



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

South Dakota

Watershed Partnership Restores River

Waterbodies Improved

Stream entrenchment and bank failure caused excess sediment to enter the Belle Fourche River, prompting South Dakota to add two segments of the river to its 2002 Clean Water Act (CWA) section 303(d) list of impaired waters for elevated total suspended solids (TSS). The Belle Fourche River Watershed Partnership led efforts to restore riparian grazing areas and reduce the volume of unused irrigation water returning to the river, both of which reduced the amount of sediment entering the river. Water quality has improved and standards are now being met. South Dakota removed both segments of the Belle Fourche River from the 2008 CWA section 303(d) list for TSS.

Problem

The South Dakota portion of the Belle Fourche River watershed (Figure 1) drains parts of Butte, Lawrence and Meade counties. The river flows eastward into the Cheyenne River and ultimately to the Missouri River. Land use in the watershed is primarily livestock grazing with some cropland and a few urban and suburban areas. Data show that elevated levels of sediment in the river were causing TSS levels to exceed the water quality standard of 158 milligrams per liter (mg/L) TSS daily maximum. Therefore, South Dakota added two segments of the Belle Fourche River—a 23-mile-long segment from near Fruitdale to Whitewood Creek and a 17-mile-long segment from Whitewood Creek to Willow Creek—to the 2002 CWA section 303(d) list of impaired waters.

In April 2001, the Belle Fourche River Watershed Partnership, a volunteer group of local people and organizations dedicated to the enhancement of the Belle Fourche River watershed, launched an assessment project to determine the total maximum daily load (TMDL) for TSS in the Belle Fourche River. The U.S. Environmental Protection Agency (EPA) approved the final TMDL in 2005.

The primary contributors of TSS, as identified in the TMDL, included a large volume of unused irrigation water that was discharged to the natural waterways, natural bank sloughing and impaired riparian habitat. Most of the irrigation in the Belle Fourche is done through surface application, which floods the fields and can result in high volumes of unused water returning to the river (runoff) carrying a large amount of suspended solids (sediment).

The TMDL indicated that irrigation and the return flow of unused irrigation water were responsible

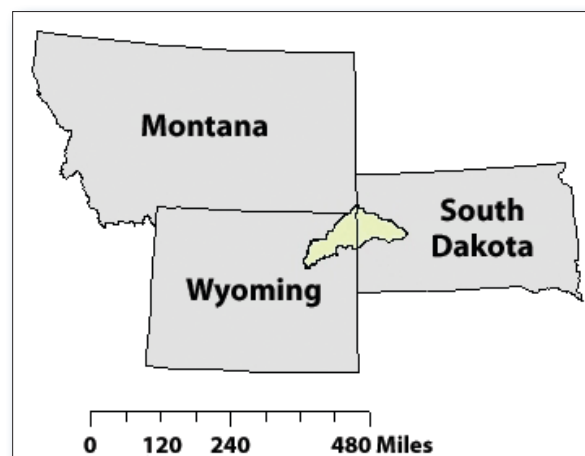


Figure 1. The Belle Fourche River watershed drains portions of northeastern Wyoming and western South Dakota.

for approximately 20 percent of the TSS in the Belle Fourche River system; stream entrenchment and bank failure were responsible for another 75 percent of the TSS. The TMDL attributed the remaining 5 percent of the TSS load to the river to rangeland and riparian area erosion.

Project Highlights

In 2004 the Partnership adopted a watershed approach to implement the Belle Fourche River TMDL. To target the best management practices (BMPs) recommended by the TMDL, the Partnership developed the Ten-Year Belle Fourche River Watershed Strategic Implementation Plan and the Five-Year Belle Fourche Irrigation District Water Conservation Plan. The plans focus on improving the conveyance efficiency of irrigation, modifying on-farm delivery of irrigation waters, restoring riparian rangeland areas, and emphasizing public outreach.



