



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Oklahoma

## Installing Best Management Practices Leads to Increased Dissolved Oxygen Levels in Tepee Creek

### Waterbody Improved

Low dissolved oxygen (DO), attributed in part to practices associated with wheat and cattle production, resulted in impairment of Tepee Creek. As a result, Oklahoma added the creek to the Clean Water Act (CWA) section 303(d) list in 2006. Implementing best management practices (BMPs) improved cropland and grazing lands, and decreased sediment and nutrient runoff into the creek. DO levels improved, prompting Oklahoma to recommend that Tepee Creek be removed from the 2012 CWA section 303(d) list for low DO.

### Problem

Tepee Creek (Figure 1) flows for 21 miles through Kiowa County in southwest Oklahoma, an area of high wheat and cattle production. Poor management of cropland and grazing lands contributed to excess sedimentation and nutrient runoff in the watershed. Excess nutrients can lead to the overgrowth of nuisance algae, and the subsequent breakdown of the algae can then cause DO levels to decrease. Water quality assessment in 2006 showed that 33 percent of the water samples were below (i.e., failed to meet) the state criteria for DO for warm-water aquatic communities. A waterbody is considered impaired for DO if more than 10 percent of samples (based on no more than 5 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 Tepee Creek to the 2006 and subsequent CWA section 303(d) lists for failing to support the fish and wildlife propagation designated use because of DO impairment.

### Project Highlights

Landowners implemented BMPs with assistance from Oklahoma's locally led cost-share program and through the local Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program, Conservation Reserve Program, Conservation Stewardship Program and general technical assistance program. These projects focused on reducing erosion by improving cropland and grazing lands. From 2006 to 2012,



Figure 1. Tepee Creek flows through Kiowa County in southwest Oklahoma.

landowners implemented integrated pest management on 892 acres and installed 9,950 feet of diversions; 43,300 feet of terraces; one acre of grassed waterways; 3,750 acres of field border and 106 acres of critical area planting. To improve the condition of pasture and rangeland, landowners installed 4,740 feet of livestock fencing, implemented prescribed grazing on 1,086 acres, practiced range planting on 95 acres, conducted rotation of supplement and feeding areas on 49 acres, and applied nutrient management plans on 788 acres. Producers planted forage on 214 acres and managed brush on 245 acres.

Current NRCS initiatives in Kiowa County are aimed at controlling soil erosion on cropland, converting marginal cropland to permanent vegetation, implementing chemical brush control for mesquite,

providing reliable and clean livestock water, managing waste from animal feeding operations, closing failing animal waste lagoons and implementing no-till farming. Active volunteer monitoring and education efforts continue in the area.

## Results

The OCC's Rotating Basin Monitoring Program, a statewide nonpoint source ambient monitoring program, documented improved water quality in Stinking Creek after restoration efforts. To meet state DO criteria for warm-water aquatic communities, Tepee Creek samples may not fall below critical DO levels (5.0 or 6.0 mg/L, depending on the season) more than 10 percent of the time. Monitoring data examined for the 2006 assessment showed that 30 percent of samples fell below the critical DO levels and failed to meet state DO criteria.

Implementing practices and educating landowners helped reduce nutrients entering the stream, which in turn allowed DO levels to improve because algae were less likely to be overgrown and die off. During the 2012 assessment, only eight percent of samples fell below the critical DO level, which met the state DO criteria (Figure 2). As a result, Oklahoma has recommended Stinking Creek for removal from the state's 2012 CWA section 303(d) list for dissolved oxygen impairment.

## Partners and Funding

The Rotating Basin Monitoring Program, which includes both fixed and probabilistic components, is funded through the U.S. Environmental Protection Agency's (EPA) CWA section 319 funds at an average annual cost of \$1 million. Monitoring costs

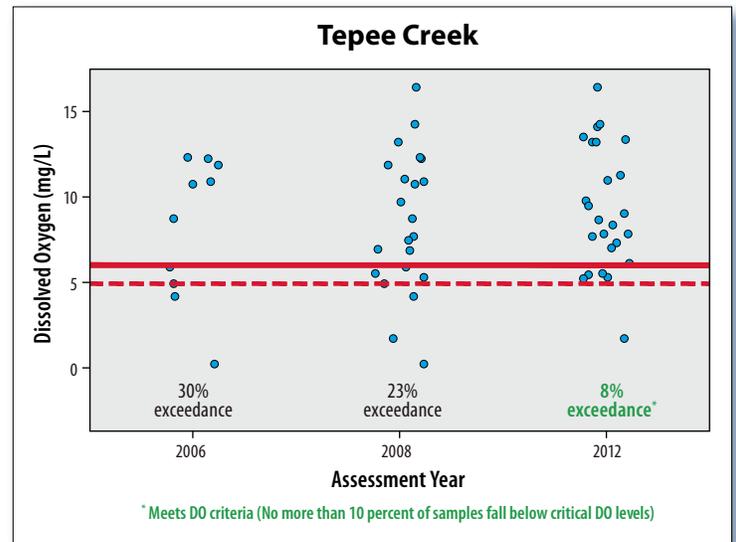


Figure 2. Data show that DO levels in Tepee Creek met state criteria for warm-water aquatic communities in 2012.

include personnel, supplies and lab analysis for 19 parameters from samples collected every five weeks at about 100 sites. In-stream habitat, fish and macroinvertebrate samples are also collected. Approximately \$600,000 in EPA section 319 funds support statewide education, outreach and monitoring efforts through the Blue Thumb program. Over the past decade, the Oklahoma cost-share program has provided \$4,500 in state funding for BMPs in this watershed through the Kiowa County Conservation District. The NRCS has spent approximately \$40,000 to implement BMPs in the watershed from 2006 through 2012. Landowners have provided a significant percentage of the cost toward BMP implementation.



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