



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Oklahoma

## Installing BMPs Results in Turbidity and Dissolved Oxygen Improvements

### Waterbody Improved

High turbidity and low dissolved oxygen, due in part to practices associated with wheat, cattle, and corn production, resulted in impairment of Cooper Creek and placement on Oklahoma's Clean Water Act (CWA) section 303(d) list in 2006. Implementation of best management practices (BMPs) to promote better quality grazing land and cropland decreased sediment and nutrient runoff into the creek. As a result, the Oklahoma Conservation Commission has proposed that Cooper Creek be removed from Oklahoma's 2010 CWA section 303(d) list for turbidity and dissolved oxygen impairment. Cooper Creek now fully attains its fish and wildlife propagation designated use.

### Problem

Cooper Creek extends over 40 miles through Blaine and Kingfisher counties in central Oklahoma, an area of high cattle and wheat production as well as some corn (Figure 1). Poor grazing land and cropland management contributed to excess sedimentation and nutrient runoff in the watershed. Excess nutrients from runoff in the watershed may lead to the overgrowth of nuisance algae, and the subsequent breakdown of the algae may then cause dissolved oxygen levels to decrease. In the 2006 and 2008 water quality assessments, monitoring showed that 16 percent of Cooper Creek's seasonal baseflow water samples exceeded 50 nephelometric turbidity units (NTU). A stream is considered impaired by turbidity if 10 percent or more of the seasonal base flow water samples exceed 50 NTU (based on 5 years of data before the assessment year). In addition, 18 percent of water samples included in the 2006 and 2008 assessments were below the dissolved oxygen criterion of 5 milligrams per liter (mg/L). Impairment results if more than 10 percent of samples fall below the criterion (based on 5 years of data before the assessment year). On the basis of these assessment results, Oklahoma added the entire length of Cooper Creek (40 miles) to the 2006 and subsequent CWA section 303(d) lists for nonattainment of the fish and wildlife propagation designated use due to turbidity and dissolved oxygen impairments.

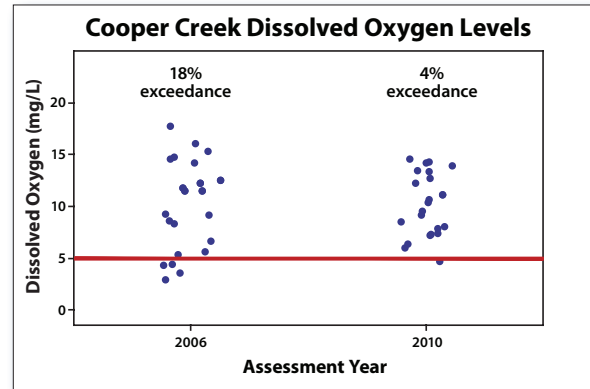
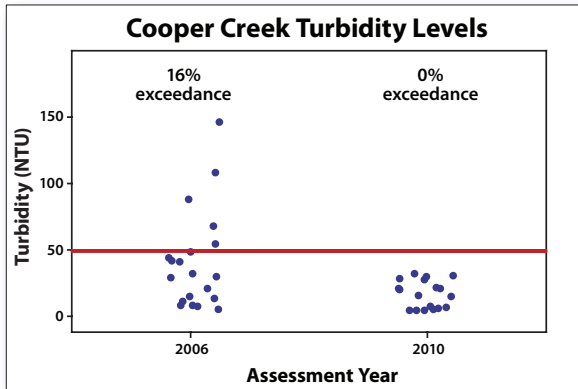
### Project Highlights

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 (EQIP) and general technical assistance program. The Cooper Creek watershed is part of



Figure 1. Oklahoma's Cooper Creek.

the EQIP Cheyenne-Arapahoe Local Emphasis Area project which began in 2002 and focused on reducing erosion by improving cropland and grazing land. From 2003 to 2007, no-till, strip-till, and mulch-till implementation occurred on 3,195 acres, with conservation crop rotations on 1,529 acres. In contrast to traditional tillage, these "conservation tillage" methods retain soil moisture and reduce soil erosion by decreasing the amount of soil exposed to wind and rain. Further reducing erosion potential on cropland, landowners adopted contour farming on 62 acres, with over 19,000 feet of terraces, 26 acres of critical area planting, 3,255 feet of diversions, and 57 acres of grassed waterways. To improve the condition of pasture and rangeland, prescribed grazing was implemented on 1,985 acres, and 576 acres received nutrient management plans, with 24 acres of heavy use areas improved. Seven new ponds were constructed to provide alternative water supplies to livestock. Producers planted forage on 340 acres and improved upland wildlife habitat management on 549 acres. Brush management occurred



Figures 2 and 3. Less than 10 percent of monitoring samples exceeded water quality standards for dissolved oxygen and turbidity.

on approximately 68 acres, and weed management was applied on 266 acres. The NRCS Conservation Security Program allowed enhancement of 158 acres for energy and soil management. This watershed is included in a new NRCS no-till initiative for Oklahoma, so the observed improvement in water quality is expected to continue.

In addition, the Oklahoma Conservation Commission's education program, Blue Thumb, actively promoted programs in the Cooper Creek watershed starting in 2005. Groundwater screening and information sessions were held in Blaine County in addition to several volunteer training events. These activities provide vital education of the residents of the watershed and help facilitate behavior changes. Active volunteer monitoring and education is continuing in the area.

## Results

The Oklahoma Conservation Commission's Rotating Basin Monitoring Program, a statewide nonpoint source ambient monitoring program, documented improved water quality in Cooper Creek due to landowners implementing BMPs. Because of the implemented practices and the accompanying education of landowners, turbidity decreased in the Cooper Creek watershed. In the 2006 assessment, 16 percent of seasonal base flow water samples exceeded the turbidity criteria of 50 NTU. This exceedance was reduced to 0 percent in the 2010 assessment (Figure 2). Reductions in nutrients result in improved levels of dissolved oxygen, as algae are less likely to be overgrown and die off. Eighteen percent of samples examined for the 2006 assess-

ment were below the critical dissolved oxygen value of 5 mg/L. This value was reduced to only 4 percent below the DO criterion for the 2010 assessment (Figure 3). Hence, Cooper Creek has been recommended for removal from Oklahoma's CWA section 303(d) list for turbidity and dissolved oxygen impairments and is now in full attainment of the fish and wildlife propagation designated use.

## 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's) CWA section 319 program at an average annual cost of \$1 million. Monitoring costs include personnel, supplies, and lab analysis for 19 parameters from samples collected every 5 weeks at about 100 sites. In-stream habitat, fish and macroinvertebrate samples are also collected. Approximately \$600,000 in EPA CWA section 319 funds supports statewide education, outreach, and monitoring efforts through the Blue Thumb program. The Oklahoma cost-share program provided \$13,168 in state funding for BMPs in this watershed over the past decade through the Kingfisher County, Blaine County, and Cimarron Valley Conservation Districts, and landowners contributed \$15,407 through this program. The NRCS spent approximately \$338,688 for implementation of BMPs in the watershed from 2003–2007. Implementation is continuing, with \$229,649 in BMPs obligated from 2008–2010 through EQIP and NRCS general technical assistance funds. Landowners provided a significant percentage toward BMP implementation in these programs as well.



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

EPA 841-F-11-001R  
March 2011

### For additional information contact:

**Shanon Phillips, Director**  
Water Quality Division  
Oklahoma Conservation Commission  
shanon.phillips@conservation.ok.gov  
405-522-4500