SECTION 319 NONPOINT SOURCE PROGRAM

WATERSHED PROJECT FINAL REPORT

BIG SIOUX RIVER WATERSHED IMPLEMENTATION PROJECT SEGMENT 3

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East Dakota Water Development District

August 2020

This project was completed in cooperation with the South Dakota Department of Environment and Natural Resources and the United States Environmental Protection Agency, Region 8.

Grant #9998185-11, #9998185-15, #9998185-18, #9998185-19

EXECUTIVE SUMMARY

PROJECT TITLE: Big Sioux River Watershed Project Segment 3

PROJECT START DATE: 14 July 2015

PROJECT COMPLETION DATE: 31 August 2020

FUNDING:

Funding Sources	Original Budget	Expended
U.S. EPA Section 319 Grant	$900,000.00	$1,035,880.79
City of Sioux Falls	$50,000.00	$84,924.00
City of Dell Rapids SRF NPS	$0.00	$142,247.00
City of Sioux Falls SRF NPS	$2,072,300.00	$3,379,217.53
CWSRF Water Quality	$100,000.00	$100,000.00
Conservation Districts	$24,000.00	$4,950.00
EDWDD	$15,000.00	$40,147.48
RCPP	$1,980,920.00	$1,780,588.99
USDA	$1,998,100.00	$2,049,507.14
Local Cash and In-Kind Match	$2,233,450.00	$5,482,468.90
Totals:	**$9,373,770.00**	**$14,099,931.83**

The project goal was to restore and protect the beneficial uses of the Big Sioux River and its tributaries (in South Dakota) from the highway 28 bridge near Estelline, SD in Hamlin County to the mouth of the Missouri River. Milestones were accomplished by promoting and implementing Best Management Practices (BMPs) in the watershed that reduced sediment loading and prevented bacterial contamination. Water quality criteria, based on beneficial use, was used as the standard for Total Suspended Solids (TSS) and/or bacteria (fecal coliform or E.coli) levels to meet the 51 TMDLs developed for the river, tributaries and lakes within the watershed.

The following actions were taken during this project segment to assist in attaining the goal:

- Continuing to expand the Big Sioux River Watershed Steering Committee to guide future project segments:
- Continuing a public education and outreach campaign to inform landowners, stakeholders, and area residents of water quality issues and BMPs important to the Big Sioux River Watershed:
- Successful implementation of the first Regional Conservation Partnership Program in the state:
- Continued refinement of the RAM and SRAM programs to remain current with changing technology, economy, producer needs and water quality goals: and
- Installation of BMPs targeted toward identified high priority sub-watersheds.

The project goal was established based on water quality information gathered during the Central and Lower Big Sioux River Watershed Assessments. Initial water quality data indicated high levels

of fecal coliform and/or E-coli bacteria and TSS in several segments of the watershed. During the Central and Lower Big Sioux River Watershed Assessments, 1,525 livestock operations were located and analyzed using the Agricultural Non-Point Source (AGNPS) pollution feedlot model. Of the 1,525 operation assessed, 492 operations were ranked at or above 50. Prioritization of animal feeding operations, based on their potential to contribute bacteria and TSS, located within close proximity to impaired waterbodies was the basis for implementation. Riparian Area Management (RAM) and Seasonal Riparian Area Management (SRAM) were innovative programs initially developed to target over-grazing and direct pollutant loading along Skunk Creek, a major tributary of the Big Sioux, to address E-coli and TSS. The program's success and addition of State Revolving Fund Non-Point Source funding from the City of Sioux Falls and City of Dell Rapids allowed for expansion to other impaired tributaries in the watershed and the Big Sioux River itself. The Big Sioux River Watershed Project was also the recipient of the state's first Regional Conservation Partnership Program Grant (RCPP) that increased BMP funding available in the watershed. Water quality sampling was increased during the last half of segment 2 and the first half of segment 3 to satisfy requirements for the National Water Quality Initiative (NWQI) established in the Skunk Creek Basin. Preliminary results indicated a decrease in bacteria levels in locations with BMPs established. Skunk Creek was removed from the impaired streams list for TSS in the 2016 SDDENR Integrated Report. The Moody County Conservation District continued as the lead sponsor of the project. Brookings, Lake, Minnehaha, Lincoln, and Union Counties remained co-sponsors for the project and regularly attended quarterly steering committee meetings along with the City of Sioux Falls, City of Brookings, SDDENR, EDWDD and several other interested groups and agencies.

A total of 20 engineering design plans, 17 Animal Waste Management Systems (AWMS) and 15 nutrient management plans were completed during this segment of the project. Riparian area protection projects included: 2,053 acres of SRAM and 271 acres of RAM totaling 327,070 linear feet (62 miles) of stream protection; 0 acres of conservation easements; 5.8 acres of Conservation Reserve Program (CRP) buffers totaling 1,078 linear feet of stream protection; 28 planned grazing systems with 23 alternative water sources and 30,564 linear feet of fence. The Water Quality Credit Trading Plan was found to already be developed and satisfied by the SRAM program and no formal credits were traded due to the difficulties with documenting the actual worth of a bacterial credit during segment 3 of this project. No engineered bank stabilization was completed during segment 3 due to the United States Army Corp of Engineers' reluctance to grant permits for the stabilization based on unnatural environmental influences. The 5 drain tile Bioreactors installed in cooperation with South Dakota State University Water Resource Institute during segment 2 continue to be monitored as part of their research. Cropland BMPs implemented during this segment were: 327 acres of Continuous Conservation Reserve Program (CCRP); 2,914 acres of cover crops; 70 acres of filter strips; 3,635 linear feet of grassed waterways; 0 linear feet of terrace restoration; 69,060 linear feet of RCPP terraces and 0 acres of pollinator habitat. Information and Education accomplished included: Several meetings with the City of Sioux Falls, Conservation Districts, and other partners associated with the watershed project; 5 annual Big Sioux River Summits; several press releases/news articles/news interviews related to the goals of the project and progressive/innovative ideas being implemented. No Urban Swales were designed or constructed during this segment. EDDWD collected over 2,000 water quality samples at various monitoring sites throughout the watershed and all reports were completed. Delisting Skunk Creek for Total Suspended Solids (TSS) has been achieved during segment 3 of this project (2016 SDDENR Integrated Report).

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INTRODUCTION

The Big Sioux River Watershed Implementation Project is a multi-segment, multi-year Total Maximum Daily Load (TMDL) implementation strategy in the Big Sioux River Basin in eastern South Dakota. The project goal is to restore and/or maintain the water quality of the Big Sioux River and its tributaries to meet the designated beneficial uses.

The Central and Lower Big Sioux River Watershed Assessments identified various segments of the Big Sioux River and certain tributaries between Watertown, South Dakota and Sioux City, Iowa as failing to meet designated uses due to impairments from Total Suspended Solids, Dissolved Oxygen, Chlorophyll-a, Mercury and Bacteria (Figure 1). Several TMDLs, based on the impairments, were developed for these segments (Table 1). In addition to the impaired lakes, river segments and creeks with approved TMDLs, certain sub-watersheds were found to be contributing impairments to downstream water bodies as well. In some instances, addressing pollution sources in areas not technically impaired (due to a lack of a defined beneficial use or uses) may also be necessary to meet TMDLs. Implementation activities were planned to improve and/or maintain current sediment and bacterial loadings throughout targeted sub-watersheds within the project area. The SDDENR and EDWDD continued with water quality sampling throughout segment 3 of the project in an effort to collect a more robust compilation of data that could be used in future modeling and decision making. An information and education campaign was launched in partnership with the City of Sioux Falls to keep the public informed of project activities and to provide information on BMPs and water quality issues within the city and surrounding watershed.

The Big Sioux River basin is located in northwest Iowa, southeastern South Dakota, and southwest Minnesota (Figure 2). The lower portion of the Big Sioux River forms the border between Iowa and South Dakota from the Iowa/Minnesota border to the Missouri River. Since a major portion of the basin is located in both Minnesota and Iowa, TMDLs were based in part on data from those portions of the watershed that have been assessed by their respective states. Implementation projects in both Minnesota and Iowa will still need to address impairments to their contributing watersheds and apply BMPs based on respective loadings in order to attain the TMDLs that have been developed. This project focused on the South Dakota portion of the watershed (Figure 3).

Several water bodies, over a substantial geographic area, are impaired within the Big Sioux River watershed. The impairments impact the use of the river and streams for boating, fishing, swimming and other recreational uses. Further, while the impairments have not yet affected use of the river as a domestic water supply, the increased loading may require more extensive purification treatment in the future. The City of Sioux Falls periodically extracts its drinking water from the Big Sioux River. Correcting these problems will have an impact well beyond the current recreational and aesthetic problems.

The Central Big Sioux River, North-Central Big Sioux River/Oakwood Lakes Watershed and Lower Big Sioux River Assessment Projects identified several sources of TSS and bacteria (fecal and E. coli) that constitute the primary impairments in the area. Excessive TSS, i.e., fine sediment suspended in the waters of the river and its tributaries, are found primarily in the Big Sioux River and other major tributaries. Segments not technically exceeding the applicable standard may also have levels that contribute to impairments downstream.

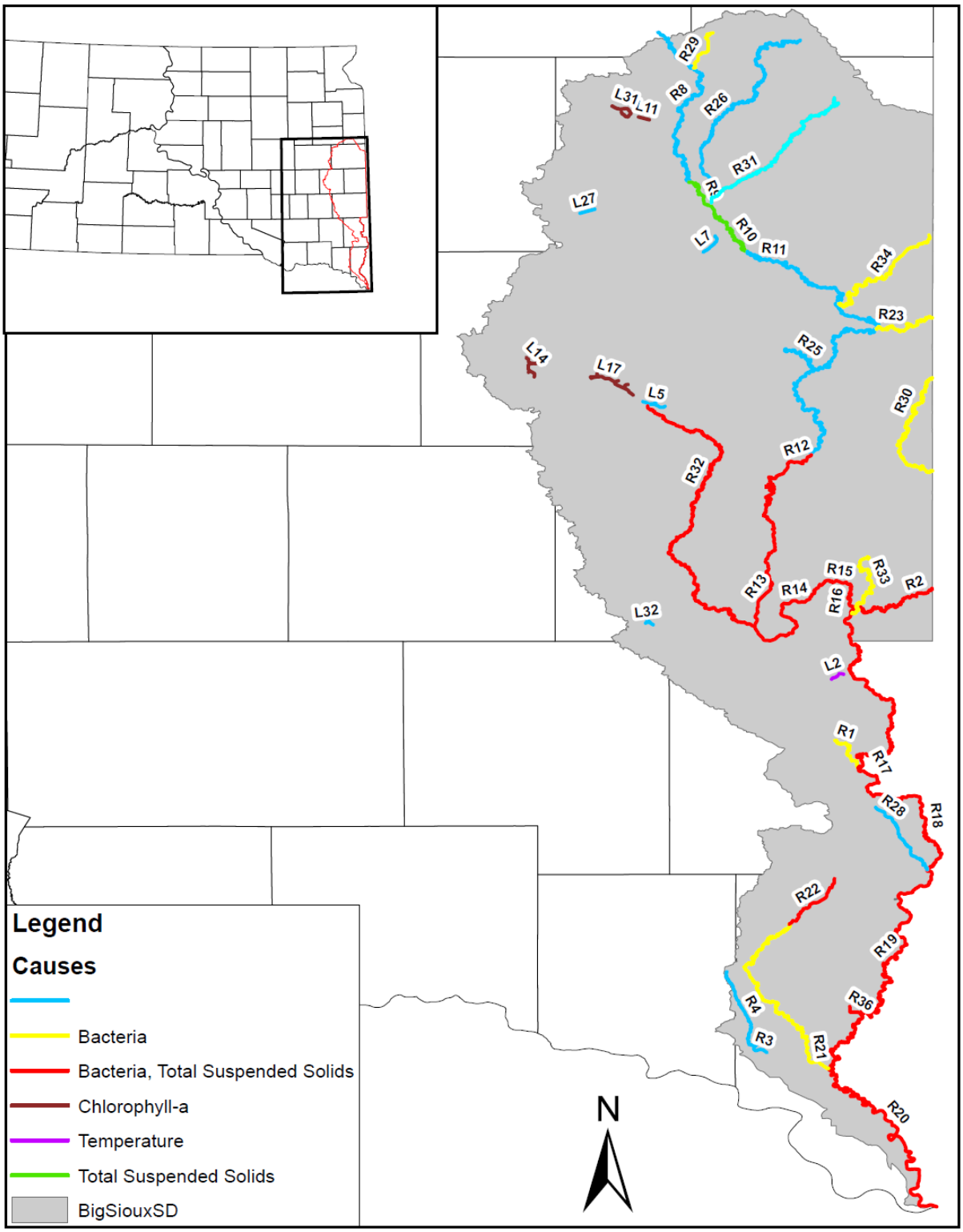


Figure 1: Big Sioux River Impaired Segments

Table 1: Beneficial Use Impairments Identified in the Big Sioux River Watershed (2020 South Dakota Integrated Report for Surface Water Quality).

Impaired Water Body	Impaired Beneficial Use	Cause
Alvin, Lake (Lincoln County)	Insufficient Data	
Brant Lake (Lake County)	Full Support	
Brush Lake (Brookings County)	Fish/Wildlife Prop., Rec. Stock	MeHg
Diamond Lake (Minnehaha County)	Insufficient Data	MeHg
East Oakwood Lake (Brookings County)	IR, LCR, WWSFL	CHL-A
Goldsmith Lake (Brookings County)	Fish/Wildlife Prop. Rec. Stock, WWMFL	MeHg
Herman, Lake (Lake County)	Fish/Wildlife Prop., IR, LCR, WWPFL	MeHg ,CHL-A
North Island Lake (Minnehaha/McCook Counties)	Fish/Wildlife Prop., Rec. Stock, WWSFL	MeHg
Madison, Lake (Lake County)	IR, LCR, WWPFL	CHL-A
Sinai, Lake (Brookings County)	Fish/Wildlife Prop., Rec. Stock, WWPFL	MeHg
Twin Lakes (Kingsbury County)	Fish/Wildlife Prop., Rec. Stock, WWPFL	MeHg
Twin Lakes (Minnehaha County	Fish/Wildlife Prop., Rec. Stock, WWPFL	MeHg
West Oakwood Lake (Brookings County)	IR, LCR, WWSFL	CHL-A
Bachelor Creek	LCR	EC
Beaver Creek 1 (Lincoln County)	LCR	EC
Beaver Creek 2 (Minnehaha County)	LCR, WWMFL	FCB & EC, TSS
Big Sioux River		
Stray Horse Creek to near Volga	LCR, WWSFL	DO
Near Volga to Brookings	WWSFL	TSS
Brookings to Brookings/Moody County Line	WWSFL	TSS
Brookings/Moody County Line to S2-104N, 49W	Fish/Wildlife Prop. Rec. Stock, WWSFL	TSS, MeHg
S2-T104N-R49W to I-90	Fish/Wildlife Prop., IR, LCR, WWSFL	EC, TSS, MeHg
I-90 to Diversion return	IR, LCR, WWSFL	EC, TSS
Diversion return to SF WWTF	IR, LCR, WWSFL	EC, TSS
SF WWTF to above Brandon	IR, LCR, WWSFL	EC, TSS
Above Brandon to Nine Mile Creek	IR, LCR, WWSFL	EC, TSS
Nine Mile Creek to near Fairview	IR, LCR, WWSFL	EC, TSS
Fairview to Alcester	IR, LCR, WWSFL	EC, TSS
Near Alcester to Indian Creek	IR, LCR, WWSFL	EC, TSS
Indian Creek to Mouth	IR, WWSFL	EC, TSS
Brule Creek	LCR, WWMFL	EC, TSS
East Brule Creek	LCR, WWMFL	EC, TSS
Flandreau Creek	LCR	EC
Medary Creek	LCR	EC
Peg Munky Run	Full Support	
Pipestone Creek	IR, LCR, WWSFL	EC, TSS
Six Mile Creek	LCR	EC, DO
Skunk Creek	LCR	EC
Split Rock Creek	IR, LCR, WWSFL	EC, TSS
Union Creek	WWMFL	TSS

CHL-A - algal blooms.
DO - dissolved oxygen.
EC - E. *coli* bacteria.
FCB - fecal coliform bacteria.
MeHg - mercury
IR - immersion recreation standard = 400 colonies per 100 milliliters of water.
LCR - limited contact recreation standard = 2,000 colonies per 100 milliliters of water.
TSS - total suspended solids.
WWSFL -warm water semi-permanent fish life - applicable standard varies with water body.
WWMFL - warm water marginal fish life - applicable standard varies with water body.
WWPFL - warm water permanent fish life - applicable standard varies with water body.

