



NONPOINT SOURCE SUCCESS STORY

South Dakota

Seasonal Riparian Area Management Improves Water Quality in Skunk Creek

Waterbody Improved

Sedimentation from agricultural nonpoint source pollution degraded warmwater marginal fish habitat in 59.7 miles of Skunk Creek. As a result, the South Dakota Department of Environment and Natural Resources (DENR) placed the waterbody on South Dakota's 2012 Clean Water Act (CWA) section 303(d) list due to a total suspended solids (TSS) impairment. Natural resource agency partners collaborated on projects to implement riparian and other best management practices (BMPs) to reduce sediment loadings. With these improvements, DENR reclassified the Skunk Creek segment in 2016 as meeting its beneficial uses for warmwater marginal fish life and removed it from South Dakota's CWA section 303(d) list.

Problem

Skunk Creek drains 582 square miles of land before merging with the Big Sioux River inside the city limits of Sioux Falls (Figure 1). Skunk Creek is an important tributary of the Big Sioux River, providing much of the water entering the city when the diversion dam is closed. To meet water quality standards for TSS, the 30-day average TSS concentration must be less than or equal to 158 milligrams per liter (mg/L) and the daily maximum must not exceed 263 mg/L on more than 10% of the sampling dates.

Skunk Creek impairments were identified by ambient water quality monitoring (1990–2018) along with various water quality monitoring projects including the Central Big Sioux River Watershed Assessment Project (2000–2001), Central Big Sioux Implementation Monitoring Project (2005–2008), Sioux Falls Total Maximum Daily Load (TMDL) Assessment Project (2009), and the East Dakota Water Quality Monitoring Project (2011–2018). As a result, DENR added the segment to the state's list of impaired waters in 2012 for failure to attain its beneficial uses for warmwater marginal fish life due to elevated TSS. A National Water Quality Initiative (NWQI) project was initiated with the U.S. Department of Agriculture's (USDA's) Natural Resource Conservation Service (NRCS) in the Skunk Creek watershed from 2014 to 2017 to document water quality results and implement BMPs to reduce bacteria, sediment, and nutrients.

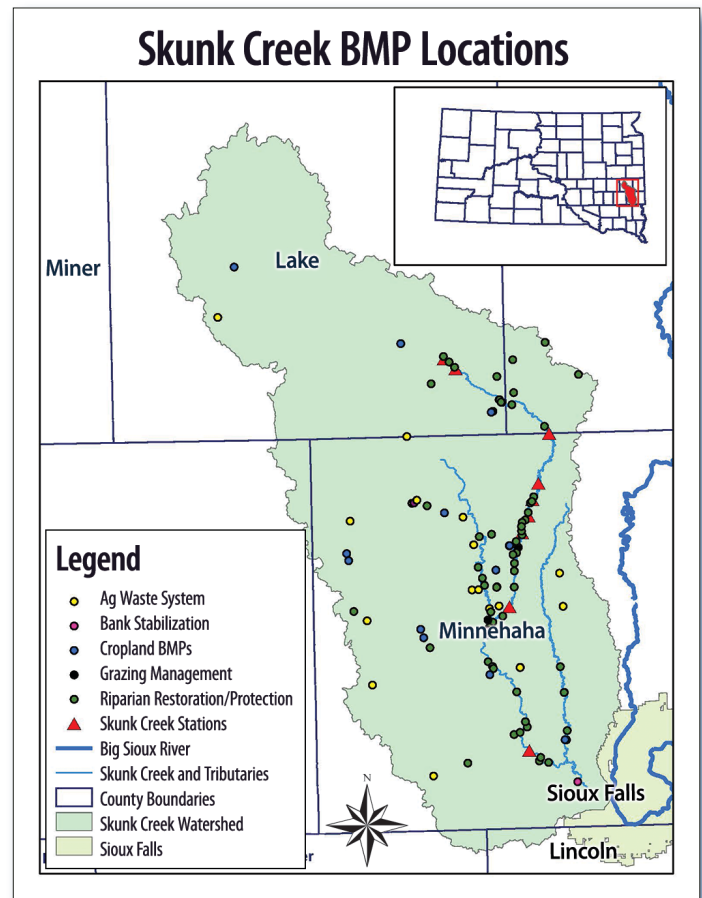


Figure 1. Landowners implemented many BMPs in the Skunk Creek watershed.



