



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Oklahoma

## Implementing Best Management Practices Improves Salt Creek

### Waterbody Improved

Low dissolved oxygen (DO) and elevated levels of *Escherichia coli* bacteria, attributed in part to practices associated with cattle production, resulted in impairment of Oklahoma's Salt Creek. As a result, Oklahoma added the stream to the state's Clean Water Act (CWA) section 303(d) list of impaired waters for DO (in 2006) and *E. coli* (in 2010). Implementing best management practices (BMPs) helped to reduce sediment, nutrient and bacteria runoff from grazing lands into the creek, and water quality has improved. As a result, Oklahoma has nominated Salt Creek for removal from the 2012 CWA section 303(d) list for its low DO and *E. coli* impairments.

### Problem

Salt Creek, a 22-mile-long stream, is in Lincoln and Creek counties in central Oklahoma (Figure 1). The primary land use in the watershed is cattle production. A lack of healthy riparian areas, combined with runoff from agricultural areas, allowed nutrients and bacteria to reach local waterbodies. Excess nutrients, in turn, can lead to the overgrowth of nuisance algae, and the subsequent breakdown of the algae can then cause DO levels to fall below critical levels needed to support aquatic life.

Water quality assessments in 2006 showed that 19 percent of the water samples from Salt Creek fell below (i.e., did not meet) state DO criteria for warm-water aquatic communities. A waterbody is considered impaired if more than 10 percent of samples (based on no more than 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 Salt Creek to the 2006 and subsequent CWA section 303(d) lists for failing to support the fish and wildlife propagation designated use due to DO impairment.

In addition, a 2010 water quality assessment showed an *E. coli* geometric mean of 158 colony forming units (CFU) per 100 milliliters of water in Salt Creek. *E. coli* are bacteria common in animal waste and can cause human illness. These bacteria are used as an indicator of the possible presence of other harmful pathogens. Waterbodies with a geometric mean above 126 CFU during the recreation season (May 1–Sept. 30) are considered impaired for primary body contact recreation due to an unacceptably high health risk from waterborne diseases. On the basis of these assessment results, Oklahoma added Salt Creek to the CWA section



Figure 1. Salt Creek is in central Oklahoma.

303(d) list of impaired waters in 2010 for failing to support the primary body contact recreation designated use due to *E. coli* 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 Stewardship Program and general technical assistance program. These projects focused on keeping livestock away from the stream, protecting the riparian area and improving grazing land. Since 2006, producers have installed 30,358 feet of fencing, 11 new ponds, two water wells, four watering facilities, 1,389 feet of pipeline, and 175 feet of reinforced, low-erosion animal trails and walkways that have kept livestock out the creek and provided alternative watering sources. Riparian areas were protected using seasonal residue management on 66 acres, establishing riparian forest buffer on 66 acres and establishing herbaceous cover

on 78 acres. To improve the condition of pasture and rangeland, producers implemented prescribed grazing on 2,595 acres and developed nutrient management plans for 2,825 acres. Producers planted forage on 205 acres, practiced better forage harvest management on 681 acres, did critical area planting on 35 acres, and used integrated pest management on 1,963 acres. Brush management occurred on 752 acres, and prescribed burning took place on 34 acres after installing 2,640 feet of firebreak. One grade stabilization structure was established. Landowners managed upland wildlife habitat on 267 acres.

In addition, the Oklahoma Conservation Commission's (OCC) education program, Blue Thumb, actively promoted restoration efforts in the Salt Creek watershed starting in 2006. Active volunteer monitoring and education efforts continue in the area. Current watershed initiatives include managing Eastern red cedar, controlling waste from animal feeding operations and closing failing animal waste lagoons.

## Results

The OCC's Rotating Basin Monitoring Program, a statewide nonpoint source ambient monitoring program, documented improved water quality in Salt Creek after restoration efforts. To meet state DO criteria for warm-water aquatic communities, Salt Creek samples must 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 a 2006 water quality assessment showed that 19 percent of Salt Creek samples fell below the critical DO levels and failed to meet state DO criteria.

Water quality improved over time. Data collected for the 2012 assessment show that all samples remained above critical DO levels and met state DO criteria (Figure 2). Similarly, data show that the *E. coli* bacteria geometric mean fell from 158 CFU in 2010 to 79 CFU in 2012—well below the impairment level of 126 CFU (Figure 3). On the basis of these data, Oklahoma has recommended that Salt Creek be removed from the 2012 CWA section 303(d) list for both the DO and *E. coli* impairments.

## Partners and Funding

The Rotating Basin Monitoring Program, which included both fixed and probabilistic components, is supported with U.S. Environmental Protection

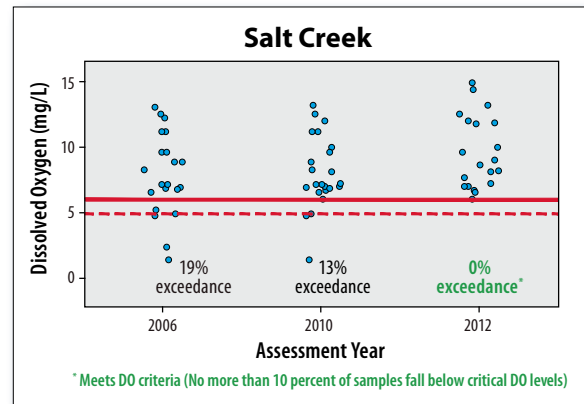


Figure 2. Data show that DO levels in Salt Creek met state DO criteria in 2012.

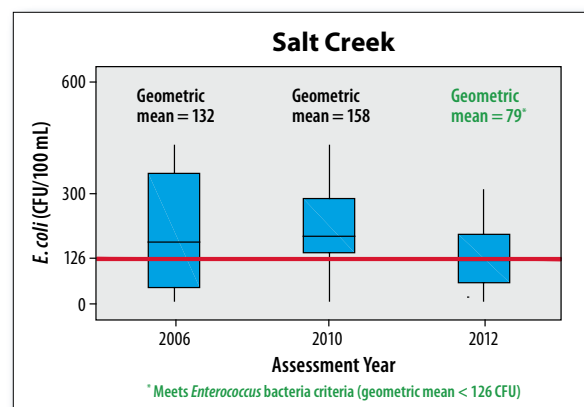


Figure 3. Data show that Salt Creek met the *E. coli* bacteria criteria in 2012. Boxplots indicate the interquartile range (25<sup>th</sup>-75<sup>th</sup> percentile) and median of the data.

Agency (EPA) CWA section 319 funds at an average annual cost of \$1 million. Monitoring costs 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 CWA section 319 funding supports statewide education, outreach and monitoring efforts through the Blue Thumb program. Over the past decade, the Oklahoma cost-share program provided \$18,305 in state funding for BMPs in this watershed through the Lincoln and Creek County Conservation Districts. The NRCS has spent approximately \$178,000 to implement BMPs in the watershed from 2006–2012. Landowners provided a significant percentage of the cost toward BMP implementation.



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