Big Sioux River Watershed Basin

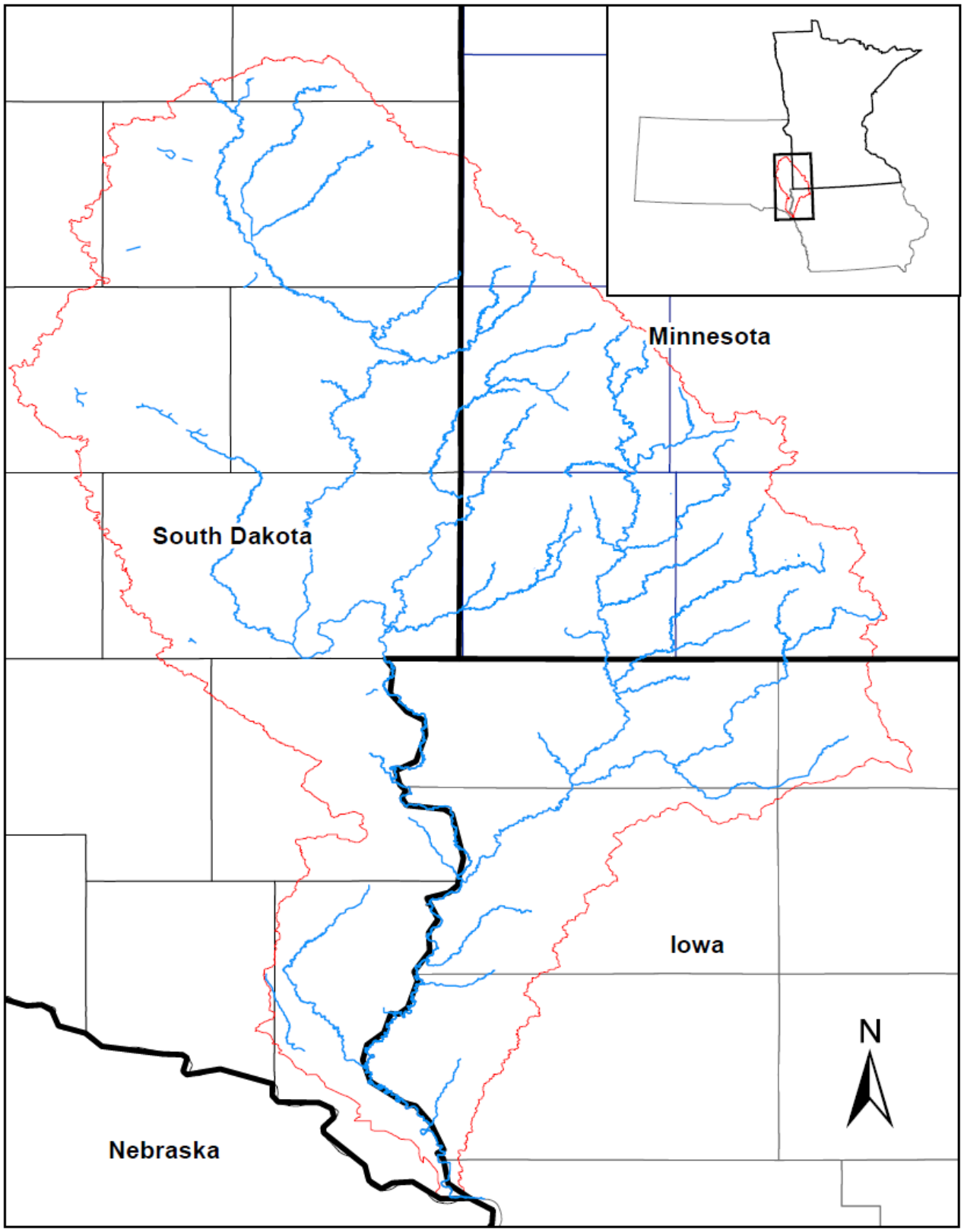


Figure 2: Watershed Basin

Big Sioux River Watershed
Project Area

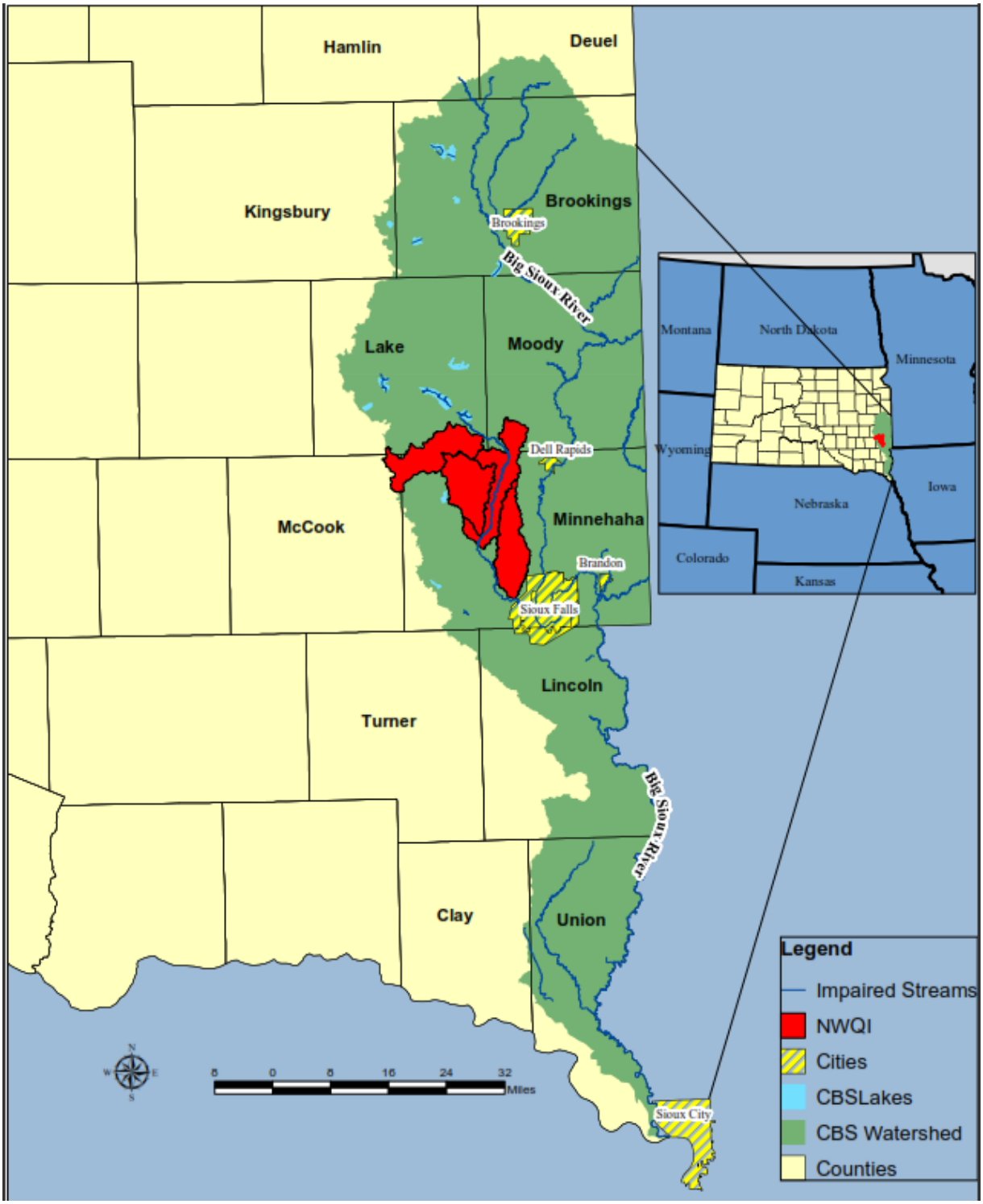


Figure 3: Project Area

The Big Sioux River Watershed Project encompasses the Big Sioux River (in South Dakota) between Estelline, South Dakota in the north and Sioux City, Iowa in the south. The project watershed area is approximately 2,107,000 acres (Table 2).

Table 2: Big Sioux River and its Basin Features.

Waterbody Name:	Big Sioux River, 26 impaired stream segments and 11 impaired lakes
Hydrologic Unit Code:	Big Sioux River – 10170202, 10170203
SD DENR Waterbody ID:	SD-BS-R-BIG_SIOUX_04-17
Location:	S27, T113N, R51W to S30, T89N, R47W
Impaired Beneficial Use and Cause:	See Table 2.1
Major Tributaries (South Dakota):	Peg Munky Run, North Deer Creek, Six Mile Creek, Skunk Creek, Split Rock Creek, Beaver Creek, Brule Creek
Major Tributaries (Minnesota):	Beaver Creek, Pipestone Creek, Split Rock Creek, Rock River
Major Tributaries (Iowa):	Rock River, Sixmile Creek, Indian Creek, Broken Kettle Creek
Receiving Waterbody:	Missouri River
Big Sioux River Segment Length:	311 miles
(Watershed Area)	
South Dakota	2,107,000 acres
Minnesota	937,000 acres
Iowa	877,000 acres
Total	3,921,000 acres

The river and major tributaries are permanent water courses within the project area that convey water throughout the year. There are numerous intermittent tributaries which convey water only during spring snow melt, rainfall events or when field drainage tile is discharging directly into them. The river also receives storm sewer discharges or otherwise enhanced runoff from several communities along its course in South Dakota including the cities of Brookings, Flandreau, Dell Rapids, Sioux Falls, Brandon, Canton and Hudson. Cites along the River on the Iowa side include Hawarden and Akron. Sections of the stream have been impacted by channelization (straightening and/or artificial stabilization) and numerous road crossings over the river and tributaries. The Big Sioux River ultimately drains to the Missouri River at Sioux City, Iowa.

Many segments of the river do not fully support the designated uses, particularly with regard to limited contact or immersion recreation (Table 1). The 1998 South Dakota 303(d) Waterbody List, and subsequent versions in 2006 and 2008, identified this portion of the Big Sioux River watershed as impaired and a priority for TMDL development. Fifteen impairments were known at the start of the assessments, seven for total TSS, six for bacteria, one for nitrate and one for trophic state index (East Oakwood Lake). The Central Big Sioux River and the North-Central Big Sioux River/Oakwood Lakes Watershed Assessment Projects were initiated at the request of local organizations and citizens concerned about water quality problems in the Big Sioux River between the communities of Watertown and Brandon. The main issues were related to high

suspended sediment loads that adversely affected fish populations (both numbers and diversity) and high bacterial loads that limited water use for swimming and boating recreation. The watershed assessments included:

- River and tributary water monitoring from 1999 through 2003;
- Quality assurance/quality control for water quality samples;
- River and tributary stage and discharge determinations;
- Biological monitoring (fish and insects);
- Watershed modeling using a sediment delivery model; and
- Review of previous water quality data collected for the watershed.

The assessment project confirmed that most segments of the Big Sioux River, and many of the tributaries, were impaired due to high levels of bacteria. The limited contact standard of 1,178 colonies per 100 ml of water, which is applicable to the entire river stretch, was most often exceeded during high flow events, suggesting runoff from feed lots as a source. However, high E. coli counts at low flow rates suggest that animal grazing in or near the river and its tributaries is a significant influence. The E. coli problem becomes particularly acute below the community of Dell Rapids, where the more stringent immersion recreation standard (235 colonies per 100 ml) is also applicable. For most of the watershed below this point, reductions in excess of 75% to 95% are needed to meet the beneficial use standards (Table 3). In this area, both feedlots and riparian area grazing are known issues. Since the completion of the Lower and Central Big Sioux River Watershed Assessment Projects, a total of 14 lake and 37 stream TMDL reports have been completed and approved. The reports formed the basis for the Big Sioux River Watershed Implementation Project.

Table 3: Fecal and E. coli Bacteria Reductions Needed by TMDL Segment.

Site ID	High Flow Reduction Needed (cfu/day)		Moist Flow Reduction Needed (cfu/day)		Mid Flow Reduction Needed (cfu/day)		Dry Flow Reduction Needed (cfu/day)	
	FCB	EC	FCB	EC	FCB	EC	FCB	EC
R-1 (Beaver Creek 01) **	8.74E+13	None	1.48E+12	None	None	None	6.30E+10	None
R-2 (Beaver Creek 02) **	3.12E+13	None	None	None	None	None	None	None
R-12 (Big Sioux 08) *	6.22E+12	None	2.12E+12	None	2.77E+12	None	2.48E+12	None
R-13 (Big Sioux 10) *	1.06E+13	None	1.82E+13	None	2.09E+12	None	9.17E+11	None
R-14 (Big Sioux 11) *	3.18E+13	None	1.28E+13	None	3.21E+12	None	1.54E+12	None
R-15 (Big Sioux 12) *	4.15E+13	None	1.59E+13	None	3.20E+12	None	1.29E+12	None
R-16 (Big Sioux 13) *	8.85E+12	5.20E+12	None	None	None	None	None	None
R-17 (Big Sioux 14) *	2.61E+13	1.53E+13	None	None	None	None	None	None
R-18 (Big Sioux 15) *	2.18E+14	1.28E+14	1.92E+13	1.13E+13	None	None	None	None
R-19 (Big Sioux 16) *	9.05E+13	5.31E+13	6.96E+12	4.09E+12	None	None	None	None
R-20 (Big Sioux 17) *	7.45E+14	4.38E+14	None	None	None	None	None	None
R-22 (East Brule Creek 01) *	7.98E+14	None	1.09E+13	None	1.12E+12	None	4.56E+11	None
R-29 (Peg Munkey Run 01) *	1.76E+15	None	None	None	6.79E+10	None	1.77E+09	None
R-30 (Pipestone Creek 01) **	5.31E+12	None	None	None	6.87E+11	None	None	None
R-31 (Six Mile Creek 01) **	1.10E+10	None	None	None	None	None	None	None
R-32 (Skunk Creek 01) **	4.12E+14	None	None	None	None	None	None	None
R-33 (Split Rock Creek 01) **	1.28E+14	None	3.62E+12	None	5.67E+11	None	None	None
R-36 (Union Creek 01) *	5.84E+15	None	4.00E+16	None	4.70E+15	None	5.50E+12	None

*** margin of safety included in calculation**

**** margin of safety not included in calculation**

TSS impairments are mainly associated on the Big Sioux River within the watershed (Table 4). Excessive TSS levels in the tributaries typically occur in the lower part of the watershed in the Pipestone Creek/Split Rock Creek basin along with the Rock River basin largely with influence from Minnesota and Iowa. One exception is Sixmile Creek near Brookings. Degraded riparian areas and stream bank erosion are believed to be the primary source of sediment, along with remobilization of in-stream sediment. Low sediment inputs from most tributaries within the watershed indicate current land-use practices are successfully limiting erosion. High sediment levels found in the tributaries that span Minnehaha, Lincoln and Union Counties are attributed to the relatively high erosion potential of the soils and slope in the area.

In several instances, some of the sub-watersheds assessed during the study had no applicable water quality standard. However, the loadings resulting from these sub-watersheds will need to be addressed if subsequent downstream water bodies are to be brought into compliance.

Since the start of segment 2 of this project NRCS has selected four HUC 12s for the National Water Quality Initiative (NWQI) within the watershed. Due to NWQI requirements more intense monitoring of the HUCs had to be incorporated into the project. The 22 Big Sioux River monitoring sites and 11 tributary sites are shown in (Figure 4). Also shown are the NWQI monitoring sites in relation to their location in the watershed. Of the 11 tributary sites, 4 new sites were added to monitor the impacts of BMPS in the NWQI area. Several of the monitoring sites sampled during the Central Big Sioux River Watershed Assessment Project in segment 2 were sampled during segment 3 of the project to assess the impact of newly implemented BMPs.

Table 4: TSS Reductions Needed by TMDL Segment.

Site ID	High Flow Reduction Needed	Moist Flow Reduction Needed	Mid Flow Reduction Needed	Dry Flow Reduction Needed
	TSS (tons/year)	TSS (tons/year)	TSS (tons/year)	TSS (tons/year)
R-1 (Beaver Creek 01)	None	None	None	None
R-2 (Beaver Creek 02)	None	None	None	None
R-12 (Big Sioux 08)	25039	None	None	None
R-13 (Big Sioux 10)	None	8,505	None	None
R-14 (Big Sioux 11)	871,218	None	None	None
R-15 (Big Sioux 12)	237,652	None	None	None
R-16 (Big Sioux 13)	Assessment Initiated	Assessment Initiated	Assessment Initiated	Assessment Initiated
R-17 (Big Sioux 14)	Assessment Initiated	Assessment Initiated	Assessment Initiated	Assessment Initiated
R-18 (Big Sioux 15)	556,880	239,257	1,095	621
R-19 (Big Sioux 16)	1,448,576	273,568	13,322	10,768
R-20 (Big Sioux 17)	5,627,315	147,570	30,843	212,067
R-22 (East Brule Creek 01)	Assessment Initiated	Assessment Initiated	Assessment Initiated	Assessment Initiated
R-29 (Peg Munkey Run 01)	None	None	None	None
R-30 (Pipestone Creek 01)	None	None	None	None
R-31 (Six Mile Creek 01)	None	None	None	None
R-32 (Skunk Creek 01)	Initiated	Initiated	Initiated	Initiated
R-33 (Split Rock Creek 01)	TMDL Reduction Met	TMDL Reduction Met	TMDL Reduction Met	TMDL Reduction Met
R-36 (Union Creek 01)	None	None	None	None

SDDENR in cooperation with EDWDD has currently developed a new strategy called rotating basins to sample all waterbodies within the state over a 10 year period on a basin-wide scale in an attempt to have a better understanding of more real-time water quality changes.

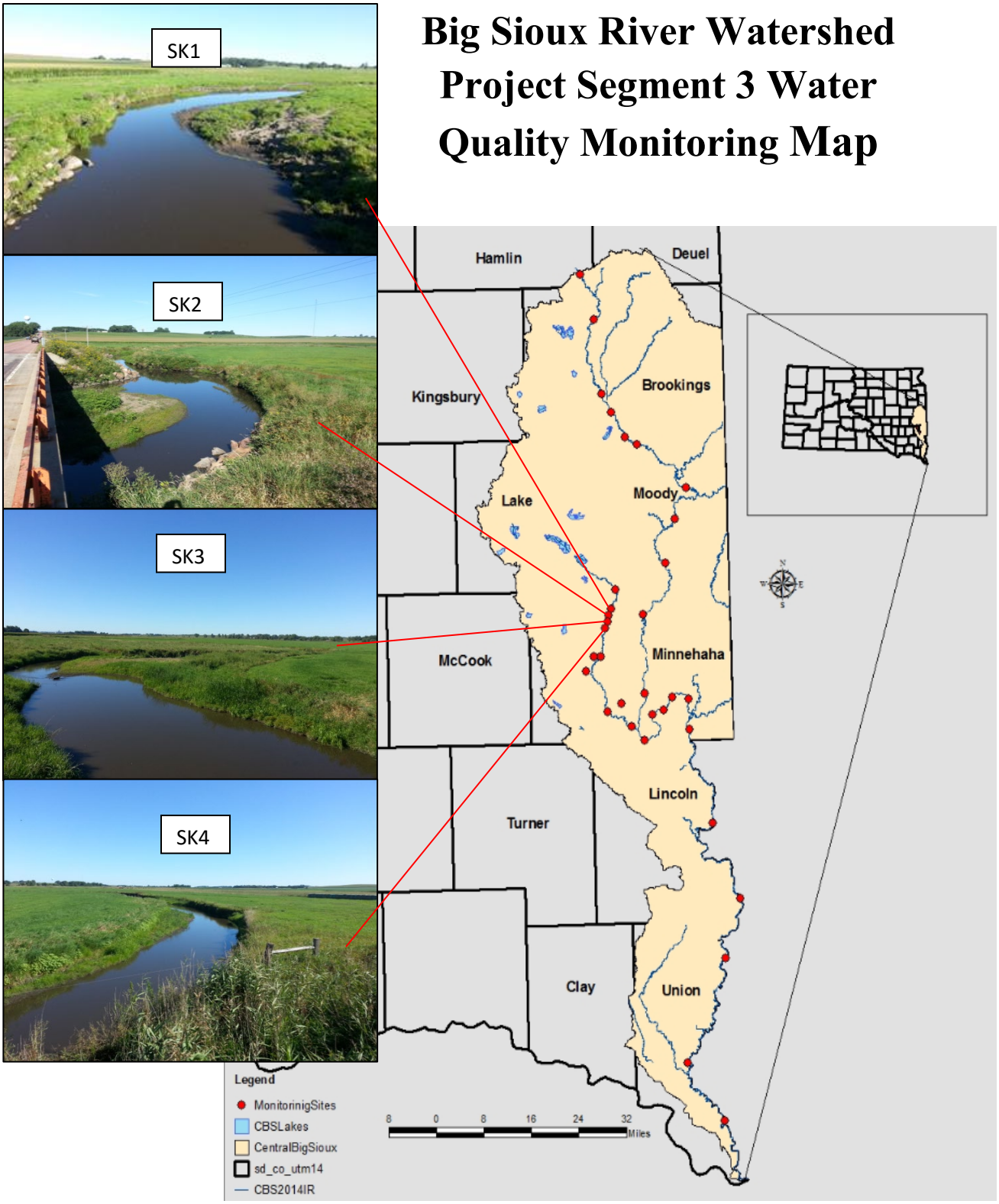


Figure 4: Water Quality Monitoring Locations

Description and Land Use of Project Area

The surficial character of the watershed can be divided into two parts, relating to the relative age of the landscape. Along the Big Sioux River valley and the eastern tributaries, drainage is well developed and non-drained depressions are rare. To the west of the river, where drainage is poor, there are numerous potholes, sloughs, and lakes. The relief in the area is moderate. Land elevation ranges from nearly 2,000 feet above mean sea level in the northeastern part of the watershed to about 1,265 feet in the southern edge of the project area.
Soils within the watershed area are derived from a range of parent materials. Uplands soils are relatively fine-grained and developed over glacial till or thin eolian (loess) deposits. Coarse-grained soils, derived from glacial outwash or alluvial sediments, are found along present or former water courses. In central and eastern Minnehaha County, in the southern part of the project area, the loess deposits are thick, often in excess of 20 to 30 feet, and the resulting soils are highly erodible. When combined with the relatively high relief, these areas are susceptible to erosion, regardless of land-use practices.

