed is about 50% grazing lands (managed pasture and rangeland), 43% forested and less than 1% cropland. Most of the cultivated fields lie in the flat lands along the stream. The primary agricultural products from the watershed are hay and cattle.

Water quality monitoring in the early to mid-2000s determined that challenges with grazing land management contributed to a 2006 listing of the 39.02-mile stream as having an impaired fish community. A 2003 fish collection produced an Index of Biotic Integrity (IBI) score of 15, which was 40% of the reference stream IBI for the Cross Timbers ecoregion. Waterbodies are considered to be not supporting the WWAC beneficial use if the IBI score is 61% or less of reference stream scores. This IBI coincided with a habitat score of 50.6, which was among the lowest measured for the ecoregion, and may have contributed to the poor fish community structure E. coli samples collected during this period were also elevated—the geometric mean of samples collected during the recreation season (May 1 - September 30) was 149 colony forming units per 100 milliliters (CFU/100 mL). A stream is considered impaired for E. coli if the geomean is greater than 126 CFU/100 mL. Based on these results, Oklahoma added segment OK520800030010 00 to the CWA section 303(d) lists



Figure 1. Salt Creek is in central Oklahoma.

in 2006 and 2010 for nonattainment of the WWAC and PBC designated beneficial uses, respectively.

Story Highlights

More than 100 landowners in the watershed worked with the Shawnee and Konawa conservation districts, the Natural Resources Conservation Service (NRCS), Farm Service Agency (FSA), and the Oklahoma Conservation Commission (OCC). They implemented CPs through Oklahoma NRCS's Environmental Quality Incentives Program (EQIP), Conservation Stewardship Program (CStwP) and general conservation technical assistance program; FSA's Conservation Reserve Program (CRP); and OCC's Locally Led Cost Share Program (LLCP). From 2000 to 2020, landowners improved grazing management, which reduced runoff of sediment, bacteria, and other pollutants by

increasing vegetative cover and reducing bare soil. Landowners implemented access control (61 acres [ac]), brush management (2,617 ac), conservation cover (0.30 ac), critical area planting (47.5 ac), fence (38,287 feet [ft]), forage harvest management (3,507 ac), firebreak (28,816 ft), grade stabilization structures (2), herbaceous weed treatment (332 ac), high tunnel systems (2), livestock pipeline (8,053 ft), nutrient management (3,248 ac), pasture and hayland planting (394 ac), pest management (8,360 ac), ponds (41), prescribed burning (656 ac), prescribed grazing (14,581 ac), upland wildlife habitat management (2,647 ac), animal waste transfer, water well (1) and windbreak shelter belt (1,600 ft). In addition, at least 3,248 acres were enrolled in CStwP, meaning that conservation plans had already addressed the most urgent natural resource concerns and producers were working towards even greater resource protection.

Results

The OCC documented improved water quality in Salt Creek due to installation of CPs through its statewide nonpoint source Rotating Basin Ambient Monitoring Program. By 2016, the *E. coli* geometric mean had dropped to 57.4 CFU/100 mL and remained at similar or lower levels through the 2022 assessment period (Figure 2). Fish communities had also improved to an IBI of 19, which is 80% of reference conditions for the ecoregion (Figure 3). Aquatic habitat scores slightly improved to 55.9, primarily due to emergence of rocky riffles and increased instream cover. Based on these data, Oklahoma removed Salt Creek from the CWA section 303(d) list for *E. coli* and fish community in 2016. Salt Creek now partially supports its WWAC and PBC beneficial uses.

Partners and Funding

The OCC monitoring program is supported by U.S. Environmental Protection Agency's (EPA's) CWA section 319 funding at an average annual statewide cost of \$1 million. Approximately \$500,000 in EPA 319 funds support statewide water quality educational efforts through Blue Thumb. Approximately \$209,870







Figure 3. Fish communities improved in Salt Creek with the installation of CPs that resulted in improved fish habitat.

of these federal and state matching funds have been devoted to Salt Creek.

From 2000 to 2020, NRCS supplied more than \$280,000 for CP implementation in Oklahoma through EQIP. In addition, many practices were funded by landowners based on recommendations through CStwP, NRCS general technical assistance, and FSA's CRP. Finally, OCC, Shawnee and Konawa conservation districts, and landowners funded more than \$273,214 worth of CPs (at least \$145,737 of which was funded by landowners through the LLCP).



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

EPA 841-F-21-001Z November 2021

For additional information contact:

Shanon Phillips Oklahoma Conservation Commission 405-522-4728 • shanon.phillips@conservation.ok.gov