



NONPOINT SOURCE SUCCESS STORY

Oklahoma

No-till, Cover Crops, and Similar Conservation Practices Improve Water Quality in Turkey Creek

Waterbody Improved

High *Escherichia coli* (*E. coli*) concentrations and poor fish community structure resulted in impairment of Turkey Creek and placement on Oklahoma's Clean Water Act (CWA) section 303(d) list of impaired waters in 2006 (fish) and 2008. Pollution from crop and 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 in 2016 from its CWA section 303(d) list. Turkey Creek now fully supports its primary body contact (PBC) and warm water aquatic community (WWAC) designated beneficial uses.

Problem

The Turkey Creek Watershed covers approximately 202,750 acres in Jackson, Greer and Harmon counties in Oklahoma (Figure 1). Land use in the watershed is about 47% grazing lands (managed pasture and range-land), and 47% cropland. The Turkey Creek Watershed supports a system of 31 flood control dams constructed by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). These reservoirs reduce the impacts of flooding in 89.5 square miles and provide an estimated \$727,000 in benefits including reduction of flood damages to crops and infrastructure. They may also provide benefits such as irrigation, municipal or industrial water supply, and recreation. These structures protect 243 farms or ranches and 27 bridges, create or enhance 1,304 acres of wetlands, and reduce sedimentation to downstream waterbodies by 224,704 tons per year. The primary agricultural products from the watershed are cotton, wheat, soybeans 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 51.64-mile stream as having an impaired fish community when the 2004 fish collection produced an Index of Biotic Integrity (IBI) score of 16, which is 64% of reference condition scores for the Central Great Plains Ecoregion. Waterbodies are considered to be not supporting the WWAC beneficial use if the IBI score is less than 80% of reference condition scores. *E. coli*

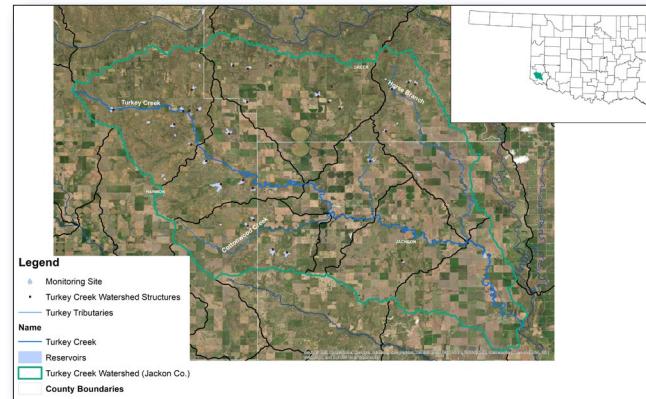


Figure 1. Turkey Creek is in southwestern Oklahoma.

samples collected during this time were also elevated when the geometric mean of samples collected during the recreation season (May 1 – September 30) was 210 colony forming units per 100 milliliters (CFU/100 mL). A stream is considered impaired for *E. coli* if the geo-mean is greater than 126 CFU/100 mL. Based on these results, Oklahoma added segment 311600020060_00 to the CWA section 303(d) lists in 2006 and 2008 for nonattainment of the WWAC and PBC designated beneficial uses, respectively.

Story Highlights

More than 170 landowners in the watershed worked with the Greer, Harmon, and Jackson county conservation districts; 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 through the OCC's Locally Led Cost Share Program (LLCP). From 2000 to 2020, landowners improved crop land and grazing management, which reduced runoff of sediment, bacteria and other pollutants by increasing vegetative cover and reducing bare soil. Landowners implemented access control (882 acres [ac]), brush management (10,335 ac), conservation cover (2,977 ac), conservation crop rotation (2,635 ac), cover crop (5,773 ac), critical area planting (100 ac), diversion (5,560 feet [ft]), fence (149,138 ft), filter strip (7.9 ac), forage harvest management (94 ac), grade stabilization structures (2), grassed waterway (45.3 ac), groundwater testing (4 tests), heavy use area protection (3,118 square feet [sf]), irrigation pipeline (11,685 ft), microirrigation system (657 ac), irrigation water management (676 ac), livestock pipeline (109,307 ft), nutrient management (11,060 ac), pasture and hayland planting (3,003 ac), pest management (3,539 ac), prescribed grazing (19,971 ac), range planting (111 ac), no-till (45,330 ac), reduced tillage (4,535 ac), mulch tillage (838 ac) and other CPs.

Results

The OCC documented improved water quality in Turkey 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 57.9 CFU/100 mL and remained at similar or lower levels through the 2022 assessment period (Figure 2). Also, by 2016 the fish IBI scores had risen to 18, which was 82% of reference condition scores for the ecoregion during that assessment period (Figure 3). Based on these data, Oklahoma removed Turkey Creek from the 303(d) list for *E. coli* and fish in 2016. Turkey Creek now partially supports its WWAC and fully supports its PBC beneficial uses.

Partners and Funding

The OCC monitoring program is supported by the 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

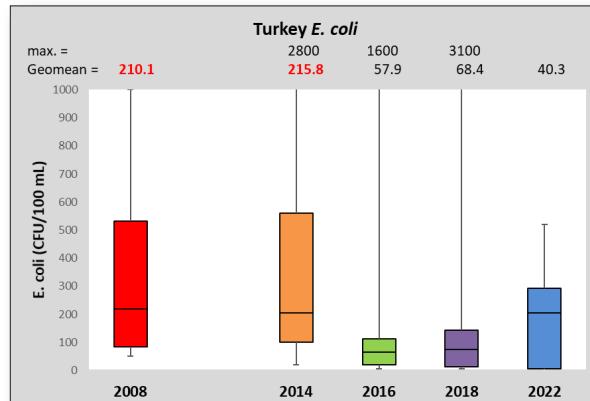


Figure 2. *E. coli* in Turkey Creek decreased with the installation of CPs.

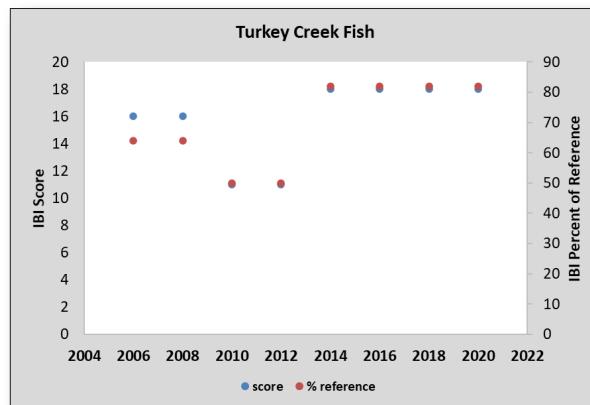


Figure 3. Fish communities in Turkey Creek improved with reduced sediment loading to the stream.

efforts through Blue Thumb. Approximately \$773,610 of these federal and state matching funds have been devoted to Turkey Creek.

From 2008 to 2018, NRCS and FSA supplied more than \$4,250,000 for CP implementation in Oklahoma through EQIP, CStWP, and CRP. In addition, many practices were funded by landowners based on recommendations through NRCS general technical assistance. Finally, the OCC; Greer, Harmon, and Jackson county conservation districts; and landowners funded more than \$231,359 worth of CPs (at least \$109,481 of which was funded by landowners through the LLCP). Finally, the OCC invested at least \$123,250 in operations and maintenance costs to maintain and protect the watershed structures in Turkey Creek.



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

EPA 841-F-21-001AA
November 2021

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