



NONPOINT SOURCE SUCCESS STORY

South Dakota

Watershed Projects Reduce Sediment in a Segment of the Big Sioux River

Waterbody Improved

Sedimentation from agricultural nonpoint source pollution degraded warmwater semipermanent fish habitat in a 49.77-mile segment (Segment Four) of the Big Sioux River. As a result, the South Dakota Department of Environment and Natural Resources (DENR) placed the waterbody on South Dakota's 2008 Clean Water Act (CWA) section 303(d) list of impaired waters for total suspended solids (TSS) impairment. Partners implemented seven CWA section 319 implementation projects spanning the Upper Big Sioux watershed, which reduced sediment levels. Due to these improvements, DENR reclassified the segment in 2010 as meeting its beneficial uses for warmwater semipermanent fish life and removed it from the CWA section 303(d) list.

Problem

The Big Sioux River, a major river in eastern South Dakota, drains some of the most populated and intensely farmed areas in the state (Figure 1). Many of the 17 segments of the 418-mile river are designated as impaired waters due to nutrients, dissolved oxygen, bacteria and TSS. To meet water quality standards for TSS, the 30-day average TSS concentrations 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. Water quality monitoring during the North Central Big Sioux River Watershed Assessment from 2001–2006 showed that Segment Four of the Big Sioux River (segment ID SD-BS-R-BIG_SIOUX_04; Stray Horse Creek to Near Volga; 49.77 miles) violated these standards. As a result, DENR added the segment to the state's list of impaired waters in 2008 for failure to attain its beneficial uses for warmwater semipermanent fish life due to elevated TSS. Segment Four drains 3,032 square miles of northeast South Dakota before continuing downstream south of Volga.

Project Highlights

Multiple implementation projects from 2006 to the present contributed to water quality improvements in the Upper Big Sioux River. The Upper Big Sioux River Project was initiated to reduce sediment and nutrient loads to Lake Kampeska and was later expanded to include improvements to the Big Sioux River, upstream of Segment Four. The Lake Poinsett Project reduced nutrient and sediment loading to the lake, improving water quality in the northern part of Segment Four. The Central Big Sioux Project, now named the Big Sioux River Watershed Implementation Project (a total maximum daily load [TMDL] implementation project), addressed water quality impairments in the southern portion of Segment Four.

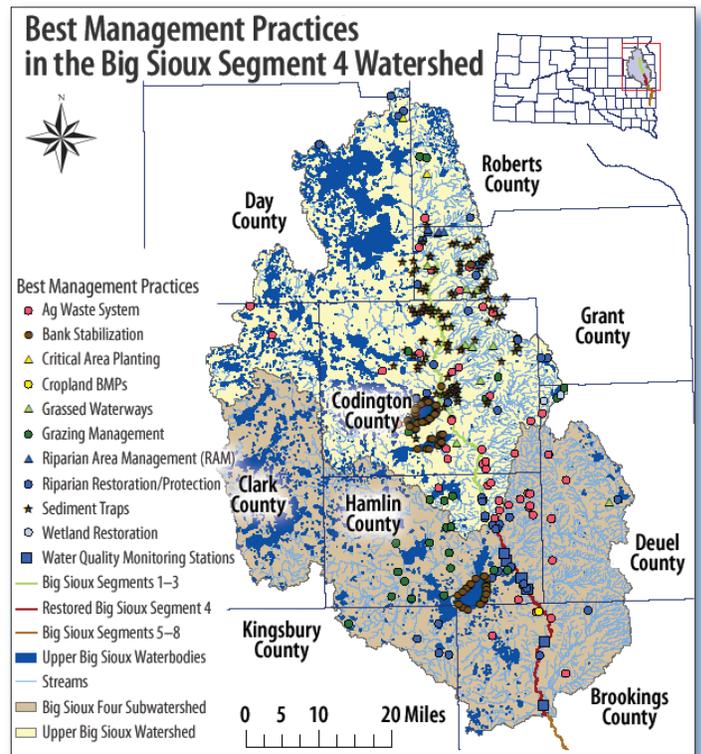


Figure 1. Location of the Upper Big Sioux Watershed and Best Management Practices. Segment Four was listed as impaired for TSS in the 2008 Integrated Report from Stray Horse Creek to Volga, shown in red. Segments 5–8 shown in brown remain impaired for TSS and continue southward off the map.

