Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
South Dakota

Implementing Best Management Practices Restores Water Quality in the Keya Paha River

Waterbody Improved

Agricultural nonpoint source pollution contributed to elevated sediment and bacteria levels in South Dakota's Keya Paha River. As a result, the river was placed on South Dakota's 1998 Clean Water Act (CWA) section 303(d) list of impaired waters due to these pollutants. Through the Lewis and Clark Lake Implementation Project, the Randall Resource Conservation and Development (RC&D) Council worked with landowners to voluntarily implement best management practices (BMPs) to reduce sediment and bacteria levels in runoff. The river now meets the sediment standards and attains its warmwater semipermanent fish life designated use. As a result, South Dakota removed the Keya Paha River's sediment impairment from the state's list of impaired waters in 2014.

Problem

The Keya Paha River drains 1,092,300 acres in southern South Dakota before entering Nebraska and emptying into the Niobrara River (Figure 1). The watershed is comprised of 57 percent rangeland and 42 percent cropland. The Keya Paha River begins at the confluence of Antelope and Rock creeks near the Rosebud Indian reservation and flows 68 miles to the Nebraska border.

The Keya River contributes sediment and bacteria to the Niobrara River, which in turn discharges these pollutants to Lewis and Clark Lake, a reservoir on the Missouri River near Yankton, South Dakota. The reservoir provides recreational opportunities and provides drinking water to South Dakota and Nebraska residents. Sediment and bacteria loading from the Keya Paha River threaten these beneficial uses.

To meet water quality standards for sediment, the 30-day average total suspended sediment (TSS) concentration must be less than or equal to 90 milligrams per liter (mg/L) and the daily maximum must not exceed 158 mg/L more than 10 percent of the time. To meet standards for bacteria, fecal coliform must not exceed a geometric mean of 1,000 colony-forming units per 100 mL of water (cfu/100 mL) and no single sample may exceed 2,000 cfu/100 mL more than 10 percent of the time. In addition, *Escherichia coli* must not exceed a geometric mean of 630 cfu/100 mL and no single sample may exceed 1178 cfu/100 mL more than 10 percent of the time.

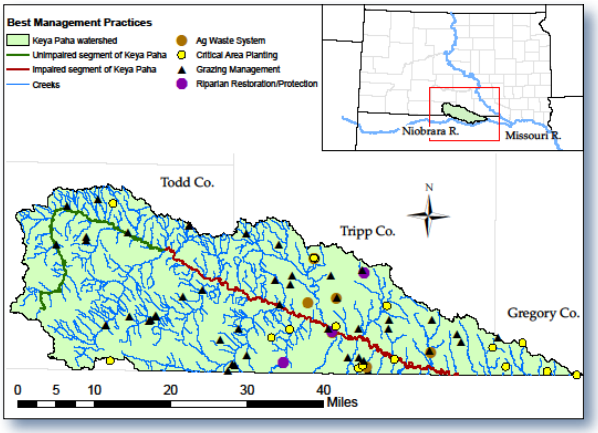

Figure 1. The Keya Paha River watershed is in south-central South Dakota. Partners installed numerous best management practices throughout the watershed.

Monitoring data indicated that the Keya Paha River failed to meet these water quality standards for TSS and bacteria (fecal coliform and *E. coli*). Therefore, the South Dakota Department of Environment and Natural Resources (DENR) placed the 68-mile-long Keya Paha River (segment SD-NI-R-KEYA _ PAHA _ 01) on the CWA section 303(d) list of impaired waters for TSS in 1998, fecal coliform in 2008, and *E. coli* in 2010. By failing to attain these water quality standards, the river was unable to support its beneficial uses for limited immersion recreation and warm water semipermanent fish life. DENR completed a TSS total maximum daily load for the Keya Paha River in 2009.