Figure 2. Landowners installed center-pivot irrigation systems such as this one in the Belle Fourche Irrigation District.

The Partnership worked with producers to complete numerous projects within the near-Fruitdale to Whitewood Creek portion of the Belle Fourche River watershed, including rehabilitating 2,000 acres of riparian grazing land and improving irrigation efficiency. The partners implemented canal automation, developed a canal operational model, updated the water card/billing system, and

lined open canals and laterals within the Belle Fourche Irrigation District. These projects increased irrigation delivery efficiency dramatically (estimated at more than 10 percent) and improved the understanding of how the system operates as a whole. Partners installed nine center-pivot irrigation systems to replace the existing flood irrigation practices (Figure 2).

Results

Improving the efficiency of irrigation systems has significantly reduced the amount of sediment-laden water returned to the river and its tributaries. Providing off-stream water supply for livestock and managed grazing alternatives has also improved the surface water quality by trapping sediments before they can enter the stream.

Recent water quality monitoring data show that both previously impaired segments of the Belle Fourche River now meet the TSS water quality standard, which requires that TSS levels be less than 158 mg/L (Table 1). As a result, South Dakota removed the segments from its CWA section 303(d) list in 2008 (Figure 3).

Table 1. Recent water quality monitoring results for the Belle Fourche River (2005–2007)

Monitoring Station Location	Mean TSS Level (mg/L)
Near Fruitdale to Whitewood Creek	29.0
Whitewood Creek to Willow Creek	18.3

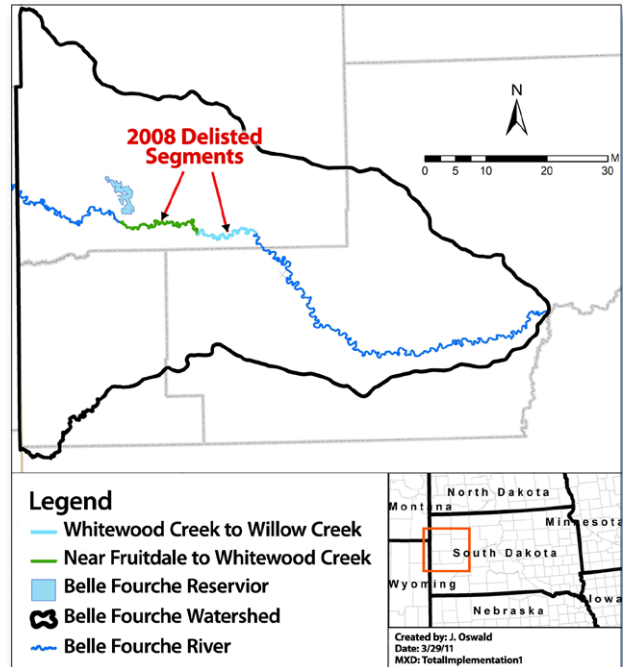


Figure 3. Two segments are delisted within the South Dakota portion of the Belle Fourche River watershed.

Partners and Funding

The success of the project is largely a result of the participation of the following local, state and federal agencies and organizations: Butte and Lawrence County Conservation District, Elk Creek Conservation District, South Dakota Conservation Commission, South Dakota Department of Agriculture, South Dakota Department of Environment and Natural Resources, South Dakota Game Fish and Parks, South Dakota Grassland Coalition, South Dakota School of Mines and Technology, South Dakota State University, U.S. Bureau of Reclamation, EPA, U.S. Geological Survey, U.S. Fish and Wildlife Service and Wyoming Department of Environmental Quality.

The Partnership and its collaborators are in their sixth year of implementing projects in the South Dakota portion of the watershed. To date, approximately \$14.3 million from several local, state and federal sources has supported watershed rehabilitation efforts. Of that total amount, approximately \$3.7 million was granted from EPA CWA section 319 funds through the South Dakota Department of Environment and Natural Resources, \$6.0 million came from local participants, and \$4.6 million was secured from other federal sources.



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