The average annual precipitation in the Big Sioux River watershed is 23.2 inches, of which 76% typically falls April through September. Tornadoes and severe thunderstorms strike occasionally. These storms are often only of local extent and duration, and occasionally produce heavy rainfall events. The average seasonal snowfall is 36.5 inches per year. Land use in the watershed is primarily agricultural.

The land use of the watershed is estimated at about 71% cropland with the production of row crops and hay land as the primary cropland uses. The principal crops are corn, soybeans, alfalfa and spring wheat. Grazing lands used for livestock operations make up approximately 11% of the acres. Row crops, such as corn and soybeans, dominate, but significant tracts are also in grass and/or pastureland. Native grass pastures do exist in the watershed but constitute a small percentage of the pastureland that is grazed. Most of the pastureland that remains has been converted over time with continuous grazing to tame grass pastures with the bulk of those acres occurring in riparian areas along rivers and streams. The watershed assessments also identified approximately 1,525 animal feeding operations located within the confines of the project area.

Significant residential development has taken place around the cities of Sioux Falls, and Brookings, and smaller communities in the region are experiencing similar growth. Total population in the project area is roughly 300,000. Recreation has experienced an increased interest among residents in and around the watershed. Canoeing, kayaking, fishing and swimming are the primary activities that continuously take place in the watershed.

Project Goals, Objectives, Tasks and Activities

Objective 1: Reduce bacteria (fecal, E.coli) and sediment loadings to the Big Sioux River and its tributaries through the renovation and improvement of existing high-priority animal feeding operations and limiting runoff to impaired water bodies.

Task 1: Livestock Nutrient Management. Assist livestock producers to install 13 Animal Waste Management Systems (AWMS) at critical locations within the project area to reduce bacterial and sediment loading.

Products: Feasibility studies completed on animal feeding operations along with engineering designs and plans for 13 AWMSs that were prepared by third-party engineering firms/Technical Service Providers (TSPs) and/or South Dakota NRCS engineers; 13 AWMS installed for existing high priority feedlots or feeding areas and 13 Nutrient management plans developed by TSPs or NRCS personnel.

Milestones:	**Planned**	**Completed**
Engineering Design	13	20
AWMS Installed	13	17
Nutrient Management Plans	13	15

Accomplishment: Twenty (20) designs have been engineered with 17 AWMS's constructed during segment 3. Producers interested in AWMSs were taken on several tours (Figure 5) to look at barns that were built with assistance from the project. It gave them the opportunity to discuss the pros and cons as well as different configurations of barns that were constructed during segment 2. This also allowed them to see the finished product and if it was something that would fit their operation. There were 2 hog facilities (Figures 6 – 12) constructed to replace outdated operations with outside lots and handling areas to address animal waste runoff concerns. The remaining 15 operations consisted of deep pit barns that replaced open lots lacking any waste storage along with full containment open lot conventional systems to help salvage portions of the existing operation that allowed for less extensive engineering and construction of containment structures. Nutrient Management Plans were completed for all systems but not indicated in the milestones because they were completed in segment 2 prior to the construction of some of the facilities. Figures 13 – 25 are before and after pictures of a few of the systems that were constructed in the watershed. The RCPP consultant and project coordinator had over 200 producer contacts on AWMSs during this reporting period. The RCPP National Review Team also toured the Big Sioux River Watershed Project (Figure 20) to see some of the work accomplished through the partnership during segment 3 of the project.

Figure 5: Barn Tour

Figures 6 – 8:
Hog Facility
Abandoned (Left)
Construction (Right)
Completed (Below)

Figures 9 & 10: Abandoned Confinement Structures With Runoff

Figures 11 & 12: New Facility Under Construction

Figure 13: 2,400 AU Hog Facility Completed 100% Containment

Figures 14 & 15: 999 AU Open Lot Operation Before and During Construction

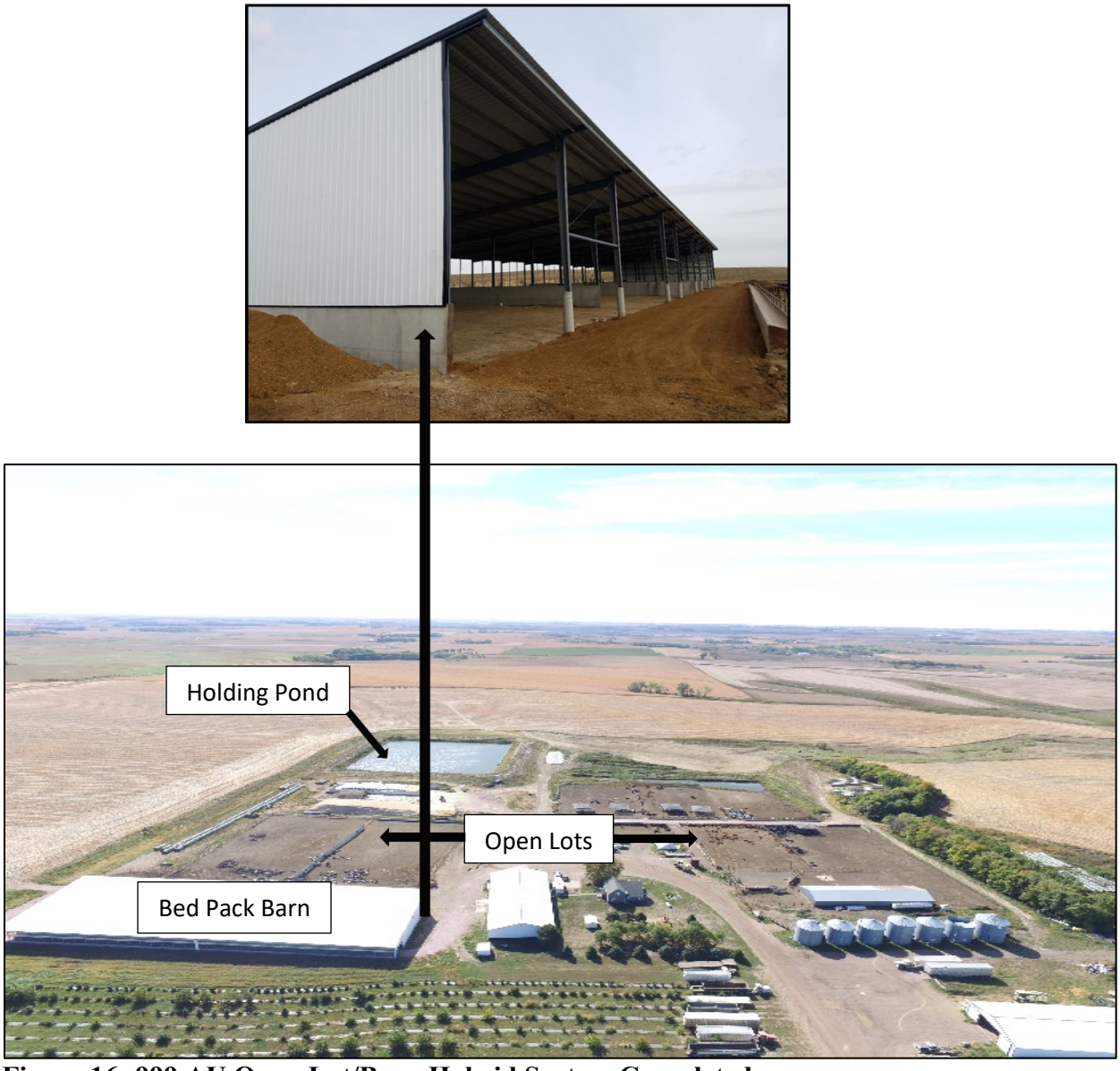


Figure 16: 999 AU Open Lot/Barn Hybrid System Completed

Figures 17 & 18: Abandoned 250 AU facility and construction of new facility

Figures 19 & 20: New 250 AU facility completed 100% containment

Figure 21: RCPP National Review Team Tour

Figure 22: Gabled Roof Barn

Figure 23: Deep Pit Configuration

Figure 24: Abandoned Open Lots With Surface Water Issues

Figure 25: Completed Hoop Structure With 100% Manure Containment

Task 2: <u>Riparian Area Protection</u>. Provide resources to livestock owners to limit or prevent livestock access to impaired water bodies and provide alternative water sources to replace use of streams and lakes as domestic drinking water for their livestock within the watershed.

Products: 43 acres of RAM, 1,700 acres of SRAM, 37.5 acres of Perpetual Easements, 10 Grazing Management Systems, 20 Water Developments, 8 Bank Stabilization Engineering Designs, 5,000 feet of Bank Stabilization Construction and 15 acres of Pollinator Habitat implemented on Pastureland in riparian areas adjacent to impaired lakes and streams within the watershed.

Milestones:	**Planned**	**Completed**
Riparian Area Management (RAM)	43 ac.	271 ac.
Seasonal Riparian Area Management (SRAM)	1,700 ac.	2,053 ac.
Perpetual Easements	37.5 ac.	0 ac.
Grazing Management Systems	10	28
Water developments (Pipelines, Wells, tanks)	20	23
Bank Stabilization Engineering Designs	8	3
Bank Stabilization Construction	5,000 ft.	0 ft.
Pollinator Habitat	15 ac.	0 ac.

Accomplishment:
Seasonal Riparian Area Management (SRAM) was a new program developed in segment 2 of the Central Big Sioux River Watershed Project. Enrollment of land immediately adjacent to Skunk Creek and within the 100 year flood plain was eligible for the program. Livestock producers enrolling pasture into the program were paid $60 per acre to defer grazing from April through September but be allowed to dormant graze from October through March as long as a minimum vegetative stand of 4 to 6 inches remained. Alternative water sources were required to minimize livestock impacts on the riparian area during the dormant grazing period. Haying was allowed from April through September for the acres enrolled to utilize the forage and maintain the vigor of the vegetative stand. Fencing, pipelines and tanks were eligible for cost share not to exceed 75 percent project incentives with 25 percent producer match. The program was piloted and evaluated on Skunk Creek for two years in segment 2 and has shown a considerable amount of success in reduction of E-coli. Due to the success and acceptance of the SRAM program, it was expanded to the impaired waterbodies within the watershed during this segment 3 with emphasis still on the Skunk Creek basin (Figure 26). It has been one of the most aggressive and accepted programs that has been implemented in the Big Sioux River Watershed. The RAM and SRAM programs were revisited during this segment 3 of the project to make some adjustments and needed changes to keep the programs current. The changes are documented in the revised project BMP section on page 45 of this report. Figures 27 – 55 are before and after pictures of photo points set up for a collection of sites enrolled into the RAM and SRAM programs to document changes that have taken place over the years.

The watershed coordinator and consultant hired through the RCPP program had over 400 producer contacts for grazing management and enrolling pastureland into the SRAM/RAM programs. During this segment, producers have enrolled 2,053 acres of pastureland into the SRAM program and 271 acres of pastureland into the RAM program. Most of the producers opted to just hay the SRAM acres and not carry out a fall grazing, but producers that wanted to

Segment 3 Totals

- 2,324 Acres
- 327,070 Feet
- 62 Miles

2020 Signup

- 384 acres SRAM
- 33 acres RAM
- 51,500 Feet
- 9.8 miles

Overall Program Totals

Program:	SRAM	RAM	CRP
Acres:	2,628	295	52
Str. LF:	333,422	79,840	9,780
Miles:	63	15	1.9

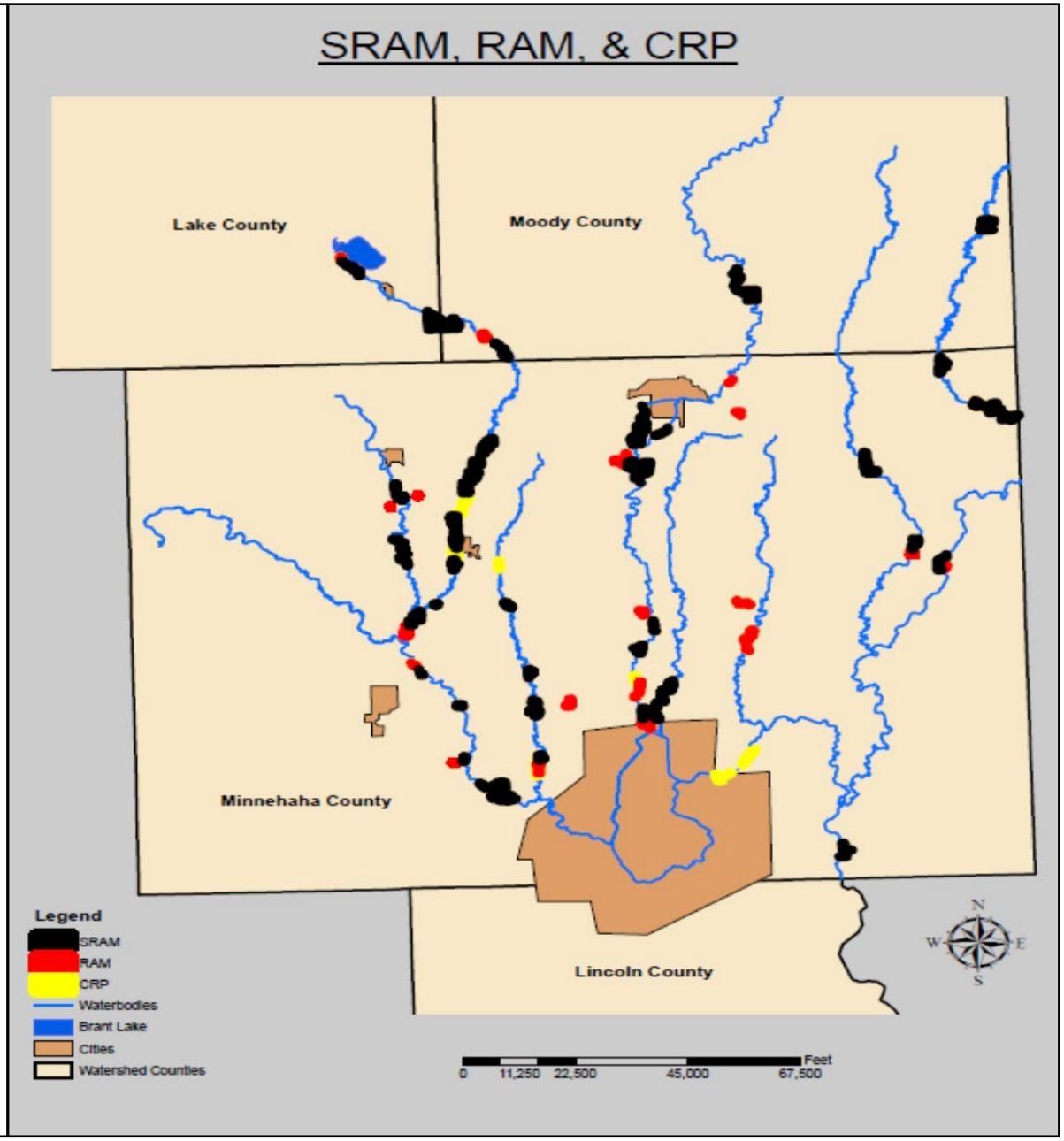
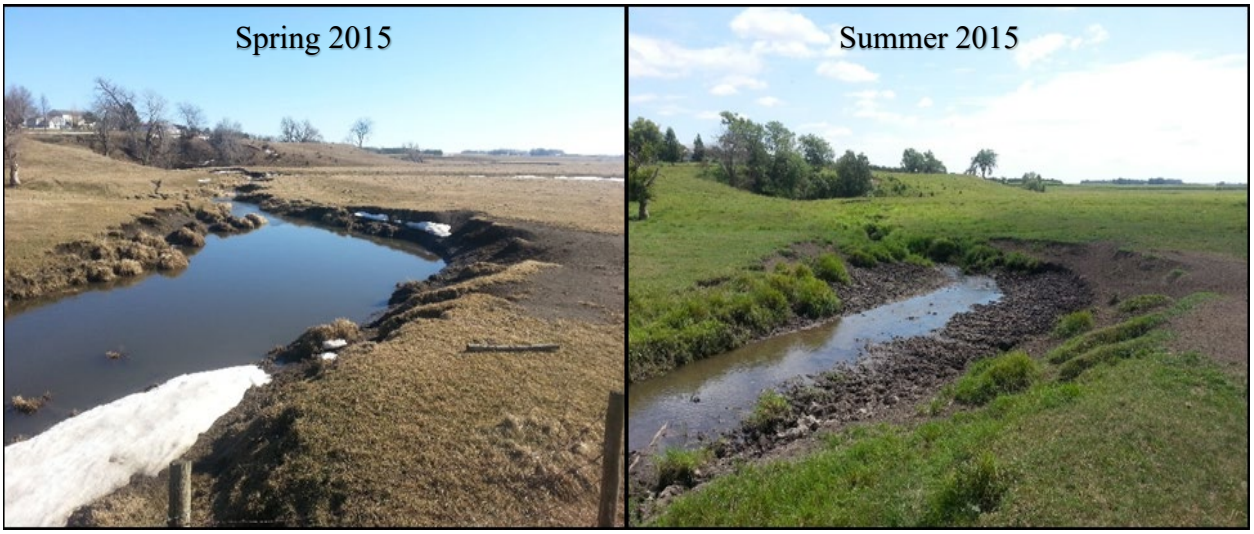


Figure 26: SRAM, RAM and CRP Implementation

conduct fall grazing were assisted with installing alternative water sources, rock crossings and fence. There has been 256,947 feet (48.7 miles) of stream deferred from grazing but allowed haying during summer months and managed grazing in the fall with SRAM and an additional 70,123 feet (13.3 miles) of stream excluded from livestock access but allowed 1 time haying with RAM. The linear feet of stream being protected (bacteria and TSS reductions) during this reporting period totaled 327,070 feet (62 miles). Figures 27 – 55 show the impact SRAM had on over-grazed riparian areas. With proper management, those sensitive riparian areas healed quickly, provided use and improved water quality. Figure 42 shows the magnitude of the flooding on Skunk Creek that persisted throughout the spring and summer months during the last two years of this reporting period.

