Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
Kansas

Implementing Agricultural Best Management Practices Reduces Bacteria in the Neosho River

Waterbodies Improved

Runoff from cattle grazing areas contributed high levels of bacteria to several waterbodies in Kansas' Twin Lakes watershed, including a 20.6-mile-long segment of the Neosho River ("Neosho River near Parkerville") and a 12.2-mile-long segment of Haun Creek, a tributary to the Neosho River. In 1998 the Kansas Department of Health and Environment (KDHE) added these waterbodies to the state's Clean Water Act (CWA) section 303(d) list of impaired waters for violating the state's fecal coliform (FC) bacteria water quality standard and not supporting the waterbodies' primary contract recreation designated uses. Working with the local Kansas Watershed Restoration and Protection Strategy (KS WRAPS) Twin Lakes Project, project partners in Morris County implemented agricultural best management practices (BMPs) throughout the watershed. River monitoring data collected between 2004 and 2011 showed that the "Neosho River near Parkerville" segment and waters upstream to the river's headwaters now meet the state's bacteria water quality standards. As a result, in 2012 KDHE removed the two segments ("Neosho River near Parkerville" and the Haun Creek segment, totaling 32.8 miles) from the state's list of impaired waters.

Problem

The headwaters of the Neosho River originate in the northwest corner of Morris County in central Kansas, which is part of the Twin Lakes watershed (Figure 1). Nestled in the Flint Hills, the Twin Lakes watershed is predominately grassland, which covers 67 percent of the drainage area. The livestock grazing density in the watershed, 30 to 45 animals units per square mile, is considered medium. The Neosho River near the town of Parkerville drains 87 square miles and flows directly into the Council Grove Lake (a public water supply) before continuing on to the John Redmond Reservoir.

Sampling conducted during 1992 and 1996 showed that levels of FC bacteria exceeded the state criterion for primary contact recreation, 200 fecal coliform colony forming units (cfu) per 100 milliliters (mL). As a result, in 1998 KDHE listed the 20.6-mile-long "Neosho River near Parkerville" segment and a 12.2-mile-long segment of Haun Creek on the CWA section 303(d) list of impaired waters for excessive bacteria. High bacteria levels caused the segments to violate water quality standards during the primary recreation season (April through October). KDHE developed a total maximum daily load (TMDL) for bacteria for "Neosho River near Parkerville" in 2002. The TMDL cites small, unpermitted livestock operations and rural homesteads and farmsteads along the river as contributing nonpoint sources of FC bacteria to the river.

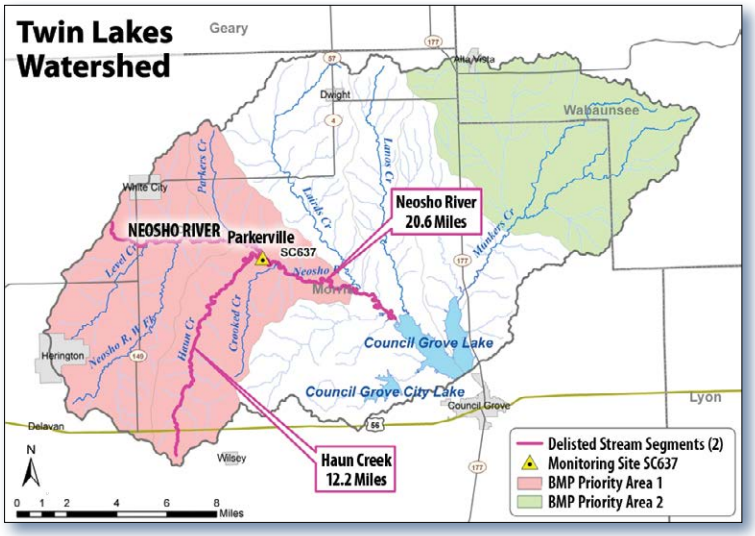

Figure 1. The Neosho River is in the Twin Lakes watershed in central Kansas. Implementing BMPs removed the bacteria impairment on two segments in the Neosho River watershed.

