



NONPOINT SOURCE SUCCESS STORY

Oklahoma

Implementing Agricultural Conservation Practices Improves Dissolved Oxygen, Turbidity and Bacteria Levels in Pond Creek

Waterbody Improved

High turbidity, bacteria and low dissolved oxygen resulted in the impairment of Pond Creek and placement on Oklahoma's Clean Water Act (CWA) section 303(d) list of impaired waters in 2004 and subsequent years. Corn, wheat and cattle production contributed to these impairments, and implementation of a system of conservation practices (CPs) to promote better quality grazingland and cropland decreased sediment and bacteria loading into the creek and improved dissolved oxygen levels. As a result, the entire length of Pond Creek was removed from Oklahoma's 2010 CWA 303(d) list for turbidity and dissolved oxygen impairments and from the 2014 list for *Escherichia coli* (*E. coli*) impairment. Pond Creek is now in full attainment of its fish and wildlife propagation designated use and in partial attainment of its primary body contact recreation use.

Problem

Pond Creek is a 60-mile-long stream in Grant County in north central Oklahoma (Figure 1). Land use in the 198,000-acre watershed is primarily cultivated cropland with corn, wheat, sorghum and soybean production. About a third of the watershed is pasture for cattle production.

Poor grazingland and cropland management contributed to excess sedimentation, high levels of bacteria and low dissolved oxygen in Pond Creek. It was listed as impaired for *E. coli* bacteria in 2004 when the geometric mean was 162 colony forming units/100 milliliters (CFU), higher than the criterion of 126 CFU. In the 2006 water quality assessment, monitoring showed that 50 percent of Pond Creek's seasonal baseflow water samples exceeded 50 nephelometric turbidity units (NTU). A stream is considered impaired by turbidity if more than 10 percent of the seasonal base flow water samples exceed 50 NTU (based on five years of data before the assessment year). In addition, 14 percent of dissolved oxygen values in the 2006 assessment were below the seasonal criteria for warm water aquatic communities; impairment results if more than 10 percent of samples (based on five years of data before the assessment year) fall below 6.0 milligrams per liter (mg/L) from April 1 through June 15 or below 5.0 mg/L during the remainder of the year. On the basis of these assessment results, Oklahoma added the entire length of Pond Creek (OK621000050010_00) to the 2004 CWA section 303(d) list for nonattainment of the primary body contact recreation designated use, and to the 2006 303(d) list for nonattainment of the fish and

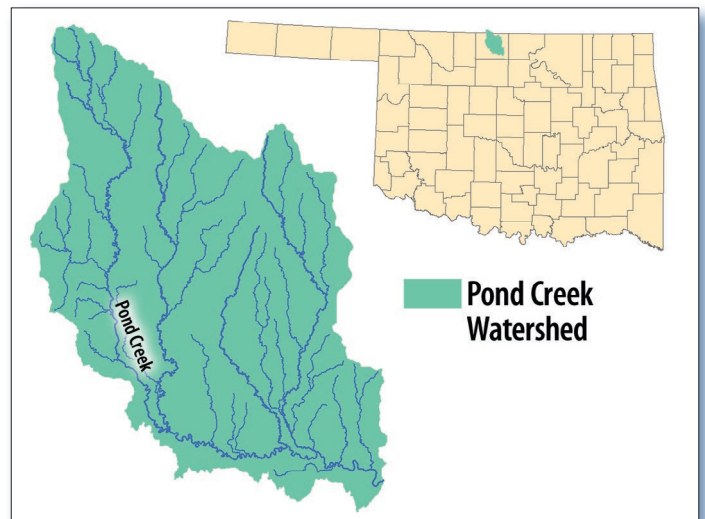


Figure 1. Pond Creek is in Grant County in northern Oklahoma.

wildlife propagation designated use due to turbidity and dissolved oxygen impairments. In 2011 Oklahoma completed TMDLs for turbidity and bacteria.