Other CWA section 319-funded projects in the Big Sioux River basin include the statewide CWA section 303(d) Watershed Planning and Assistance Project, Northeast Glacial Lakes Watershed Improvement and Protection Project, East Dakota Riparian Area Restoration and Protection Project, and Deuel County Lakes Watershed Improvement Project. Through



Figure 2. Farm Service Agency imagery from 2004 and 2014 shows improved riparian function on 4.3-acre grassed easement on former crop ground along the Big Sioux River. Hayed area is outside the easement.

these seven projects, 51 agricultural waste systems, 114 bank stabilizations, two critical area plantings, 11 grassed waterways, 26 grazing management practices, six riparian area management practices, 46 riparian restoration practices, 100 sediment traps and two wetland restorations were installed throughout the Upper Big Sioux Watershed (Figure 2).

Results

As of 2010, Segment Four's TSS values no longer violated water quality standards and the waterbody was removed from the state's CWA section 303(d) list. This improvement can be seen in Figure 3, which shows the decreases in the percent exceedances of the daily maximum pollutant levels for TSS (from 11 percent in 1998–2005 down to 3 percent in 2006–2015) which meets the water quality standards. As of June 2015, nitrogen has been reduced by 234,850 pounds (lbs), phosphorus by 59,859 lbs, and sediment by 14,254 tons per year across the Upper Big Sioux drainage according to the STEPL (Spreadsheet Tool for Estimating Pollutant Load) model.

Partners and Funding

Local sources were used to fund the majority of water quality improvements, including grassed waterways, sediment dams and alternative water sources to exclude cattle from the streams. CWA section 319 funds supported riparian grazing management, information and education, water quality monitoring as well as agricultural waste systems which reduce more nutrients than sediment.

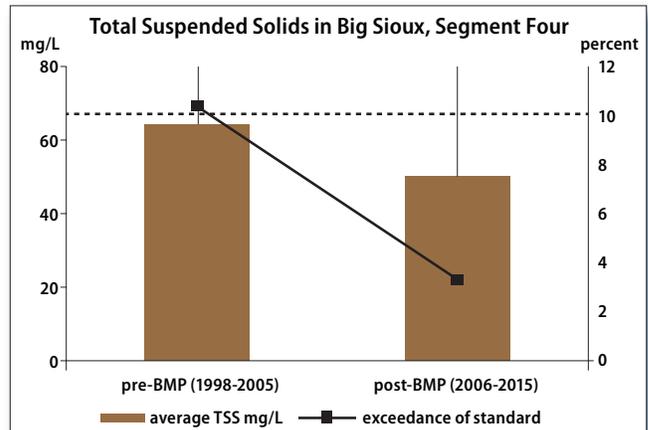


Figure 3. Average TSS concentrations and percent exceedances of 158 mg/L calculated from six water quality monitoring stations along Segment Four. (Error bars show standard deviation.) Segment Four supports beneficial uses for fish/wildlife propagation, irrigation water, limited contact recreation and warmwater semipermanent fish life.

Hard work and funds from local, state and federal agencies and committed landowners restored Segment Four of the Big Sioux River. The participating projects funded BMP installation totaling \$4,436,327. CWA section 319 funds contributed \$588,178 to BMP implementation while \$685,913 was from other federal sources. State, local and in-kind sources provided \$3,162,237.

Local partners included participating landowners; the city of Watertown; Watertown Municipal Utilities; Kampeska Water Project District; Lake Pelican Water Project District; Lake Pelican Preservation Society; Lake Area Technical Institute; Isaak Walton League of America, Northern Prairies Land Trust; East Dakota Water Development District; Lake Poinsett Water Project District; Lake Poinsett Sanitary District; Lake Poinsett Development Association; Hamlin County Livestock Improvement Association; KWAT radio (Watertown); and Brookings, Codington, Deuel, Hamlin and Kingsbury County Conservation Districts. Statewide partners included the South Dakota Department of Game, Fish and Parks; South Dakota Department of Environment and Natural Resources; South Dakota State University; South Dakota Association for Conservation Districts and the South Dakota Discovery Center. National partners included the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Department of Agriculture (Farm Service Agency and Natural Resources Conservation Service), and Ducks Unlimited.



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