The project team met with several producers to discuss grazing management systems. The discussions consisted of primarily installing alternative water sources for their operations along with some cross fencing and stream crossings. Grazing systems implemented during this segment consisted of 28 new systems installed on 3,715 acres of pasture. Producers have installed 23 alternative water sources and 12,801 feet of pipeline during this reporting period. There were 2 water and sediment control basins and 5 stream crossings completed during segment 3.

Several producers with stream banks susceptible to accelerated erosion were contacted about the bank stabilization project. Engineering was coordinated through the City of Sioux Falls on selected sites that were planned for future stabilization. The engineering plans were completed and submitted for approval from the US Army Corp or Engineers but were not granted permits to proceed with construction. However, there were still plans to have bank stability work done on one site of the Big Sioux River that sustained damage since the site had an active permit from the previous work done. However, Due to the record flooding, the work was further delayed and the permit expired so the site was not completed. There were no easements or rip rap stabilization completed during this reporting period. The pollinator habitat was planned to be used as an enhancement to the buffers and filter strips, but due to seed cost, program standards and maintenance of the stand, no acres were implemented.



Figures 27 & 28: Before SRAM Site #22 Willow Creek

Figures 29 & 30: After SRAM Site #22 Willow Creek

Figure 31: Before SRAM Site #11 Skunk Creek 2017

Figure 32: After SRAM Site #11 Skunk Creek 2018

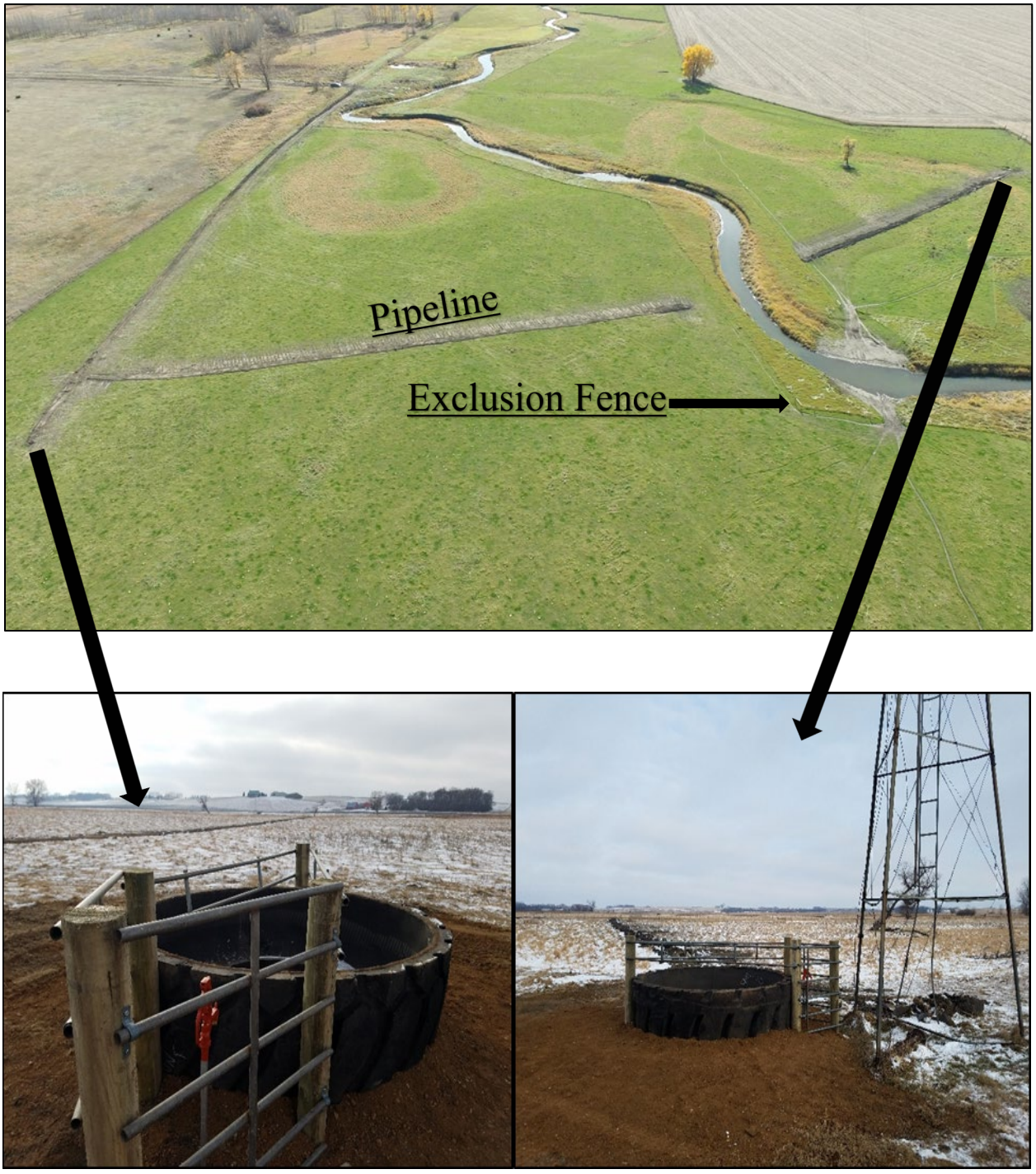


Figure 33: SRAM With Alternative Water Source Installed

Figure 34: Before SRAM Site #33 Colton Creek 2017

Figure 35: After SRAM Site #33 Colton Creek 2018

Figure 36: Before SRAM Site #44 Colton Creek 2018

Figure 37: After SRAM Site #44 Colton Creek 2019

Figure 38: After SRAM Site #44 Colton Creek 2020

Figure 39: Before SRAM Site #55 Colton Creek 2018

Figure 40: After SRAM Site #55 Colton Creek 2019

Figure 41: Before SRAM Site #1 Skunk Creek 2013

Figure 42: After SRAM Site #1 Skunk Creek 2018

Figure 43: After SRAM Site #1 Skunk Creek Record Flooding 2019

Figure 44: After SRAM Site #1 Skunk Creek June 2020

Figure 45: After SRAM Site #1 Skunk Creek August 2020

Figure 46: Before SRAM Site #7 Skunk Creek 2014

Figure 47: After SRAM Site #7 Skunk Creek 2018

Figure 48: Before SRAM Site #7 Skunk Creek 2014

Figure 49: After SRAM Site #7 Skunk Creek 2018

Figure 50: Before SRAM Site #66 Skunk Creek 2019

Figure 51: After SRAM Site #66 Skunk Creek 2020

Figure 52: Before SRAM Site #6 Skunk Creek 2014

Figure 53: After SRAM Site #6 Skunk Creek 2018

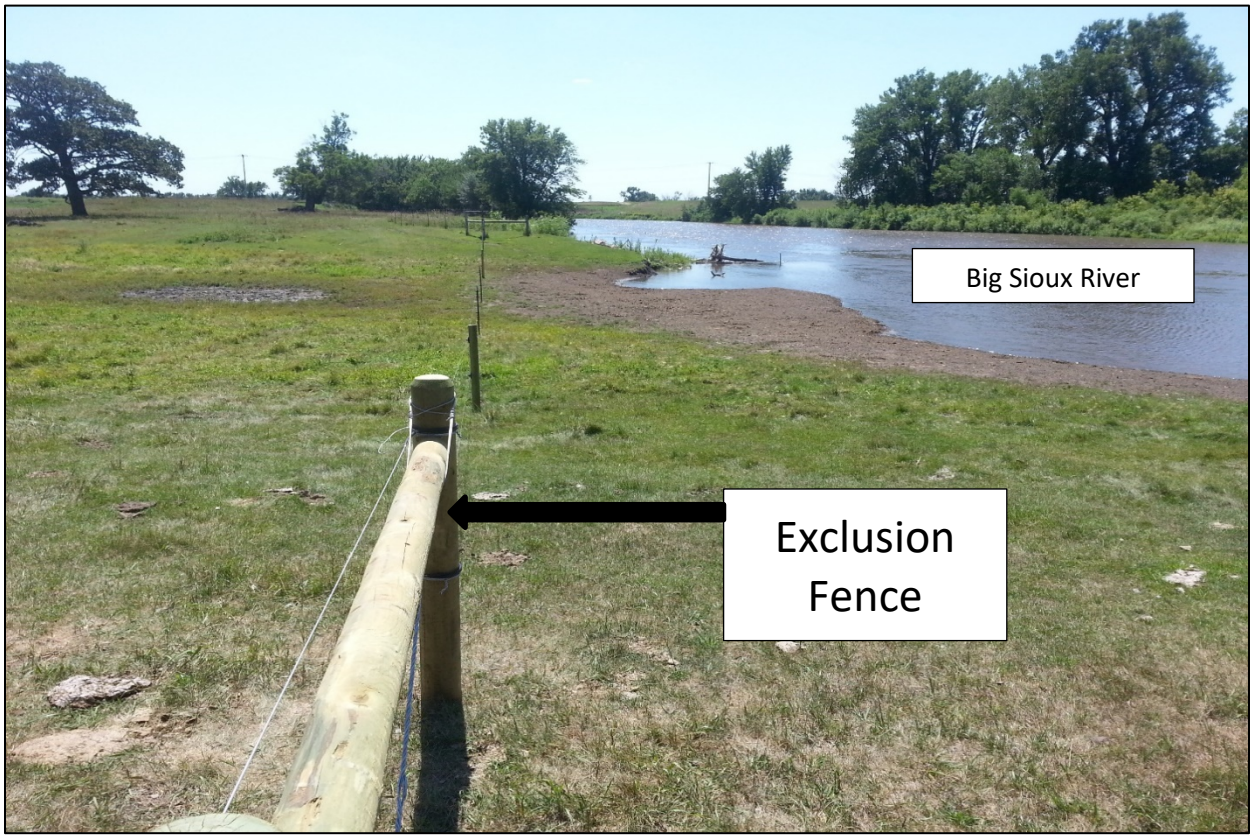


Figure 54: Before RAM Site #61 Big Sioux River 2016

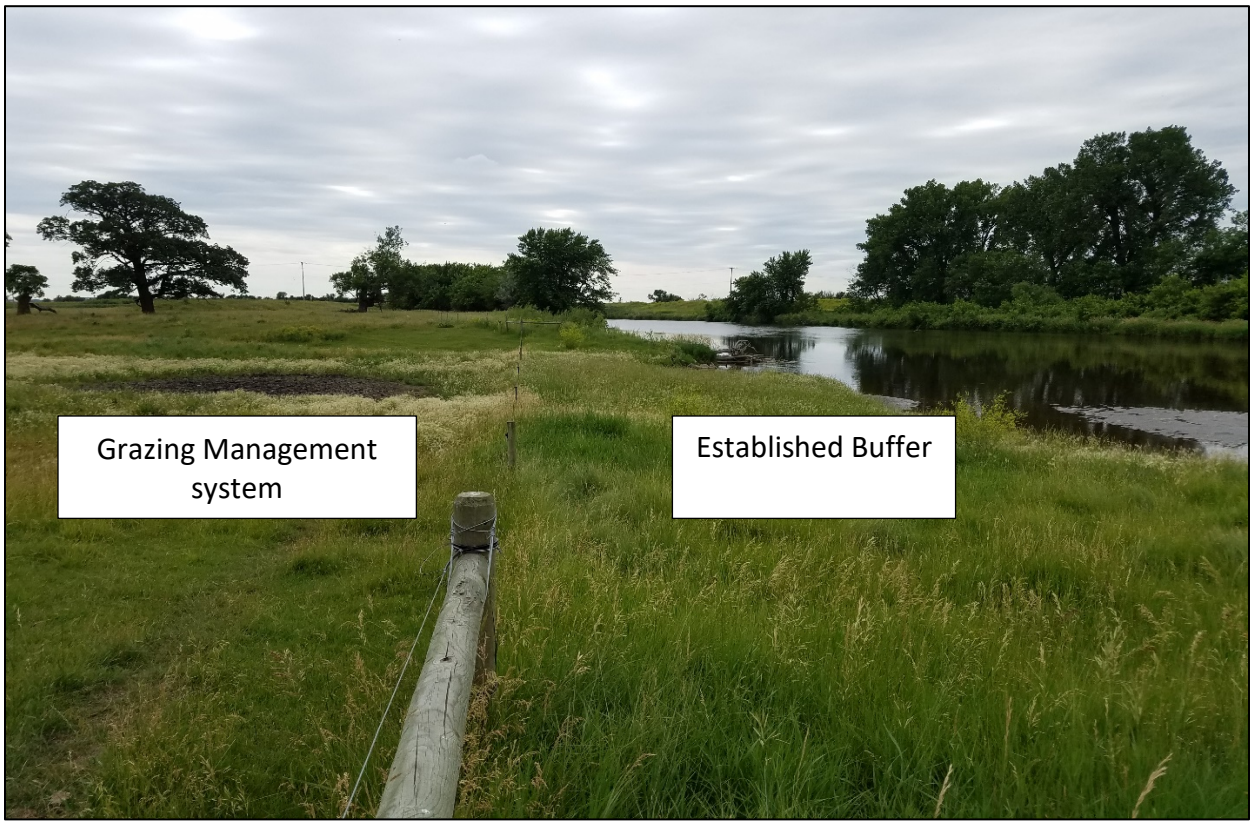


Figure 55: After RAM Site #61 Big Sioux River 2018

Task 3: <u>Cropland BMPs.</u> Provide assistance for producers with Cropland to protect priority areas of the Big Sioux River and its tributaries.

Products: 10,000 feet of terrace restoration, 108,775 feet of terraces, 10,000 feet of grassed waterways, 20 acres of filter strips, 300 acres of cover crop and 5 acres of pollinator habitat on cropland. BMPs installed were funded by the 319 watershed funding, landowner/operator local match and the USDA/NRCS conservation programs (EQIP and RCPP).

Milestones:	**Planned**	**Completed**
Terrace Restoration	10,000 ft.	0 ft.
Terraces	108,775 ft.	69,060 ft.
Grassed Waterways	10,000 ft.	3,635 ft.
Filter Strips	20 ac.	70 ac.
Cover Crops	300 ac.	2,914 ac.
Pollinator Habitat	5 ac.	0 ac.

Accomplishment: The terrace restoration program that was initiated in the Lower Big Sioux River Watershed Project Segment 2 to restore capacity and functionality of terraces that had exceeded their lifespan or had filled in over the years reducing sediment delivery was continued in this segment 3. There were 0 feet of terraces restored through the restoration program in this segment. Most of the terrace work that producers indicated a need for was new construction since the existing structures were so badly degraded due to extreme wet weather experienced during segment 3. This along with unchanged project reimbursement rates for the terrace restoration program made it undesirable, so an effort was made to include the Terrace 600 practice into the list of approved practices for the RCPP funding in the segment 3 Project Implementation Proposal. There was a shortfall in the EQIP program for terraces because they were not a priority as a stand-alone practice in the NRCS ranking and screening. Also, funding for EQIP in the lower portion of the watershed was limited and several planned terrace systems did not reach the threshold in order to be funded. The terrace practice was amended in the PIP and included as a priority practice for the RCPP in year 3 of this segment of the implementation project. Technical assistance was provided by the project coordinator, RCPP consultant and NRCS staff to determine eligibility of terrace projects. Several producers had either put in new terraces or rebuilt older terraces to fit larger farming equipment. Most of the terrace work had taken place in Lincoln and Union Counties primarily because of the Loess soils and more rugged landform. During this segment, 69,060 linear feet of terraces were completed with use of the RCPP program funding (Figure 56 & 57). The project will continue with the restoration program to reduce TSS transport to surface waters by helping with smaller projects that may not rank high enough for EQIP yet still need repairs to keep them from failing. Reimbursement guidelines have been updated for the relaunch of the terrace restoration program in segment 4 of this project. A total of 3,635 feet of grassed waterways were installed during segment 3, short of the 10,000 feet goal. Field tile installation has been increasing in the watershed and replaced many of the existing grass waterways and has also taken the place of many applications of the practice. Seventy acres of filter strip buffers were installed on cropland immediately adjacent to waterbodies throughout the watershed that primarily consisted of 319 funding used for RAM. Several producers were assisted with planning through the project by the Farm Service Agency (FSA) and NRCS to enroll the acres into CRP and RAM at the beginning of segment 3. RAM buffers became the practice of choice during the last 3 years of this segment because of changes to the CRP program and reduced acres offered by FSA.

Producers signed applications for several acres of cropland to be planted to cover crops. Overall, RCPP funds had been obligated for 4,179.8 acres of cover crops. Due to record flooding throughout the watershed during this reporting period, cover crop acres that were obligated have not been able to be planted due to the wet conditions. Some producers were fortunate enough to get their cover crops planted. There have been 2,914 acres of cover crops (Figure 58 & 59) and 0 acres of pollinator habitat planted during this reporting period. As wet conditions subside and weather cooperates, these BMPs should be completed in the next reporting period. The RCPP consultant had 132 producer contacts on the various cropland BMPs.

Figures 56 & 57: Terrace Construction

Figures 58 & 59: Cover Crops

Task 4: <u>Urban BMPs.</u> Engineering design and construction of urban riparian vegetated water quality treatment structures.

Products: Design and construction of rain gardens, vegetated swales and various riparian improvements by the City of Sioux Falls.

Milestones:	**Planned**	**Completed**
Rain Gardens/Vegetated Swales	2	0
Riparian Improvements	1	0

Accomplishment: No SRF-NPS funding was used for design or construction of rain gardens, vegetated swales or riparian improvements. Due to extensive flooding in 2018 and 2019, plans were pushed back for urban improvements. The City of Sioux Falls has resumed talks for a few of the projects again with plans to implement them in segment 4.

Objective 2: Information & Education/Public Outreach. Increase public awareness of water quality issues in general (project activities and results in particular) throughout the Big Sioux River watershed. Promote sound BMPs that best address priority impairments.

Task 5: <u>Public Information and Outreach.</u> Conduct informational meetings and provide mailings and new releases to the public for information on the project. Demonstrate the value of strategically placed watering systems for improved soil and water quality, riparian and bank protection, and cattle gains.

Products: Conduct quarterly steering committee meetings, attend project sponsor and partner conservation district meetings and give presentations at the annual Big Sioux River Summit and other water quality venues to inform stakeholders and water quality professionals about watershed project progress and accomplishments. Update web site and links for the watershed project in cooperation with Conservation Districts, East Dakota Water Development District and City of Sioux Falls to provide information to the general public on activities are occurring in the watershed.