Figure 2. A section of Skunk Creek before (2013, left) and after SRAM (2018, right) was implemented.

Story Highlights

Watershed partners implemented a wide variety of BMPs including agricultural waste systems, cropland BMPs, alternative water sources, fencing, riparian area management, stream exclusion and bank protection. During the restoration of Skunk Creek and other Big Sioux reaches and tributaries, a new BMP was developed. Landowners found that the Seasonal Riparian Area Management (SRAM) practice is an attractive option for using land on the river corridor while also protecting it from livestock use during the recreation season (Figure 2). Livestock producers enrolling pasture into the program were paid \$60 an acre to defer grazing from April through September but can graze in the off-season as long as a minimum vegetation stand of 4 inches is maintained. Haying is also allowed from June through September; alternative water is required if the area is grazed in the winter season. Land within the 100-year floodplain of Skunk Creek is eligible for the program. Over 1,200 acres of riparian area along Skunk Creek have been entered into SRAM to date.

The SRAM practice was later used as the model for the governor's buffer strip bill, which now applies statewide. This innovative practice is feasible because it meets both producers' needs and conservation objectives. Skunk Creek became an NWQI watershed in 2014–2017 when additional practices were implemented and water quality and other biology and habitat data were collected. Baseline conditions for bacteria, sediment and nutrients were established in the Jensen Creek–Skunk Creek watershed; monitoring continues today to test the difference between control (no SRAM) and treatment (SRAM present) sites.

Results

As of 2016, Skunk Creek TSS levels no longer violate water quality standards. According to STEPL modeling, sediment loads have been reduced by 365 tons per year during the Big Sioux Implementation Project Segment 3; 2,654 tons per year during the Central Big Sioux Implementation Project Segment 2; and 184 tons during the Central Big Sioux Implementation Project Segment 1. Total reductions of 45,371 pounds nitrogen; 14,331 pounds phosphorus; 3,203 tons of sediment; and 1.9 E10 most probable number of *Escherichia coli* were calculated for Skunk Creek alone during all three implementation project segments. Median TSS values have steadily declined across all sites in the Skunk Creek watershed from 60 mg/L in 2011 to 28 mg/L in 2018. Acute TSS violations have declined from 11% in 2011 to 3% in 2017. Slight improvements in macroinvertebrate and fish community measures between control (no-SRAM) and treatment (SRAM) locations in the NWQI watershed have been noted. As a result, Skunk Creek was removed from the state's 303(d) list for its TSS impairment in 2016.

Partners and Funding

CWA section 319 funds specifically were used for agricultural waste systems, cropland BMPs, and a variety of riparian restoration practices. Through three project segments spanning 13 years, CWA section 319 funds contributed \$184,059 toward BMPs. Other federal sources, including the USDA Regional Conservation Partnership Program and the USDA Environmental Quality Incentives Program, provided \$1,024,118 to support BMPs. State contributions include the Clean Water State Revolving Fund (Nonpoint Source), which granted \$3,356,908—the bulk of the SRAM funding. Local sources, including landowners and East Dakota Water Development District, contributed \$1,817,674. The local project sponsor is the Moody County Conservation District. Local partners include participating landowners, the city of Sioux Falls, the Lake and Minnehaha county conservation districts, East Dakota Water Development District, and the Big Sioux River Watershed Steering Committee. State partners include DENR. Federal partners include the U.S. Environmental Protection Agency and the USDA NRCS.



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