Project Highlights

Since the approval of the "Neosho River near Parkerville" TMDL in 2002, the Morris County Conservation District, the Morris County office of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), local landowners, and the Twin Lakes WRAPS have implemented agricultural BMPs throughout the watershed. (WRAPS is a planning and management framework that adopts a citizen-stakeholder approach to coordinate watershed protection and restoration efforts.)

From 2004 to 2011, project partners implemented a number of BMPs in the Neosho River near Parkerville to reduce runoff into the waterbody. Project partners worked with landowners to address grassland runoff by implementing 1,175 acres of prescribed grazing (the controlled harvest of vegetation with grazing animals); 351 acres of range planting (establishing perennial or self-sustaining vegetation, which can help to reduce erosion); 20 acres of grassed waterways (grass strips planted along cropland drainage areas); 19 acres of filter strips (vegetated buffers between possible contamination sources and waterbodies); and 2.5 acres of critical area planting. In addition, partners installed 1,395 feet of fencing to limit livestock's access to waterbodies; enrolled 1,477 acres in a nutrient management plan; installed six onsite wastewater systems; and installed nine constructed ponds, providing alternative livestock watering sources.

Results

Kansas' bacteria standards underwent changes in 2003. *Escherichia coli* replaced fecal coliform as the indicator bacteria, and impairment was determined by a geometric mean greater than 427 cfu/100 mL based on five samples taken over a 30-day period. KDHE conducted routine sampling in 2004 and 2008, as well as intensive sampling over 30-day periods four times each year in 2007 and 2011. All eight resulting geometric means met the state's *E. coli* water quality criterion (Figure 2). In addition, since 2003 only five of the 52 samples taken from the Neosho River near Parkerville monitoring station have exceeded the *E. coli* bacteria criterion. Based on these data, KDHE has removed both impaired segments ("Neosho River near Parkerville" and Haun Creek) from the state's 2012 list of impaired waters. Although the bacteria impairment has successfully been eliminated, further efforts are needed to reduce nutrient (phosphorus) impairment in the Neosho River.

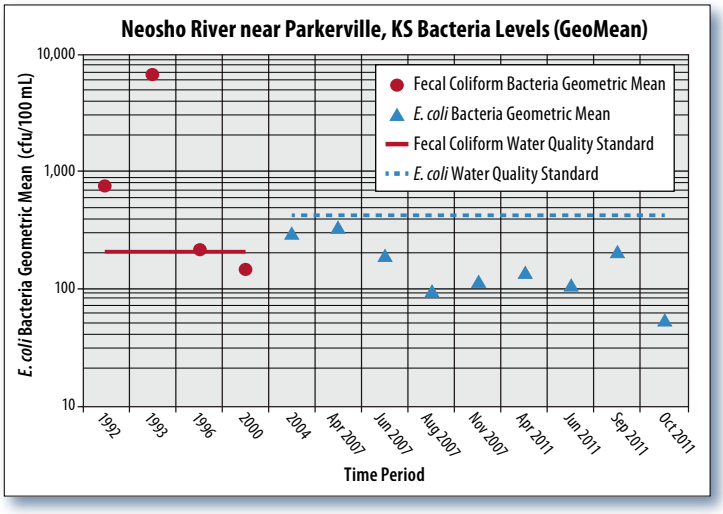

Figure 2. Data show that bacteria levels in the Neosho River have steadily declined over time and have met the applicable water quality standard since 2004.

Partners and Funding

The success of this project can be attributed to a number of local, state and federal partners, including the Morris County Conservation District; Morris County NRCS office; Kansas Water Office; Flint Hills Conservation and Development Council; Kansas Forest Service; Kansas Department of Agriculture, Division of Conservation; Kansas State University; U.S. Environmental Protection Agency, Region 7; Kansas Rural Center; U.S. Army Corps of Engineers; Kansas Department of Wildlife and Parks; and local landowners.

The project was supported by six CWA section 319 grants (totaling $440,678) for Twin Lakes implementation projects between 2003 and 2011. The Kansas Department of Agriculture's Division of Conservation, NRCS and local landowners provided additional support.

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