Milestones:	**Planned**	**Completed**
Public Meetings, News Articles, Mail	95	153
Web Site and Maintenance	5	5

Accomplishment: During segment 3 there were several articles and interviews completed (See Appendix B). Five Big Sioux River Summits; one International Legislative Forum Tour; three EPA tours; several producer tours/educational events; twenty steering committee meetings and sixty watershed project sponsor board meetings to inform federal, state, county and local agencies, city administrators, partners, agencies, elected officials and the general public on what is being done in both the rural and urban areas to help improve the water quality of the Big Sioux River. The International Legislative Forum was held in Sioux Falls during this reporting period. Legislators from North Dakota, Minnesota, South Dakota and Manitoba Canada gathered to discuss current issues in and around the City of Sioux Falls. The Big Sioux River Watershed Project was highlighted as one of Sioux Falls priority tasks for water quality and how it affects future planning of water resources (Figures 63, 65 and 69). Three tours were held in the

watershed with representatives from Region 8 EPA to highlight some of the work that has been completed in the watershed along with the partnerships that have been developed (Figures 67 & 68). The project coordinator also gave a presentation on innovations of the Big Sioux River Watershed Project at the 2020 EPA Region 5, 7 and 8 Harmful Algal Blooms Conference in Kansas City. Field training tours and workshops were held with NRCS and partners to showcase watershed project success and partnerships involved (Figures 64 - 66). The watershed coordinator gave presentations at the 5 Annual Big Sioux River Summits, 3 in Sioux Falls, one in Brookings and one in Watertown to inform the public on current projects related to improving the water quality of the Big Sioux River Watershed (Figures 60 – 62). Several speakers were on the agenda to discuss other projects related to water quality in and around the region as well. The city has continued with an information campaign on the radio to educate residents on lawn fertilizer and other chemicals that find their way into the storm drains and impact the water quality of the Big Sioux River. Sioux Falls has also sponsored a series of radio announcements to inform the public of the importance of keeping pollutants from making their way to the storm drains that lead to the Big Sioux River. The 20 steering committee meetings held during the reporting period were used to inform committee members and the public of what progress the watershed project has been making. The 60 project sponsor board meetings were held to keep the Moody Conservation District (MCD) and Minnehaha Conservation District (MCD) updated on projects occurring within the watershed.

Figure 60: 2015 Annual Big Sioux River Summit Brookings, Brookings, SD

Figure 61: 2016 Annual Big Sioux River Summit, Sioux Falls, SD

Figure 62: 2017 Annual Big Sioux River Summit, Watertown, SD

Figure 63: Mayor's Unveiling of City Parks Buffer Program

Figure 64: NRCS Orientation for New Employees Training Tour

Figure 65: Sioux Falls Park's Buffer Initiative

Figure 66: NRCS National New Employee Orientation

Figure 67: EPA Region 8 SDDENR/NRCS Watershed Tour

Figure 68: EPA Region 8 Tour 2

Figure 69: City of Sioux Falls Watershed Tour

Objective 3: Water Quality Monitoring and Evaluation to assess project impacts on water quality in the watershed.

Task 6: <u>Water Quality Monitoring</u> at the 33 river and tributary locations.

Products: 1,250 water quality samples and analysis for TSS, bacteria (fecal and E. coli), and other parameters from 33 sites in the project area along with 250 QA/QC samples.

Milestones:	**Planned**	**Completed**
Water Samples/Testing by EDWDD	1,250	2,660
QA/QC samples	250	266

Accomplishment: EDWDD and SDDENR have completed all sampling in the watershed during this project. Throughout this segment, 2,660 total samples were collected by EDWDD with 1,463 of the samples collected along the northern portion of the Big Sioux River; 239 samples on the lower portion of the Big Sioux River; 293 samples along various tributaries and the remaining 665 samples taken within the NWQI area. The SDDENR also collected over 1,000 samples for the Water Quality Monitoring (WQM) network in the watershed. The main pollutants sampled, but not limited to, were Bacteria, TSS, Nitrate and Phosphorus. Sampling

results for impaired streams in this watershed can be found in Appendix A of this report. A list of sites and locations in the watershed where samples were taken is shown in Table 6. EDWDD has continued to sample river sites that were originally set up during the assessment project in 1999. Seven sites within the NWQI area were monitored to target those watersheds more intensely. The Before-After Control Impact Designs (BACI) protocol methodology was used as the monitoring strategy in order to document statistically significant changes in the water quality in the NWQI HUC 12 watersheds due to BMP implementation. EDWDD also continued their sampling in segment 3 that they started in segment 2 along a four mile stretch of Skunk Creek to count the number of fish as well as the number of different species within the stream (Table 5) based on their location in proximity to pastures that had been grazed versus pastures that were enrolled into SRAM. Fish Habitat analysis and sampling was conducted at 3 of the 4 Skunk Creek monitoring sites within the NWQI area over a 3 year period (Figures 70 – 73). Results of species and numbers found at the sites indicated a more diverse population along pastures that were enrolled into the SRAM program versus pastures with no management.

Figures 70 & 71: Fish Sampling and Habitat Study

Figures 72 & 73: Fish Sampling and Habitat Study

Table 5: Fish Sampling 2014 – 2016

SK1:	**2014**	**2015**	**2016**
# of Species:	10	10	9
Total # Captured:	3,150	2,178	899
SK3:	**2014**	**2015**	**2016**
# of Species:	13	12	16
Total # Captured:	1,738	2,326	1,286
SK4:	**2014**	**2015**	**2016**
# of Species:	11	12	12
Total # Captured:	1,650	1,401	327

Table 6:	**Site**	**Location**
	R19	Big Sioux River (BSR) @ Estelline
	R20	BSR @ Bruce
	R1	BSR @ 8th Street South
	R2	BSR @ 216th St. Brookings
	R3	BSR 471st Ave. Brookings
	R4	BSR @ below Brookings USGS gage
	R5	BSR @ Flandreau
	R6	BSR @ Egan
	R7	BSR @ Trent
	R8	BSR @ below Dell Rapids
	R9	BSR @ I-90 Sioux Falls (SF)
	R10	BSR @ Western Avenue (SF)
	64	BSR @ East Falls Park Drive (SF)
	R11	BSR @ North Bahnson (SF)
	117	BSR @ North Timberline Rd. (SF)
	R12	BSR @ Brandon
	R13	BSR @ SD Highway 42
	65	BSR @ US Hwy 18 Canton
	66	BSR @ 488th Ave. Hudson
	67	BSR @ 302nd St. Hawarden
	32	BSR @ SD Hwy 50 Richland
	LBSRM21A	BSR @ North Sioux City
	T18	Skunk Creek @ Chester
	T18.5	Skunk Creek @ Grand Meadow St. Lyons
	T19	Colton Creek @ Grand Meadow St. Lyons
	T20	West Branch Skunk Creek @ Van Denmark Ave. Hartford
	T21	Skunk Creek @ 467th Ave. Ellis
	T22	Willow Creek @ 262nd St. Sioux Falls
	T23	Skunk Creek @ Marion Rd. Sioux Falls
	SK1	Skunk Creek @ 247th St. Colton
	SK2	Skunk Creek @ 248th St. Colton
	SK3	Skunk Creek @ 249th St. Colton
	SK4	Skunk Creek @ 250th St. Colton

Task 7: GRTS and Final Report. Prepare and submit semi-annual and annual reports to fulfill GRTS reporting requirements and a final project report summarizing the results of the project and the impact of the BMPs on the water quality within the project area.

Products: Annual GRTS reports and Project (Segment 3) Final Report.

Milestones:	**Planned**	**Completed**
Annual GRTS reports	5	5
Segment 3 Final Report	1	1

Accomplishment: All required reports have been completed for segment 3 of the project.

Summary of Project Goals and Objectives

Table 7: Planned Versus Completed Project Milestones.

Objectives/Tasks/Products	Milestones	
	Planned	**Completed**
Objective 1: BMP Installation		
Task 1: Livestock Nutrient Management		
Engineering Designs	13	20
Nutrient Management Plans	13	15
System Installation	13	17
Task 2: Riparian Area Protection		
RAM ac.	43	271
SRAM ac.	1,700	2,053
Perpetual Easements ac.	37.5	0
Grazing Mgt. System (systems)	10	28
Water Developments (pipelines, fences, wells, pumps)	20	23
Bank Stabilization Engineering Designs	8	3
Bank Stabilization & Rehabilitation ft.	5,000	0
Pollinator Habitat ac.	15	0
Task 3: Cropland BMPs		
Terrace Restoration ft.	10,000	0
Terraces ft.	108,775	69,060
Grassed Waterways ft.	10,000	3,635
Filter Strips ac.	20	70
Cover Crops ac.	300	2,914
Pollinator Habitat ac.	5	0
Task 4: Urban BMPs		
Rain Gardens/Vegetated Swales	2	0
Riparian Improvements	1	0
Objective 2: Information & Education		
Task 5: Public Outreach		
Public/Informational Meetings, News Articles, Mailings	92	153
Website and maintenance (annually)	5	5
Objective 3: Monitoring & Evaluation		
Task 6: Water Quality Monitoring		
Water Quality Monitoring Samples	1,250	2,660
QA/QC Samples	250	266
Task 7: GRTS & Final Reports		
Annual GRTS Reports	5	5
Final Report	1	1

BMPs Revised

The Seasonal Riparian Area Management (SRAM) was a new program developed in 2012 by the Big Sioux River Watershed Coordinator, DENR, City of Sioux Falls and EDWDD. The program was finalized and piloted in 2013 on the main stem of Skunk Creek. Enrollment of land immediately adjacent to Skunk Creek and within the 100 year flood plain was eligible for the program. Livestock producers enrolling pasture into the program were paid $60 per acre to defer grazing from April through September but would be allowed to dormant graze from October through March as long as a minimum vegetative stand of 4 to 6 inches remained. An alternative water source was required if the grazing was to take place during the dormant grazing period to minimize impacts on the riparian area. Haying was allowed from June through September for the acres enrolled to utilize the forage and maintain the vigor of the vegetative stand. Fencing, pipelines, and tanks were eligible for cost share not to exceed 75 percent project incentives with 25 percent producer match. The program was piloted and evaluated on Skunk Creek for two years during this segment and has shown a considerable amount of success in reduction of E-coli. Due to the success and acceptance of the SRAM program, it was continued and expanded to the rest of the project watershed with emphasis still on the major tributaries in the Skunk Creek basin. It has been one of the most aggressive and accepted programs that has been implemented in the Big Sioux River Watershed to date.

With the expansion and growth RAM and SRAM along with the increases in cropland and pastureland rental rates, the programs experienced some growing pains. A new set of criteria was developed to keep the programs current and attractive. Incentive rates were revisited and amended in the PIP to reflect the changes. Livestock producers enrolling pasture into the program were paid a base rate of $70 per acre based on average CRP rates for marginal pastureland. A tiered payment system, based on proximity to the confluence of Skunk Creek and Big Sioux River, was used to incentivize landowners with pastures closer to the City of Sioux Falls. Producers upstream of the City and within 10 miles of the confluence were paid $90 per acre. Producers upstream and between 10 and 20 miles of the confluence were paid $85 per acre. Producers upstream and between 20 and 30 miles of the confluence received $80 per acre. All other producers outside of 30 miles received the $70 per acre base rate. Eligible pastureland along impaired rivers and streams that flowed into the Big Sioux River downstream of the City of Sioux Falls were also paid the $70 per acre base rate for enrollment into the SRAM program.

The major requirements for eligibility of the SRAM program were as follows:

1. No grazing from April 1st through September 30th to reduce E. coli and TSS levels during the recreational period to help support the listed beneficial uses associated with the waterbodies of concern.
2. Fall grazing was allowed October 1st through March 30th. A minimum vegetative stand of 4 to 6 inches with an alternative clean water supply was required to minimize impacts on the riparian area.
3. Haying was allowed from July 1st through September 30th for the acres enrolled to utilize the forage and maintain the vigor of the vegetative stand.
4. Pipelines and tanks were the financial and technical responsibility of the producer in order to meet eligible requirements for the SRAM program.
5. Grass establishment, tree planting and fabric installation were eligible for cost share not to exceed $10,000 per pasture tract.

Supplemental Information & Evaluation

Locations were gathered for all BMPs installed in the project area through the DENR Tracker system. These locations were also uploaded to the EPA GRTS website with load reductions for each point. Segment 3 BMPs implemented are shown in Figure 74 and all BMPs installed throughout all of the Big Sioux River Project segments are shown in Figure 75. Along with the type of BMP that was installed, these maps show that several BMPs were installed in close proximity to waterbodies throughout the watershed. With the frequency and location of the BMPs, the project was able to improve water quality by having a direct effect on in-stream loading of E-coli and TSS within the project area.

STEPL was used to evaluate the reduction of TSS and other nutrients from implementation of BMPs throughout the project area. Load reductions realized by lake/stream segment can be found in Table 8.

Table 8: Big Sioux Implementation Load Reductions by River Segment.

Streem Reach or Lake Affected	Sediment (Tons)	N (Pounds)	P (Pounds)
SD-BS-R-BEAVER_01	70	8246	1886
SD-BS-R-BEAVER_02	106	549	143
SD-BS-R-BIG_SIOUX_04	64	10578	2062
SD-BS-R-BIG_SIOUX_07	15	2455	503
SD-BS-R-BIG_SIOUX_08	1108	10073	2823
SD-BS-R-BIG_SIOUX_10	0	0	0
SD-BS-R-BIG_SIOUX_12	71	1010	262
SD-BS-R-BIG_SIOUX_13	197	783	268
SD-BS-R-BIG_SIOUX_14	59	273	81
SD-BS-R-BIG_SIOUX_15	410	1544	544
SD-BS-R-BIG_SIOUX_17	476	1788	618
SD-BS-R-BRULE_01	189	864	259
SD-BS-R-EAST_BRULE_01	512	9873	2454
SD-BS-R-JACK_MOORE_01	13	115	21
SD-BS-R-NORTH_DEER_01	2	2103	388
SD-BS-R-PEG_MUNKY_RUN_01	0	0	0
SD-BS-R-PIPESTONE_01	156	1597	323
SD-BS-R-SIXMILE_01	21	6693	1525
SD-BS-R-SKUNK_01	1295	42530	10197
SD-BS-R-SPLIT_ROCK_01_USGS	163	2504	591
SD-MI-R-LEWIS_AND_CLARK_01	10	36	13
SD-VM-R-LONG_01	56	250	81
Total	**4,993**	**103,864**	**25,042**