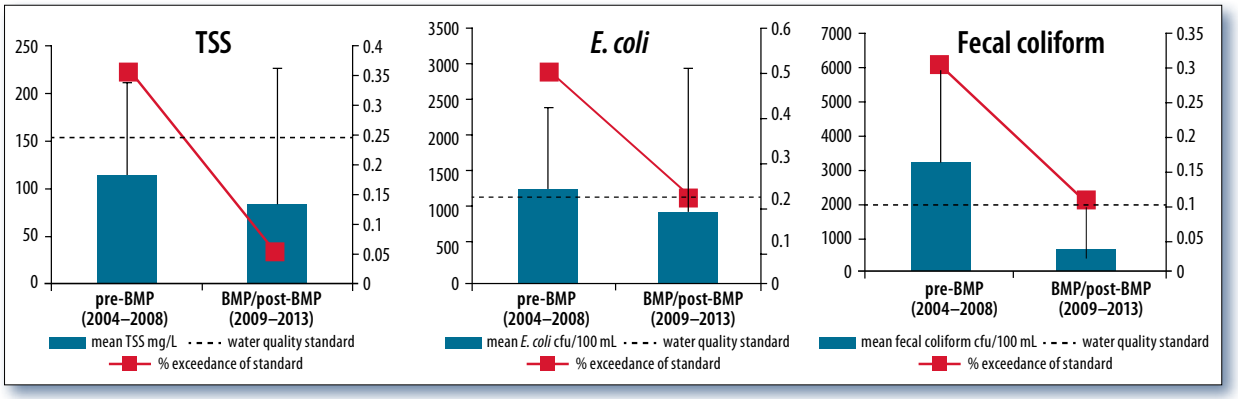

Figure 2. Pollution parameter means (left axes) and percent exceedances of beneficial use standards (right axes) before and during/after restoration. Error bars represent one standard deviation of the data. Percent exceedances of maximum allowable pollutant concentrations below 10 percent meet the standards.

Project Highlights

After a watershed assessment was conducted from 2003 to 2005, the Randall RC&D Council and its watershed partners launched the Lewis and Clark Watershed Implementation Project. The project's initial goal was to reduce the loads of sediment, nutrients and bacteria entering Lewis and Clark Lake by reducing loads in its tributaries, including the Keya Paha River. BMPs were installed from late 2008 to 2013, and additional BMPs will be installed in future years. BMPs installed in the Keya Paha watershed include agricultural waste systems, winter feeding areas, re-vegetation of critical areas, riparian restoration and protection projects, and implementation of grazing management plans that included fencing to keep cattle out of tributary creeks.

Results

After restoration, bacteria and sediment levels decreased. TSS values in the Keya Paha River are meeting water quality standards. This improvement can be seen in Figure 2, which shows the decreases in the percent exceedances of the daily maximum pollutant levels for TSS (from 35 percent in 2004–2008 down to 5 percent in 2009–2013), which meets the water quality standard. As a result, DENR removed TSS from the Keya Paha River's list of impairments in 2014.

As seen in Figure 2, data show that *E. coli* bacteria measurements are borderline, with two out of 10 samples (20 percent) exceeding the standard. Fecal coliform bacteria measurements just meet the standard (one out of 10 exceeding, or 10 percent). The Keya Paha will continue to be monitored for *E. coli* and fecal coliform to document improvements so that it can be fully evaluated for complete removal from the list of impaired waters.

Partners and Funding

Restoring the Keya Paha River was the result of hard work from committed landowners and local, state and federal agencies. The Randall RC&D Council administered the Lewis and Clark Watershed Implementation Project. Partners installing BMPs in the Keya Paha watershed included the Gregory County Conservation District (CD), Clearfield/Keya Paha CD and the Todd County CD. South Dakota DENR provided project oversight. The U.S. Department of Agriculture's Natural Resources Conservation Service, the U.S. Fish and Wildlife Service and the U.S. Environmental Protection Agency contributed funds and expertise. The Rosebud Cattlemen's Association, South Dakota Grassland Coalition, the South Dakota Association of Conservation Districts, South Dakota Pheasants Forever, and South Dakota Game, Fish and Parks assisted with BMP design and construction.

BMP installation and monitoring in the Keya Paha watershed was funded through the Lewis and Clark Implementation Project from 2006 to 2014. Partners spent $1,154,457 on six agricultural waste systems, 16 critical areas, 48 grazing management plans, and three riparian restoration projects. BMP funding sources included CWA section 319 funds ($323,247), other federal funds ($247,087), and state, local and in-kind sources ($584,123).

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