Project Highlights

Landowners implemented CPs with assistance from Oklahoma's Locally Led Cost Share (LLCP) program and through the local U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP), Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), Conservation

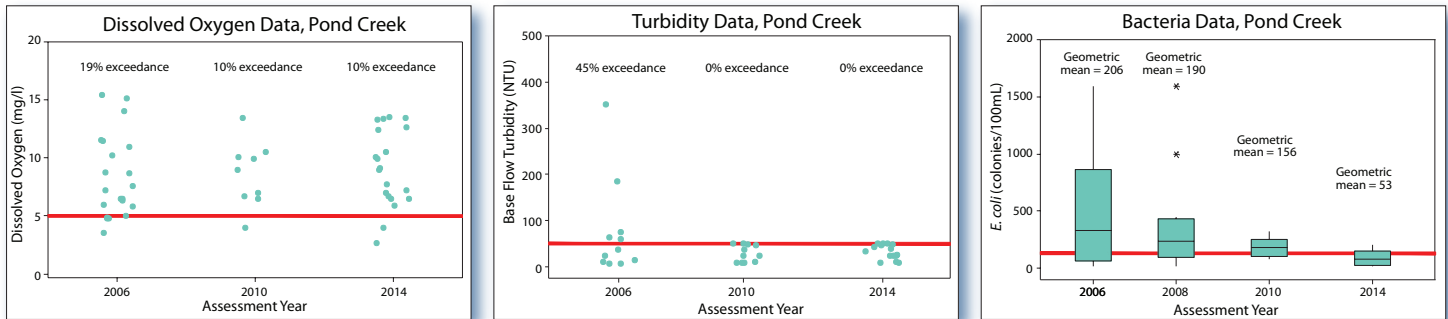


Figure 2. Monitoring data indicate that dissolved oxygen levels and base flow turbidity levels in Pond Creek have met water quality criteria since 2010. Levels of *E. coli* have steadily declined since 2006, and met the criterion in 2014.

Stewardship Program (CSP), and general conservation technical assistance program. From 2005 to 2009, landowners improved many acres of pastures and rangeland, which reduced runoff of bacteria, nutrients and sediment. CPs installed to accomplish this improvement included 9,226 acres of prescribed grazing, 327 acres of forage planting, 911 acres of nutrient management, 1,732 acres of integrated pest management, 565 acres of brush management, 15 ponds, 8,770 feet of pipeline, eight water tanks for alternative water sources and 16,474 acres of upland wildlife habitat management.

To reduce erosion of soil and the runoff of nutrients from cropland, landowners also implemented conservation cover crops on 3,774 acres and no-till/reduced till/mulch till/residue management on 4,069 acres. Range planting occurred on 6,765 acres, which helps stabilize soils by converting croplands or degraded range to perennial vegetation. Contour farming was implemented on 685 acres, which included more than 75,000 linear feet of terraces, and more than 140 acres of critical area planting and grassed waterways. Three acres of filter strips and two grade stabilization structures further reduced erosion potential from croplands. Proper nutrient management on 9,755 acres and integrated pest management on 13,936 acres improved cropland condition and reduced excess nutrient runoff and erosion. Through the CRP, landowners restored 2,175 acres of "rare and declining habitat" that had been cropland and enrolled 16,474 acres into "upland wildlife habitat management." In addition, 100 acres had wetland restoration and enhancement. These practices return degraded land to a more natural, less-erosive state.

Conservation work continues in the watershed. Since 2010, an additional 40,049 acres of cropland have no-till, reduced till, cover crop and conservation crop rotations. Landowners installed seven more grade stabilization structures, 71,796 linear feet of terraces,

79 acres of grassed waterways, and 21 new ponds, and implemented prescribed grazing on 9,864 acres of pasture and range.

Results

Through its statewide nonpoint source ambient monitoring program, the OCC documented improved water quality in Pond Creek due to landowners implementing CPs. Data showed that turbidity and dissolved oxygen have met applicable criteria since 2010, and *E. coli* met criterion in 2014 (Figure 2). On the basis of these data, Pond Creek was removed from Oklahoma's CWA section 303(d) list for turbidity and dissolved oxygen impairments in 2010, resulting in the full attainment of its fish and wildlife propagation designated use. Pond Creek's *E. coli* impairment was removed in 2014.

Partners and Funding

The Rotating Basin Monitoring Program is supported by EPA CWA section 319 funds at an average annual cost of \$1 million. Monitoring costs include personnel, supplies and lab analyses for 18 parameters from samples collected every five weeks at about 100 sites, for a total of 20 episodes per five-year cycle. Instream habitat, fish and macroinvertebrate samples are also collected. Approximately \$600,000 in EPA CWA section 319 supports statewide education, outreach and monitoring efforts through the Blue Thumb program. The OCC LLCs program provided \$158,833 in state funding for CPs in this watershed through the Grant County Conservation District, and landowners contributed \$76,256 in match. NRCS spent approximately \$1.23 million for implementation of CPs in Grant County from 2005 to 2009 through NRCS EQIP, CSP, WRP, CRP and general technical assistance funds, and another \$2.74 million from 2010 to 2014. Landowners provided a significant percentage of funding toward CP implementation in these programs as well.



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