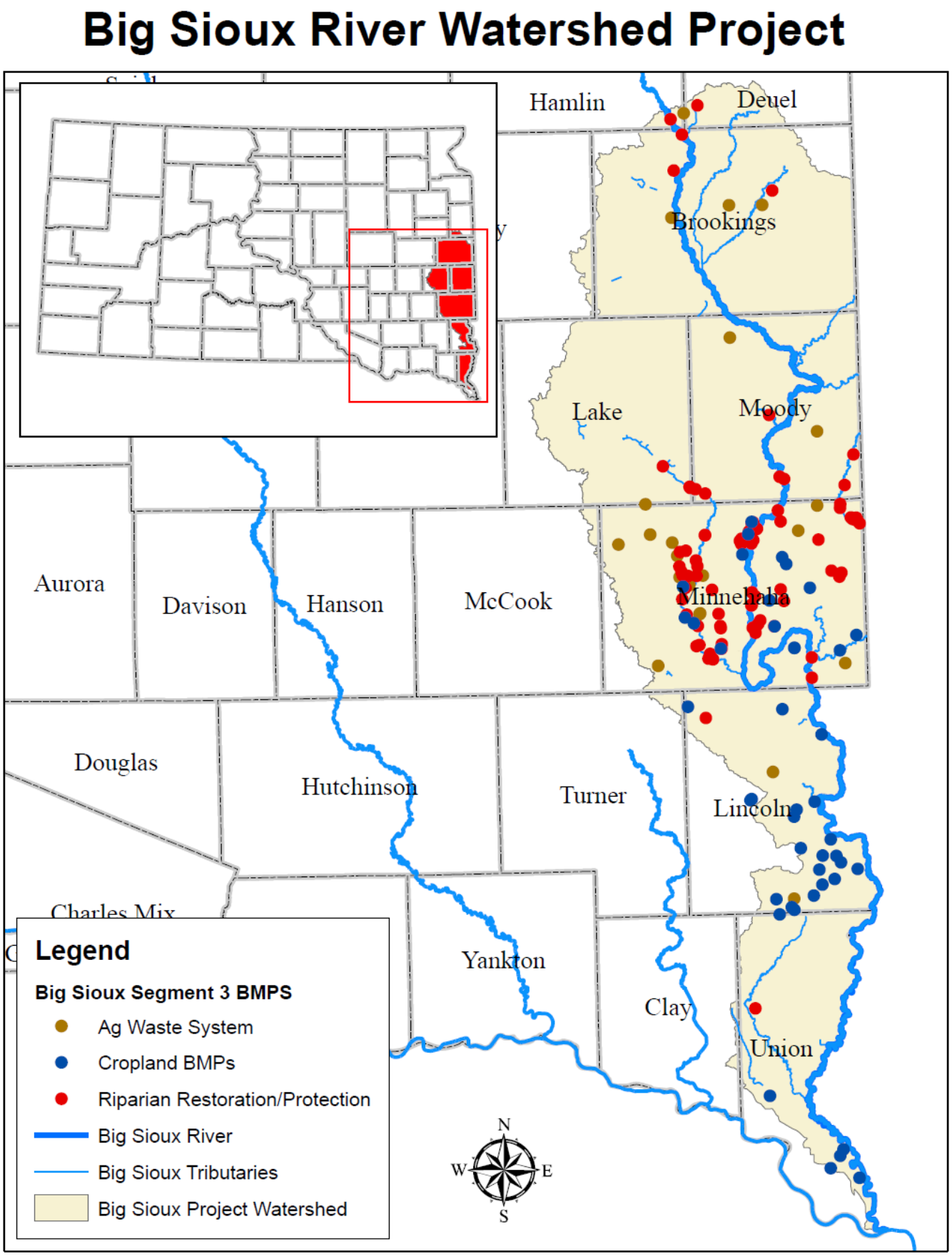


Figure 74: Big Sioux River Implementation Project Segment 3 BMP locations

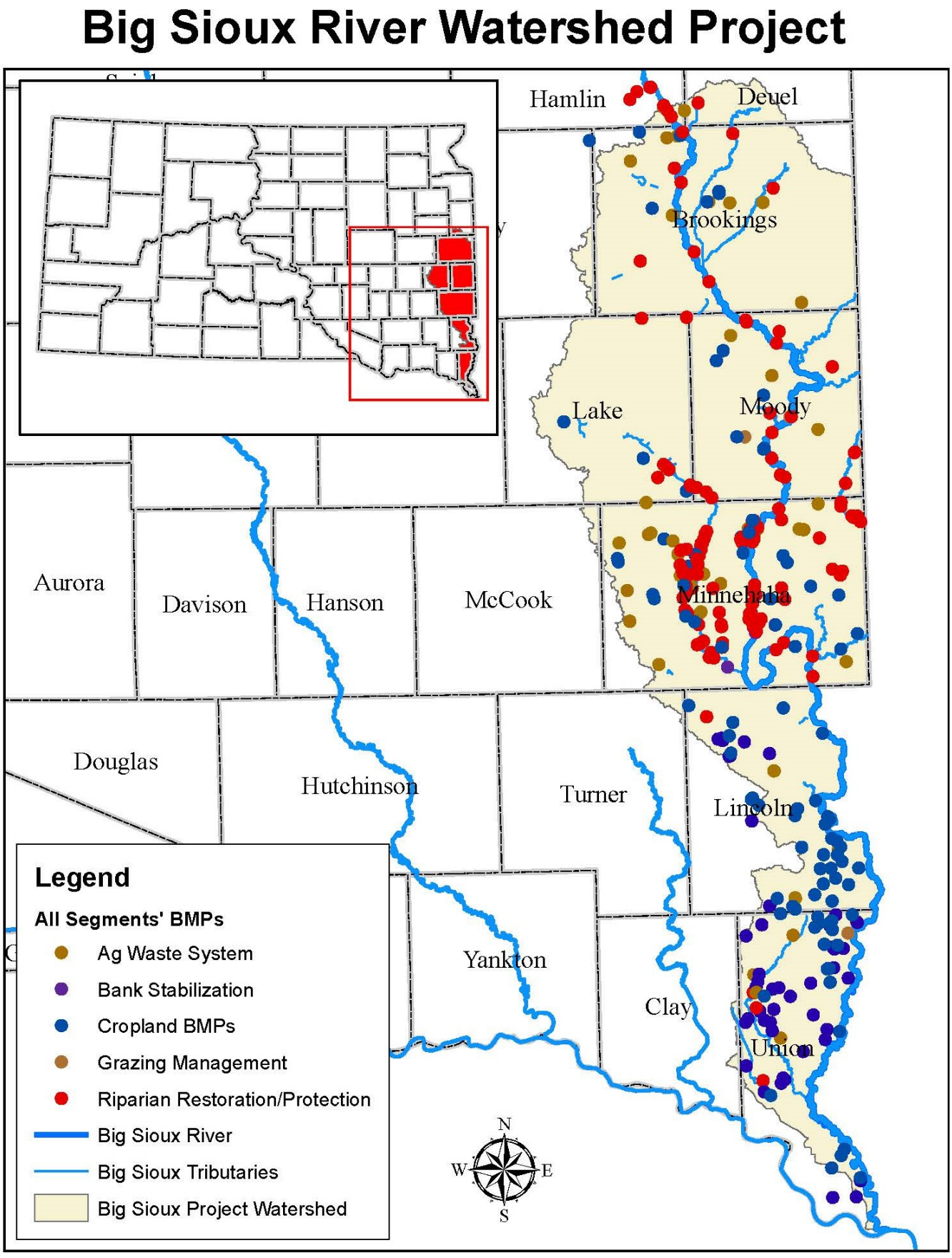


Figure 75: Big Sioux River Implementation Project All Segments BMP locations

Load reductions from past projects and the current project are broken out by BMP type and listed In Table 9. The total number of projects that were implemented to make up the load reductions are also listed in this table. The previous projects are made up of the Central Big Sioux River Implementation Project Segments 1 & 2; Central Big Sioux River Interim Project and Lower Big Sioux River Implementation Project Segments 1 & 2.

Table 9: Load Reductions by BMP.

Best Management Practices	# of Projects	Sediment (tons)			Nitrogen (pounds)			Phosphorus (pounds)		
		Previous	Current	Total	Previous	Current	Total	Previous	Current	Total
Ag Waste System	32	298	157	455	169,021	66,437	235,458	35,729	14,510	50,239
Cropland BMPs	124	17,229	2,389	19,618	65,769	9,850	75,619	23,724	3,213	26,937
Riparian Restoration/Protection	200	24,239	2,447	26,686	76,948	27,577	104,525	25,226	7,319	32,545
Totals	356	41,766	4,993	46,759	311,738	103,864	415,602	84,679	25,042	109,721

Monitoring Results

Stream water quality monitoring for the Big Sioux River main stem and tributaries was completed by SDDENR and EDWDD. They will continue the monitoring of the Big Sioux River and tributaries to document changes in water quality for the project and future segments. The results will be compared with past sampling data to determine trends and what effect BMPs are having on the water quality. See (Appendix A) for sampling results of selected stream segments.

Additional Monitoring

Monitoring was also conducted and completed along a four-mile segment of Skunk Creek 2014-2018 (Figure 4). Four sites were used to determine the effect of SRAM on the water quality of Skunk Creek. The first upstream site (NWQI_SK1) was located in an area of the watershed where no acres upstream were enrolled in the SRAM practice originally. The three remaining downstream sites (SK2-SK4) all had significant areas of the riparian corridor enrolled in SRAM program. Additional SRAM sites were enrolled upstream and downstream of the control during segment 3, but the integrity of the monitoring protocols remained unchanged.

Although the focus of the monitoring was to determine the impact of SRAM on the Section 303(d) listing pollutants, i.e., *E. coli* bacteria and TSS, other indicators were measured. This included habitat and in-stream channel measurements, macroinvertebrate and fish populations (Index of Biotic Integrity or IBI), and other water chemistry parameters. Over the course of five years 489 TSS and 1,088 *E. coli* samples were collected. A statistical analysis on these multiple lines of evidence was used to determine if the effect of SRAM on the sources of nonpoint pollution was significant ($p<0.05$).

Conclusions

- Significant reductions in *E. coli* concentrations were observed between the control and treatment sites ($p<0.05$) (Figure 76).
- No reductions were shown for nutrient and sediment parameters (Figure 77).
- A slight improvement was exhibited in IBI scores in the presence of SRAM (Figure 78).

Questions Remaining

- Will a long- term change be exhibited by the biological community?
- Is some of the bacteria stored in the bed sediment and re-released during storm events?

Results from the additional monitoring sites (Figure 76) have shown that the SRAM program has a definite impact on the direct loading of E-coli concentrations as Skunk Creek flows downstream from heavily pastured riparian areas (SK1) through pastures that have been enrolled into the SRAM program (SK2 – SK4). Results show a trending decline in the E-coli concentrations based on direct stream loading during normal to low flow levels with outliers and extremes thrown out due to the unwanted influence of overland runoff during high precipitation events. Since there is an elevated loading during high flow periods, emphasis should still remain on containment of manure for animal feeding operations near drainages and mitigation of potential runoff from fields receiving manure from these facilities through nutrient management plans. The comparison of TSS (Figure 77) at the same locations over the same 5 year period, but inclusive of the outliers and extremes resultant of high and extremely high flows, does not show any trending decline or correlation of SRAM to TSS. Since TSS is hypothetically not a by-product of livestock as is E-coli, regardless of the management or exclusion of livestock TSS may still be present in elevated numbers over a longer period of time due to the natural process of erosion. Overall stream health based on implementation of the SRAM program was documented as improving based in the IBI scores (Figure 78). Continuation of the SRAM program can have immediate positive impacts needed to improve water quality throughout the Big Sioux River Watershed. Future implementation should remain a focus of the program.

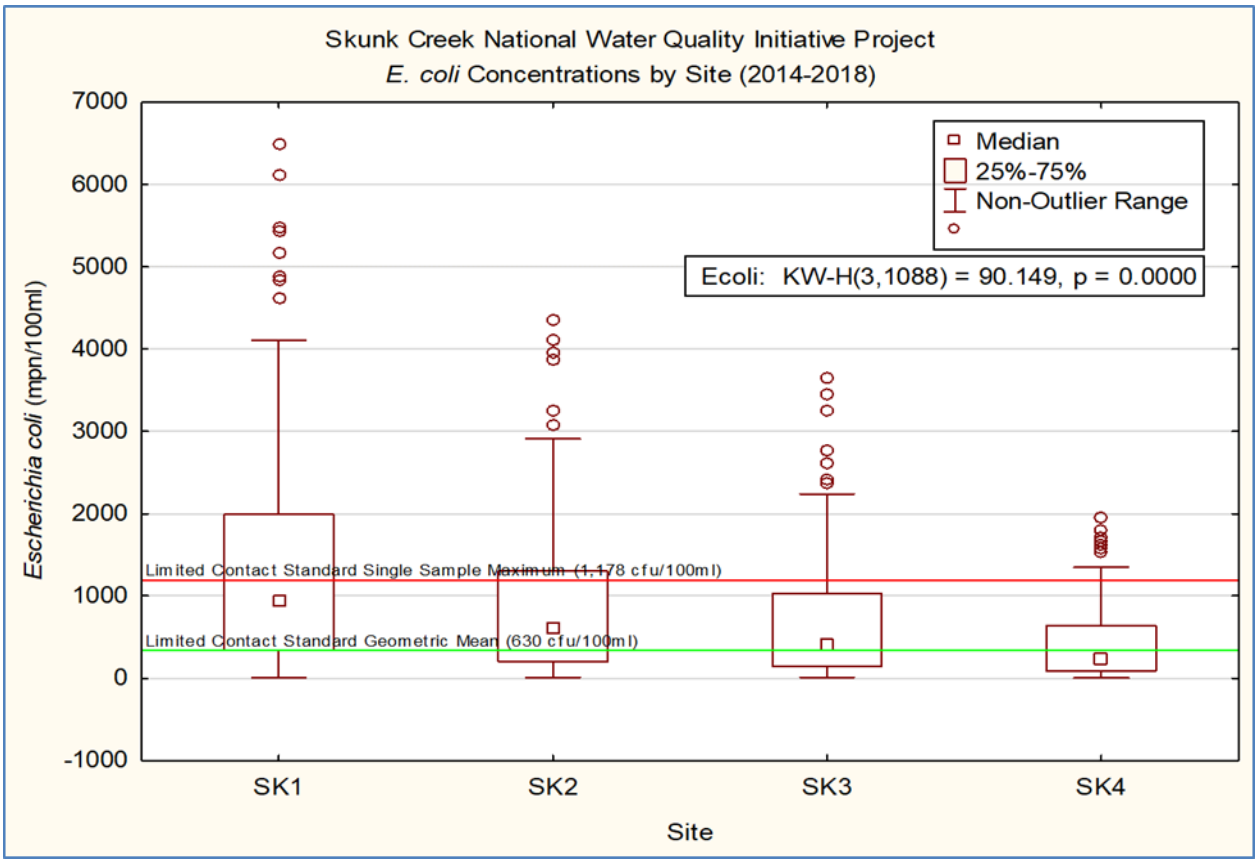


Figure 76: Box Plots for E-coli Bacteria Concentrations

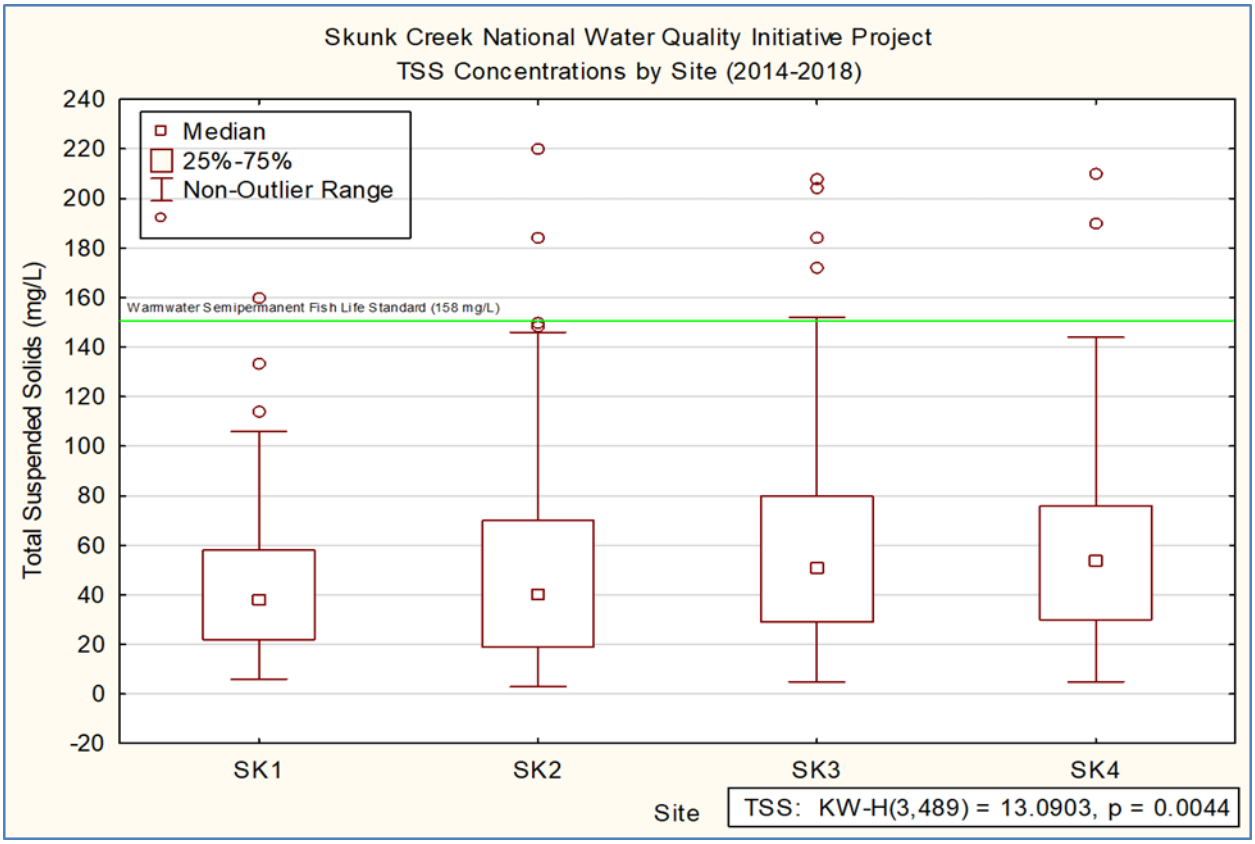


Figure 77: Box Plots for TSS Concentrations

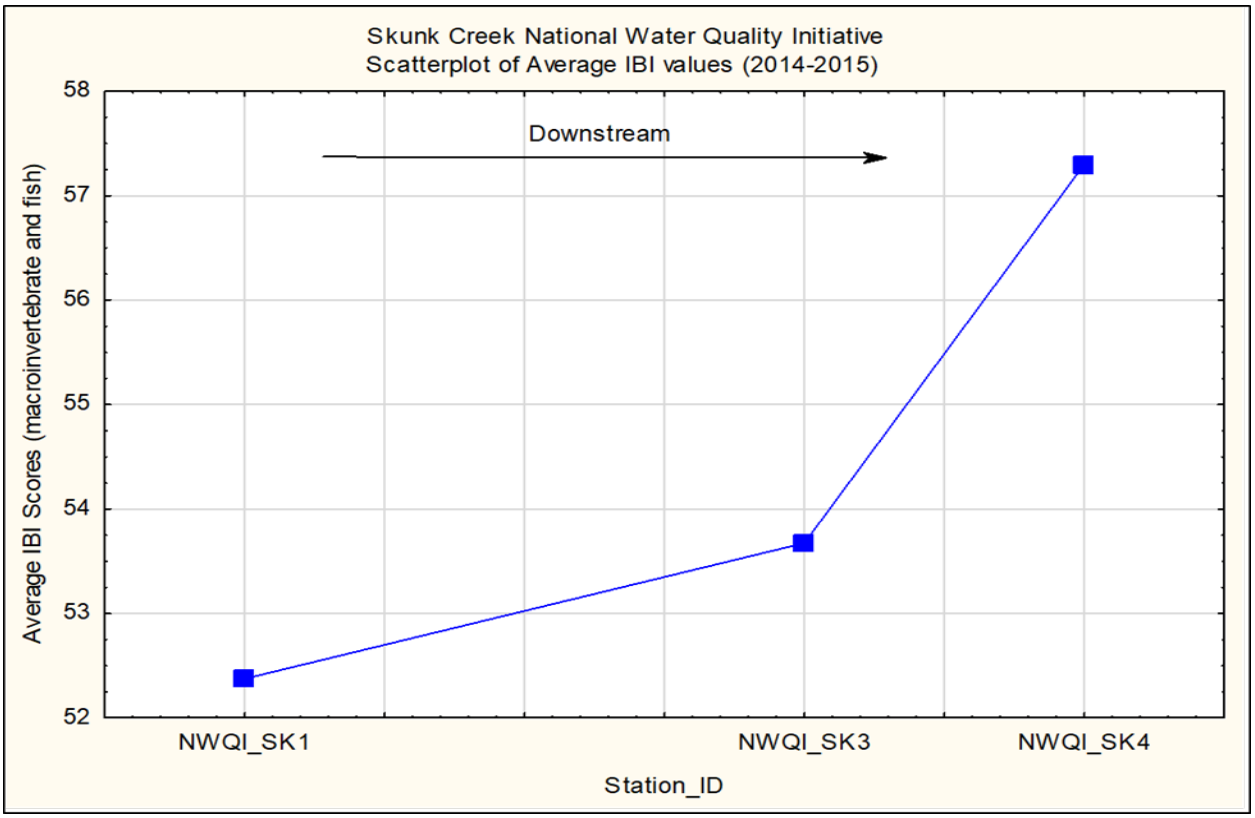


Figure 78: Macroinvertebrate IBI Scores for the 3 Skunk Creek Sites

Coordination Efforts

The Moody Conservation District was the lead sponsor of the Central Big Sioux River Watershed Segment 2 Project and this project segment. The district chairman and board of directors provided input and voted on recommendations from the steering committee for the project during monthly meetings. Federal, state, local agencies and organizations contributed funds, technical services, cash and in kind match to accomplish goals of the project (Table 10). The agencies and their roles are summarized below.

East Dakota Water Development District

The EDWDD provided budgetary administration of salary for the watershed and project coordinator. In an effort to increase the suite of BMPs and project funding, the watershed coordinator developed a preliminary application for a new USDA grant program that was developed during this segment of the project. The Regional Conservation Partnership Program (RCPP) was developed by USDA and interested partners of USDA were given the opportunity to submit preliminary proposals with new and innovative ways to put conservation on the ground. The preliminary proposal was accepted and a final proposal was completed and submitted to Washington D.C. in September of 2014. The full proposal was accepted and the project was granted $1,980,920 in February of 2015. Since the program was new it took several months to get it off the ground. The official start date for the RCPP was May 1, 2015. It took several months to develop the tools needed to start working with the funding. The RCPP is now completed and the watershed coordinator secured another RCPP grant for $2,500,000 with plans to start implementing in segment 4 of the project.

Conservation Districts

The Moody Conservation District agreed to be the lead project sponsor and entered into a joint powers agreement with the other Conservation Districts involved with the project. All counties that support the project have appointed members to serve on the steering committee. The Moody Conservation District receives a project update during each board meeting and approves project funds being spent. The office manager assists with cost-share reimbursement, file maintenance and other financial transactions during the board meetings.

