Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
Kansas

Local Watershed Management Efforts Restore Water Quality

Waterbody Improved

Bacteria in runoff from cattle grazing areas caused Clarks Creek to violate water quality standards. As a result, the Kansas Department of Health and Environment (KDHE) added Clarks Creek to its Clean Water Act (CWA) section 303(d) list of impaired waters in 1998. In cooperation with local, state and federal agencies, the conservation district offices of Geary and Morris counties used outreach and education efforts, coupled with cost-share incentives, to promote implementation of rangeland best management practices (BMPs). Water quality improved as a result. Monitoring in 2008 indicated that bacteria levels in Clarks Creek had declined to acceptable levels, allowing KDHE to remove the creek from Kansas' CWA section 303(d) list of impaired waters in 2010.

Problem

Clarks Creek drains a 247-square-mile watershed southeast of Junction City, Kansas. Part of the Kansas-Lower Republican River watershed, the Clarks Creek watershed is nearly evenly split north-south by Geary and Morris counties. Approximately 69 percent (107,984 acres) of the watershed is covered by permanent grass, most of which is native tall grass prairie. The upland areas of the watershed are used as grazing lands for cattle during the growing season. In the winter, landowners typically move cattle from the range to the valley, where the cattle feed on grazing crop residue or winter pasture grass while the yearling calves are weaned and fed in dry lots. Landowners maintain an estimated 80 dry lots throughout the watershed, approximately 75 percent of which are within one mile of a stream. The dry lot winter feeding facilities typically hold between 20 and 200 cattle for 60 to 120 days.

KDHE listed 136 miles of Clarks Creek and its tributaries on the 1998 CWA section 303(d) list for excessive bacteria and failing to attain standards for primary recreation. Sampling conducted from 1990 to 1998 showed that levels of fecal coliform bacteria exceeded the state criterion for Kansas primary contact recreation of 200 fecal coliform colony-forming units (cfu) per 100 milliliters (mL). Data also showed that spring and summer nutrient and sediment concentrations generally exceeded desirable levels, including high springtime phosphorus levels. KDHE developed a total maximum daily load (TMDL) for bacteria in the Clarks Creek watershed in 2000.

Figure 1. This new alternative water supply tank keeps cattle away from the creek.

Project Highlights

In 2006 the Clarks Creek Watershed Restoration and Protection Strategy (WRAPS) Stakeholder Leadership Team (SLT) partnered with staff from the Geary and Morris county conservation district offices to help landowners implement BMPs to reduce bacteria in runoff. The BMPs included installing 12 alternative livestock water supply tanks (Figure 1) to keep cattle away from creek watering areas, installing five check dams in a 60-acre pasture gully, upgrading or replacing 21 septic systems, establishing 8,518 feet of riparian and cross fencing, converting 41 acres of cropland to native grass and planting 38 acres of wildlife buffers.

The conservation districts and WRAPS SLT also promoted the Water Quality Buffer Initiative, a cost-share program that helped landowners establish more than 150 acres of native-grass streamside buffer strips in the watershed (Figure 2). Buffer strips are vegetated sections of land that are flat or have low slopes designed to reduce the runoff volume. Dense vegetative cover removes pollutants by detaining and filtering runoff and encouraging the water to infiltrate into the soil. Buffers can reduce bacteria by an estimated 43 percent to 57 percent, especially in agricultural watersheds.

Figure 2. A Clarks Creek landowner planted 1,175 trees and shrubs on 7.5 acres of riparian forest buffer.

To educate local landowners about the project, partners held workshops focusing on rangeland BMPs and management of winter feeding sites. The success of the BMP implementation effort can be attributed to the positive attitudes and actions of the landowners and their ability to encourage neighbors and other farmers to participate.

Results

Stakeholders' efforts to reduce bacteria in runoff have improved water quality. Prior to project implementation, fecal coliform bacteria levels on Clarks Creek frequently exceeded the nominal criterion value deemed supportive of primary recreation. High bacteria concentrations were typically associated with times of rain and increased runoff volume.

State bacteria standards underwent changes in 2003. *Escherichia coli* replaced fecal coliform as the indicator bacteria, and impairment was determined by the geometric mean of five samples taken over a 30-day period. The criterion value changed from 200 fecal coliform cfu/100 mL to 427 *E. coli* cfu/100 mL for Clarks Creek. Intensive sampling in the manner prescribed by the new regulations was conducted four times during the primary recreation season (April through October) in 2008, a notably wet year. All four resulting geometric means met the water quality criterion (Figure 3). As a result,

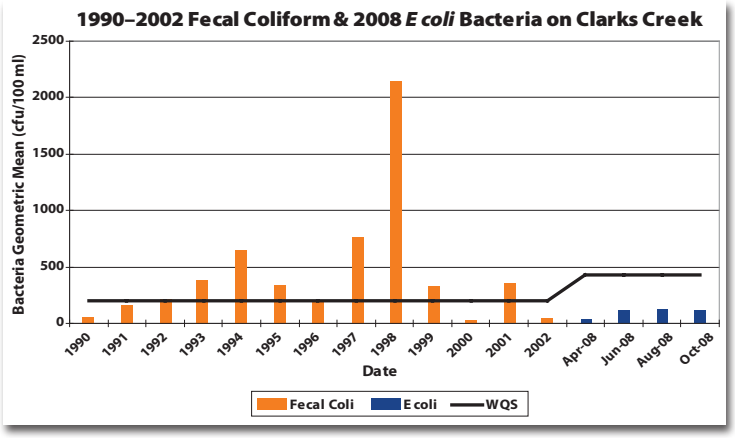

Figure 3. Water quality data from Clarks Creek show that bacteria levels have declined since the early 1990s.

KDHE removed Clarks Creek from Kansas's 2010 CWA section 303(d) list of impaired waters for bacteria. Ongoing routine sampling on Clarks Creek has confirmed that bacteria levels have consistently remained lower than those found during past primary recreation seasons.

Partners and Funding

Funding for these restoration efforts included a U.S. Environmental Protection Agency (EPA) education grant of $8,700 and a total of $163,960 in EPA CWA section 319 funding. The State Conservation Commission also provided Kansas Water Plan Funds, and the U.S. Department of Agriculture's (USDA) Environmental Quality Incentive Program and Conservation Reserve Program contributed additional funding for BMP implementation. Additional partners included the conservation districts of Geary and Morris counties, the USDA Natural Resources Conservation Service, the USDA Farm Service Agency, Geary County Commission, Morris County Commission, KDHE Bureau of Waste Management, KDHE Bureau of Water, Morris County Rural Water District #1, Flint Hills Resource Conservation & Development Council, Kansas Forest Service, Kansas Association on Conservation and Environmental Education, City of White City, Ft. Riley Environmental Division, Unified School District 481, Unified School District 475, Clarks Creek and Middle Kansas WRAPS SLT, and the Kansas Alliance for Wetlands and Streams.

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