City of Sioux Falls

The City of Sioux Falls has finalized the joint powers agreement with Moody Conservation District. They appointed members to serve on the steering committee and have held several meetings and summits to discuss the future of the watershed project and its goals. The city has provided technical and financial assistance through SRF NPS funds for bank stabilization.

RESPEC Engineering

RESPEC Engineering in cooperation with the Moody Conservation District completed the Water Quality Credit Trading Program final report and submitted their results to the USDA.

South Dakota Department of Environment and Natural Resources

The South Dakota Department of Environment and Natural Resources (SDDENR) administered the U.S. EPA Section 319 grant and provided oversight of all project activities. Project administration included on-site office visits, watershed tours, review of reports, approval of payment requests, and attendance of steering committee meetings. Training workshops and meetings were sponsored by the SDDENR to keep the watershed coordinator current with

implementation activities and funding procedures. A project officer was appointed to the project to assist in managing funds, setting up and maintaining the Tracker system and reviewing all implementation activities and reporting.

United States Department of Agriculture/Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) provided technical assistance for the planning, design and installation of conservation practices. Personnel included: District Conservationists from Lincoln and Union County field offices; a Soil Conservation Technician from the Union County office; a Civil Engineering Technician from the Minnehaha County office; a Resource Conservation Development Coordinator from the Mitchell South Dakota Service Center. A workspace was supplied from the NRCS and software licenses were granted from NRCS. Access to the NRCS system enabled the watershed coordinator to generate conservation plans, contracts and maps for BMP implementation activities. Programs utilized, but not limited to, included the USDA's Environmental Quality Incentives Program (EQIP), Regional Conservation Partnership Program (RCPP) and Conservation Reserve Program (CRP) administered through the Farm Service Agency (FSA).

United Stated Environmental Protection Agency

The United States Environmental Protection Agency provided the Clean Water Act Section 319 Grant which was the primary funding source of the project. EPA officials from the Region 8 office in Denver, Colorado participated in one on-site tour and review of the project.

Public Participation

The public was notified of opportunities to participate in the project through news releases, meetings and other public events to inform and educate them about the project. The mayor of Sioux Falls has been an integral part in putting together the Annual Mayors Big Sioux River Summit. The First Annual Mayors Big Sioux River Summit was started in the fall of 2013 to include public participation in all aspects of the Big Sioux River Watershed and to showcase what is being done to improve water quality. Audiences were given presentations on the project, its goals, and funding opportunities for implementation activities in the watershed. There have been 5 Annual Big Sioux River Summits during segment 3 of the project. Three of the summits during this project segment were held in Sioux Falls with one summit held in Brookings, SD and one in Watertown, SD.

A new and highly visible website is planned to be completed in segment 4 of the project. This will allow for easier public access to project programs, accomplishments and successes. The goal is to strengthen project awareness and brand an easily recognizable name so that the public will accept the watershed project as a fixture of their daily lives. After the new website is complete, a campaign to develop a Big Sioux River Mobile App will be considered. The app would allow the public to check on current river conditions and get real-time measurements of water quality in order to plan recreational activities throughout the summer months.

Project Budget

Table 10: Big Sioux River Segment 3 Implementation Project Original Budget.

5 Year Project Segment 3										
Project Personnel and Administration	319-EPA Grant	CWSRF WQ	City of Sioux Falls (SRF-NPS)	City of Sioux Falls	City of Dell Rapids (SRF-NPS)	East Dakota WDD	Local Cash	RCPP	USDA/NRCS	Totals
Project Coordinators 2FTE	$179,050.00	$100,000.00								$279,050.00
RCPP Consultant								$354,050.00		$354,050.00
RCPP NRCS Technical Assistance								$138,370.00		$138,370.00
Travel/Lodging/Meals/Expenses	$95,000.00									$95,000.00
Computer/Office Space/Office Supplies/Telephone	$27,500.00								$22,500.00	$50,000.00
Administration	$36,000.00		$25,000.00				$24,000.00			$85,000.00
Equipment	$15,000.00									$15,000.00
Subtotals	*$352,550.00*	*$100,000.00*	*$25,000.00*	*$0.00*	*$0.00*	*$0.00*	*$24,000.00*	*$492,420.00*	*$22,500.00*	*$1,016,470.00*
Objective 1 - Best Management Practices										
Task 1. Livestock Nutrient Management										
Animal Waste Storage Facilities	$193,450.00		$355,000.00				$2,024,550.00	$1,100,000.00	$1,852,000.00	$5,525,000.00
Subtotals	*$193,450.00*	*$0.00*	*$355,000.00*	*$0.00*	*$0.00*	*$0.00*	*$2,024,550.00*	*$1,100,000.00*	*$1,852,000.00*	*$5,525,000.00*
Task 2. Riparian Area Protection										
Riparian Area Management (RAM)	$34,000.00		$34,800.00							$68,800.00
Seasonal Riparian Area Management (SRAM)	$200,000.00		$1,330,000.00							$1,530,000.00
Grazing Management Systems	$25,000.00		$25,000.00				$50,000.00	$50,000.00	$50,000.00	$200,000.00
Water Developments	$10,000.00		$40,000.00				$50,000.00	$50,000.00	$50,000.00	$200,000.00
Bank Stabilization Engineering			$62,500.00					$62,500.00		$125,000.00
Bank Stabilization Construction			$200,000.00	$100,000.00				$200,000.00		$500,000.00
Pollinator Habitat							$1,000.00	$10,000.00	$4,000.00	$15,000.00
Subtotals	*$269,000.00*	*$0.00*	*$1,692,300.00*	*$100,000.00*	*$0.00*	*$0.00*	*$101,000.00*	*$372,500.00*	*$104,000.00*	*$2,638,800.00*
Task 3. Cropland Best Management Practices										
Terrace Restoration	$12,500.00						$5,000.00			$17,500.00
Grassed Waterways							$1,700.00		$15,300.00	$17,000.00
Filter Strips							$200.00		$1,800.00	$2,000.00
Cover Crops								$12,000.00		$12,000.00
Pollinator Habitat							$1,000.00	$4,000.00	$2,500.00	$7,500.00
Subtotals	*$12,500.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$7,900.00*	*$16,000.00*	*$19,600.00*	*$56,000.00*
Task 4 Urban BMPs										
Riparian Improvements (Rain Gardens/Vegetated Swales)										
Subtotals	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*
Objective 2 - Information & Education/Public Participation										
Task 4. Public Outreach										
News releases, Informational Meetings, Mailings	$22,500.00			$50,000.00						$72,500.00
Create Web Site Links	$6,250.00									$6,250.00
Subtotals	*$28,750.00*	*$0.00*	*$0.00*	*$50,000.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$78,750.00*
Objective 3 - Monitoring and Evaluation										
Task 5. Water Quality Monitoring										
Water Quality Monitoring Samples	$35,000.00					$15,000.00				$50,000.00
Quality Assurance/Quality Control Samples	$8,750.00									$8,750.00
Subtotals	*$43,750.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$15,000.00*	*$0.00*	*$0.00*	*$0.00*	*$58,750.00*
Totals	$900,000.00	$100,000.00	$2,072,300.00	$150,000.00	$0.00	$15,000.00	$2,157,450.00	$1,980,920.00	$1,998,100.00	$9,373,770.00

Table 11: Big Sioux River Segment 3 Implementation Project Actual Budget.

5 Year Project Segment 3										
Project Personnel and Administration	319-EPA Grant	CWSRF WQ	City of Sioux Falls (SRF-NPS)	City of Sioux Falls	City of Dell Rapids (SRF-NPS)	East Dakota WDD	Local Cash	RCPP	USDA/NRCS	Totals
Project Coordinators 2FTE	$497,232.57	$100,000.00				$26,569.76				$623,802.33
RCPP Consultant			$34,504.71					$354,048.09		$388,552.80
RCPP NRCS Technical Assistance								$138,370.00		$138,370.00
Travel/Lodging/Meals/Expenses	$53,990.91					$5,100.00				$59,090.91
Computer/Office Space/Office Supplies/Telephone	$6,136.48								$12,600.00	$18,736.48
Administration	$3,870.00									$3,870.00
Equipment	$56,825.59									$56,825.59
Subtotals	*$618,055.55*	*$100,000.00*	*$34,504.71*	*$0.00*	*$0.00*	*$31,669.76*	*$0.00*	*$492,418.09*	*$12,600.00*	*$1,289,248.11*
Objective 1 - Best Management Practices										
Task 1. Livestock Nutrient Management										
Animal Waste Storage Facilities	$65,079.20		$821,505.31				$5,330,034.52	$1,029,747.23	$1,994,394.49	$9,240,760.75
Subtotals	*$65,079.20*	*$0.00*	*$821,505.31*	*$0.00*	*$0.00*	*$0.00*	*$5,330,034.52*	*$1,029,747.23*	*$1,994,394.49*	*$9,240,760.75*
Task 2. Riparian Area Protection										
Riparian Area Management (RAM)	$45,533.03		$251,773.93		$3,780.00		$35,373.43			$336,460.39
Seasonal Riparian Area Management (SRAM)	$284,237.61		$1,692,425.60		$129,430.00		$43,113.87			$2,149,207.08
Grazing Management Systems			$13,760.74				$29,363.47	$73,965.77	$14,455.65	$131,545.63
Water Developments			$23,252.50		$9,037.00		$15,845.83			$48,135.33
Bank Stabilization Engineering			$541,994.74							$541,994.74
Bank Stabilization Construction										$0.00
Pollinator Habitat										$0.00
Subtotals	*$329,770.64*	*$0.00*	*$2,523,207.51*	*$0.00*	*$142,247.00*	*$0.00*	*$123,696.60*	*$73,965.77*	*$14,455.65*	*$3,207,343.17*
Task 3. Cropland Best Management Practices										
Terrace Restoration										$0.00
Terrace								$111,088.63		$111,088.63
Grassed Waterways									$5,441.75	$5,441.75
Filter Strips							$2,574.78		$11,035.00	$13,609.78
Cover Crops								$73,369.27	$11,580.25	$84,949.52
Pollinator Habitat										$0.00
Subtotals	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$2,574.78*	*$184,457.90*	*$28,057.00*	*$215,089.68*
Task 4 Urban BMPs										
Riparian Improvements (Rain Gardens/Vegetated Swales)										
Subtotals	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$0.00*
Objective 2 - Information & Education/Public Participation										
Task 5. Public Outreach										
News releases, Informational Meetings, Mailings	$1,954.35			$84,924.00			$29,247.00			$116,125.35
Create Web Site Links										$0.00
Subtotals	*$1,954.35*	*$0.00*	*$0.00*	*$84,924.00*	*$0.00*	*$0.00*	*$29,247.00*	*$0.00*	*$0.00*	*$116,125.35*
Objective 3 - Monitoring and Evaluation										
Task 6. Water Quality Monitoring										
Water Quality Monitoring	$21,021.05					$8,477.72	$1,866.00			$31,364.77
Subtotals	*$21,021.05*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$8,477.72*	*$1,866.00*	*$0.00*	*$0.00*	*$31,364.77*
Totals	$1,035,880.79	$100,000.00	$3,379,217.53	$84,924.00	$142,247.00	$40,147.48	$5,487,418.90	$1,780,588.99	$2,049,507.14	$14,099,931.83

Aspects of the Project that did not Work Well

Bank stabilization engineering was 90% complete for one previously stabilized site with damage from repeated flood conditions in 2018 and 2019 and three other potential sites on the Big Sioux River to finish the stabilization project that was initiated in 2005. Permits were not granted from the U.S. Army Corps of Engineers to complete the work, so the project has been shut down.

There were no terrace restoration projects funding during segment 3. Landowners enrolled into the RCPP terrace practice to completely overhaul whole field terrace systems since wet weather conditions during segment 3 caused extensive damage to existing systems. The ability to reconstruct new terrace systems to fit larger farm equipment was also a key factor to the shift in practice selection. The terrace restoration program is currently being revisited to adjust reimbursement rates that are outdated in comparison to RCPP rates so it may be more attractive and utilized in s4.

There were no pollinator habitat acres completed in segment 3 through the project. The issue was that the campaign was not a focus of the project and relied more on NRCS personnel to sell the practice. Also, eligibility requirements of the program were difficult and did not appeal to producers. Pollinator seed mix requirements were also expensive and required alternative methods of establishment and care that many producers voiced would take too much time and effort to offset the forgone income.

There were no urban water quality BMPs implemented during this segment. With the flooding issues faced by the City of Sioux Falls during segment 3, sites could not be accessed without causing more damage than usual so the projects were delayed. Discussions about the urban BMPs will resume in segment 4 to hopefully make progress towards installing a few projects.

Future Activity Recommendations

Future segments of the Big Sioux River Implementation Project should continue to work closely with the project partners to address the resource concerns in high priority areas of the watershed. Personal contacts and public meetings should continue in order to inform and educate landowners of opportunities available as the project evolves. Project personnel should invest as much time as possible working with landowners to develop a shared interest in restoring the beneficial uses of the watershed. Existing programs such as CRP and RCPP should continue to be used along with 319 and SRF NPS funds to accomplish the overall goals of the project. Additional efforts to create awareness and interest for riparian grassland buffers and rotational grazing should be made.

Creation of a watershed website would be a valuable tool for getting information out about project opportunities. A stand-alone website should be designed for the watershed project along with a campaign to develop a Big Sioux River App for smart phone users. The app could allow the public to check on current river conditions and get real-time measurements of water quality in order to plan recreational activities throughout the summer months. Social media could serve as a way to measure producer interest on a large scale towards changing management of the riparian areas from traditional methods to newer systems with less impact. Levels of riparian

program activity should be continually monitored throughout the project in order to aid in the development of new and fresh ideas to enhance riparian health.

BMPs that reduce sediment and bacteria transport should be considered for this portion of the watershed. Additional monitoring of stream bank and gully erosion should be investigated in order to refine future segment implementation projects to target critical areas on and along the river. Pilot projects to inventory effects of tiling and riparian degradation due to pasturing should be taken into consideration as well.

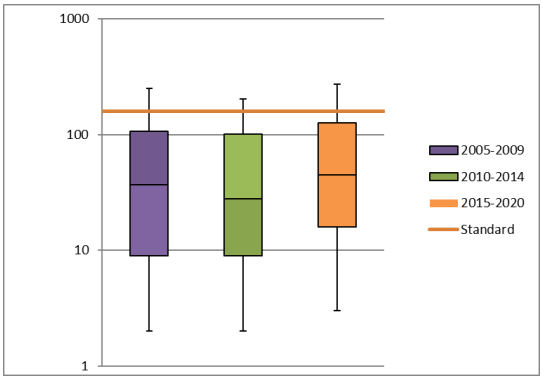
Animal feeding operations should remain a high priority in regard to waste storage, handling and utilization. Nonpoint sources of runoff should be targeted for implementation activities along and near tributaries and the Central Big Sioux River itself. Cover crops should be used in combination with fields susceptible to erosion in close proximity to surface water drainages. Installation of BMPs in these sensitive areas will provide the largest benefit to enhancing and protecting water quality in the watershed. A cost analysis based on BMP reductions should be considered through the progression into future segments and used to extend water quality impacts of shrinking federal program funds.

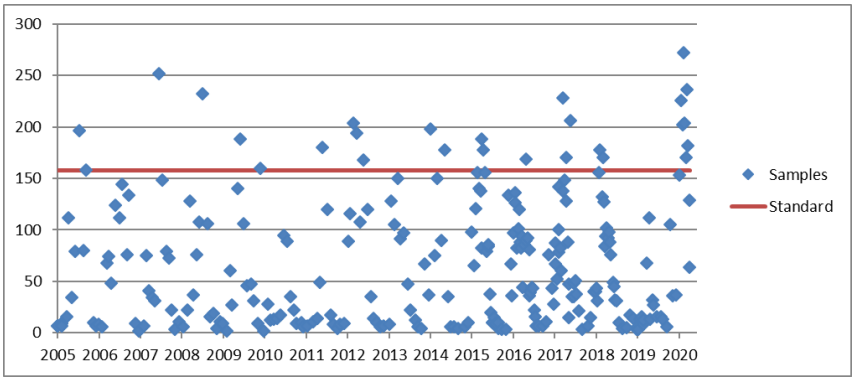
Appendix A

Monitoring Results

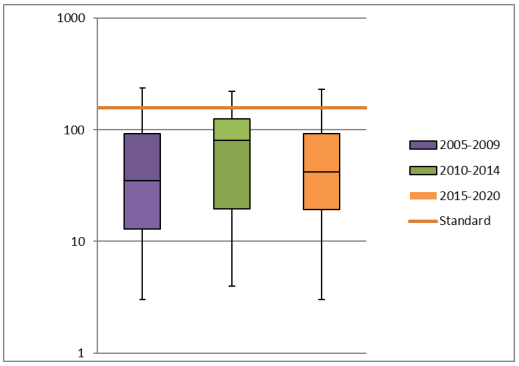
The following figures show the daily standard for each stream segment in comparison to stream samples. Each of these segments are listed in the SD DENR 2020 Integrated Report (IR). To be listed in the IR over 10% of the samples exceed the Standard. In some causes the chronic standard (not displayed in these figures) is applied to the reach. These samples and exceedances given here are not those used for the 2020 IR.

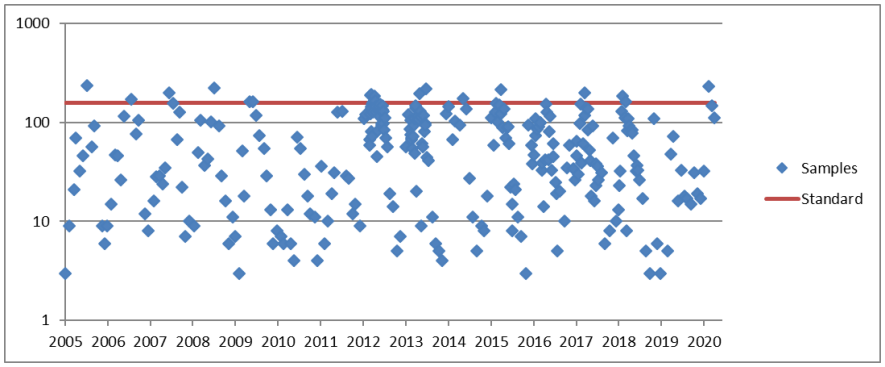
Big Sioux_05 TSS-11.03% Exceedance



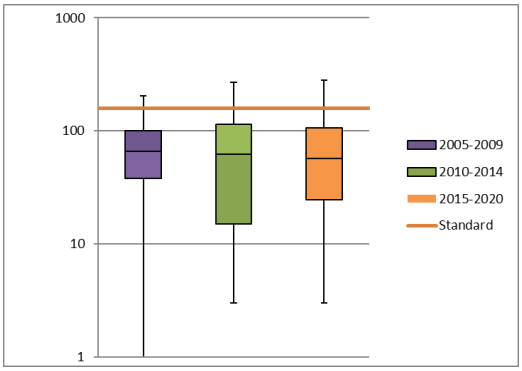


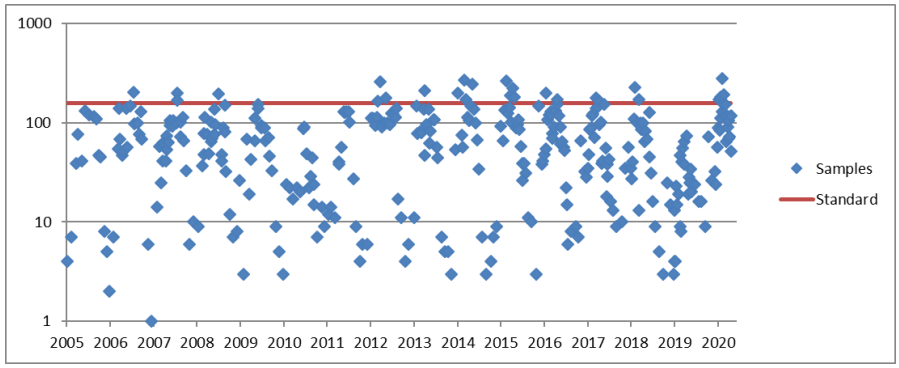
BS_06 TSS -4.1% exceedance, likely listed for the chronic standard with a 26% exceedance.



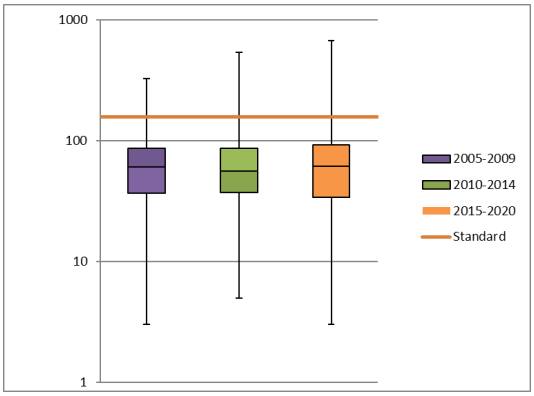


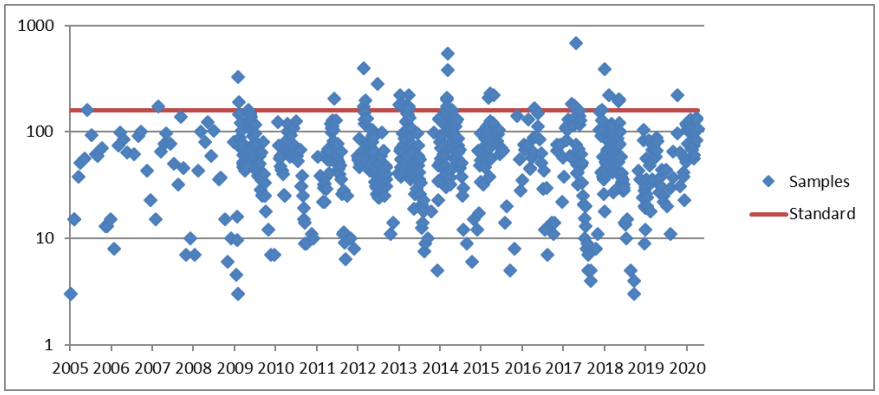
BS_07 TSS- 9.03% exceedance, likely listed for the chronic standard with a 32% exceedance.



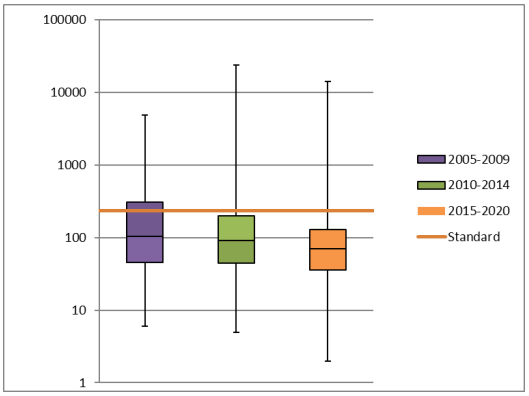


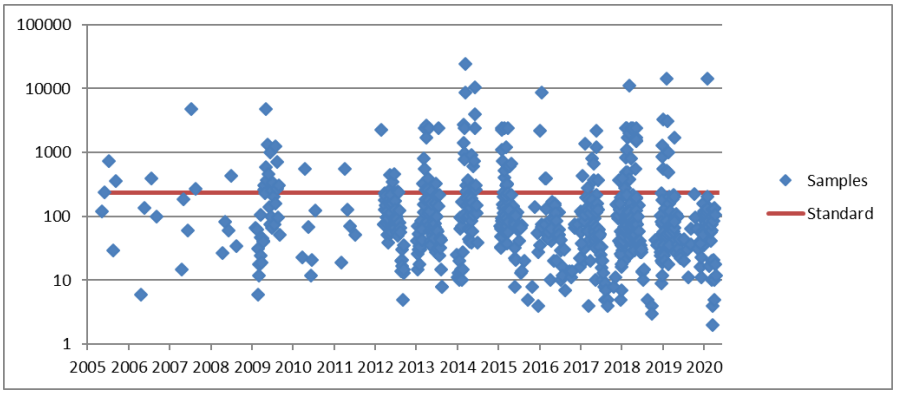
BS_08 TSS- 4.8% exceedance, likely listed for the chronic standard with a 26% exceedance.



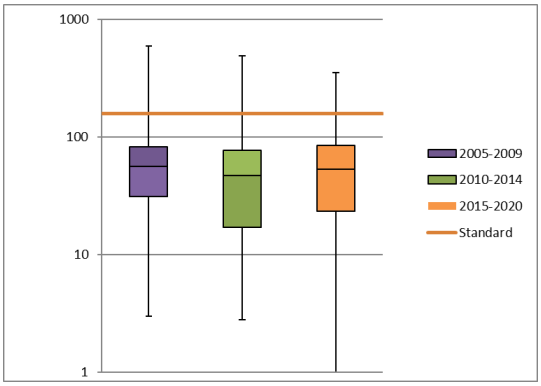


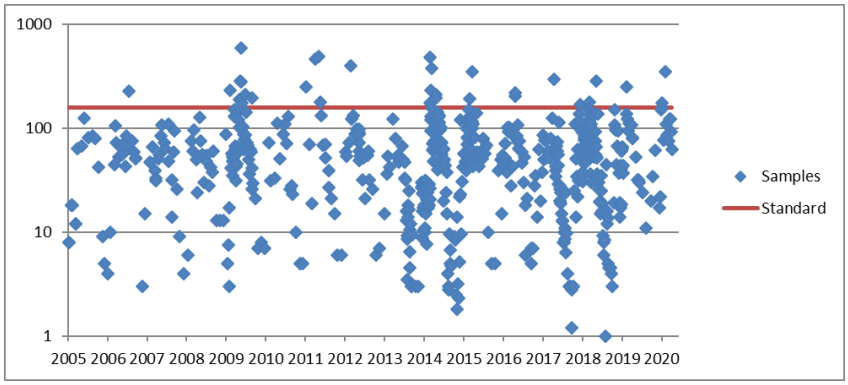
BS_08 E-coli- 30% exceedance.



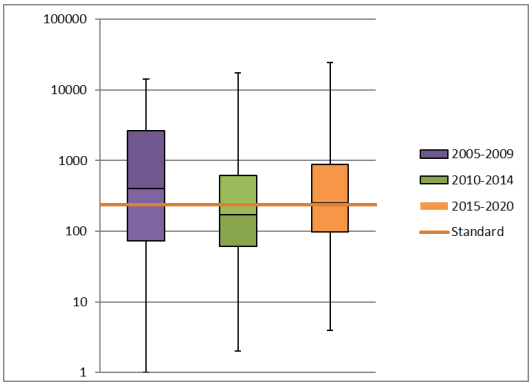


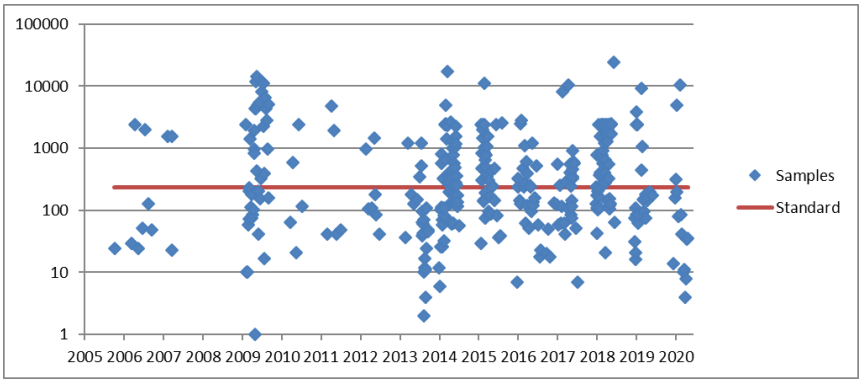
BS_10 TSS- 4.2% exceedance, likely listed for the chronic standard with a 23% exceedance.



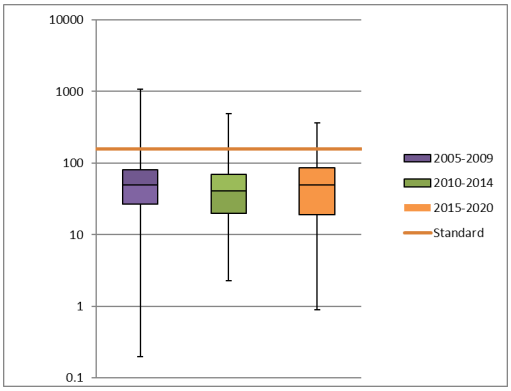


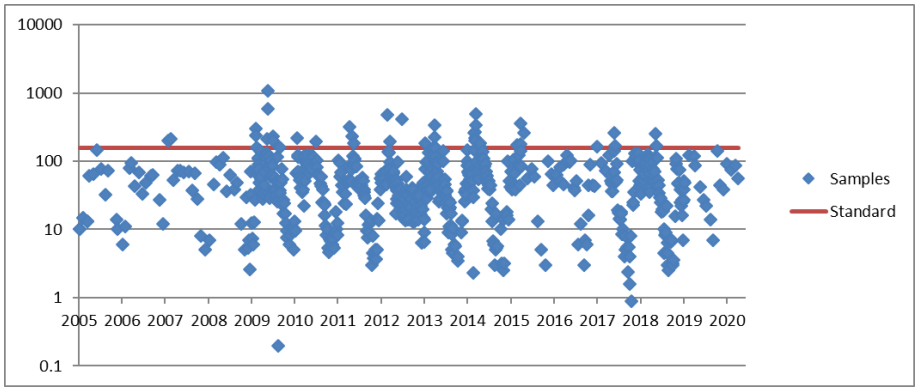
BS_10 E-coli- 54% exceedance.



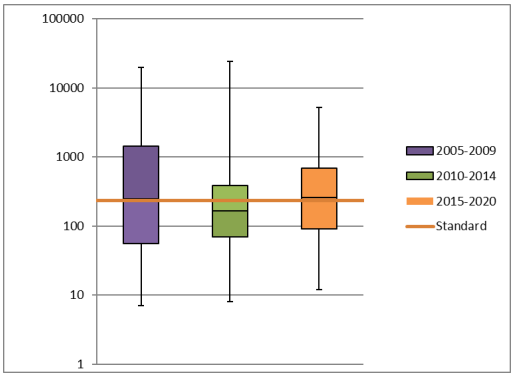


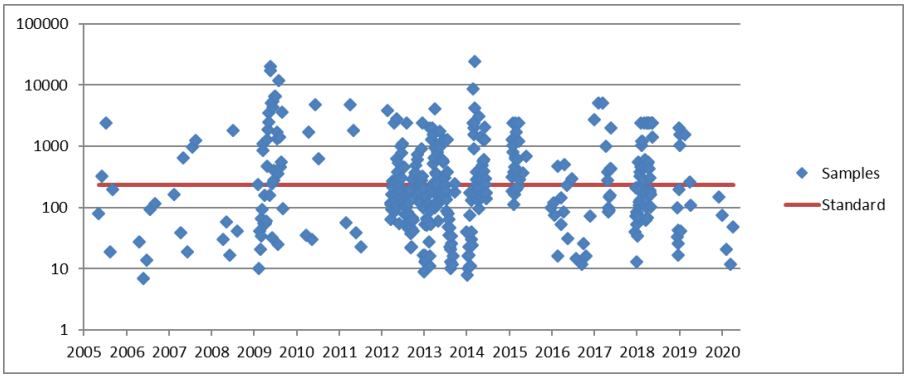
BS_11 TSS-4.1% exceedance, listed for the chronic standard with a 22% exceedance.



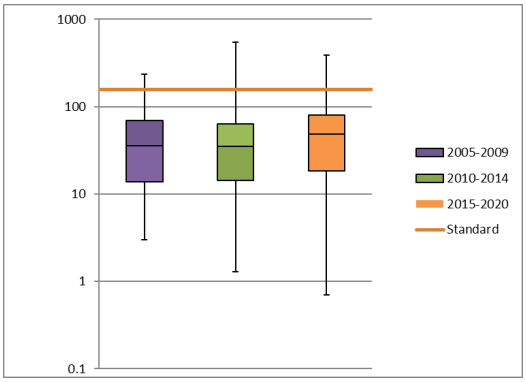


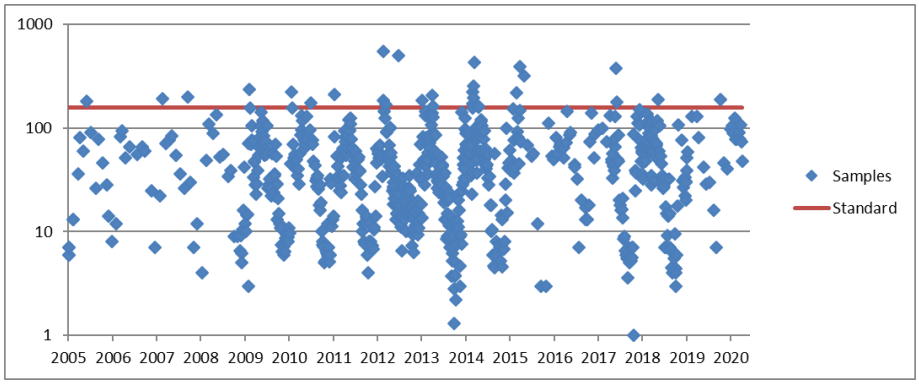
BS_11 E-coli-51% exceedance.



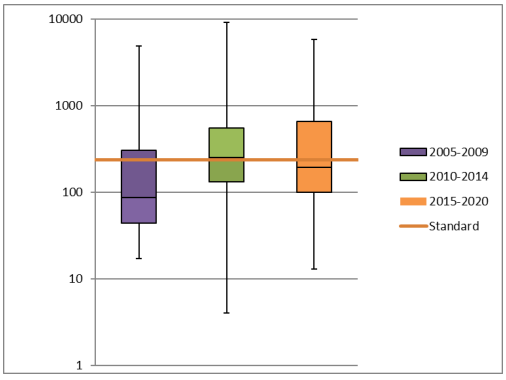


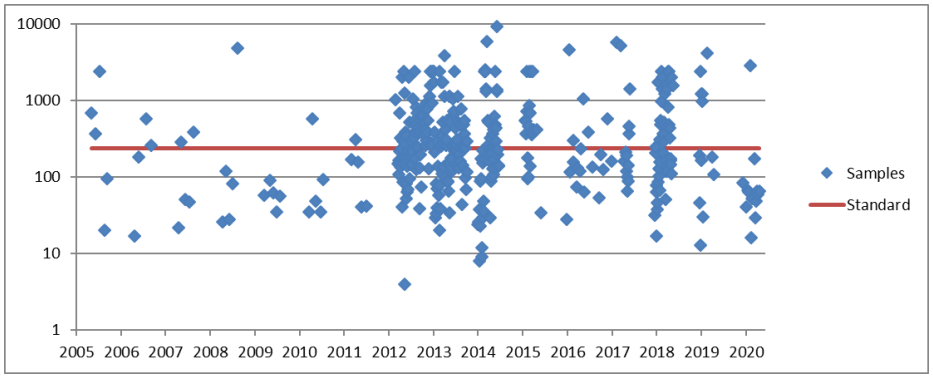
BS_12 TSS-3.1% exceedance, likely listed for the chronic standard with a 19% exceedance.



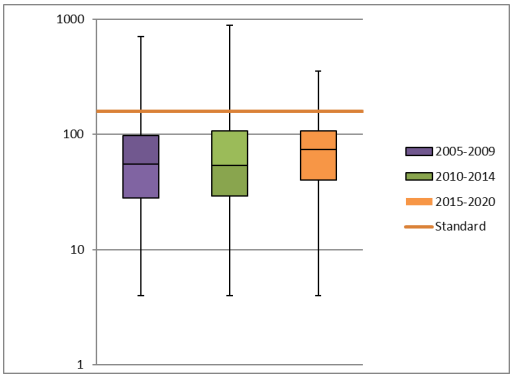


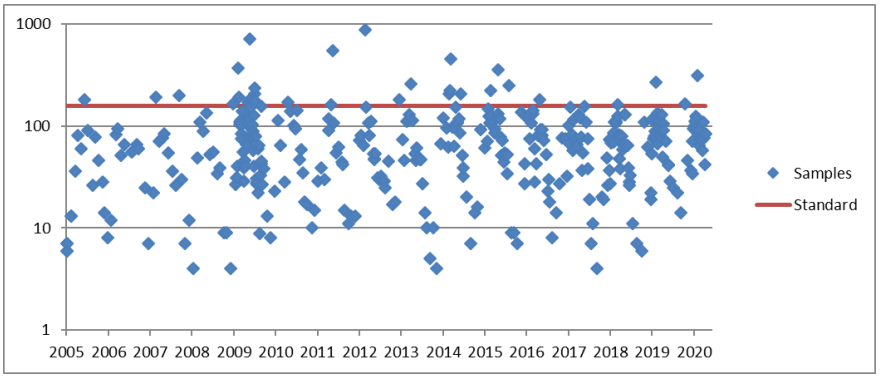
BS_12 E-coli-3.1% exceedance, likely listed for the chronic standard with a 46% exceedance.



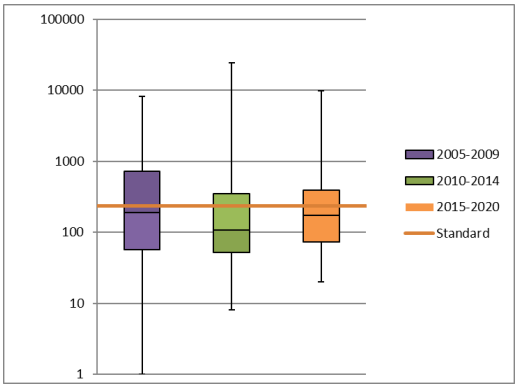


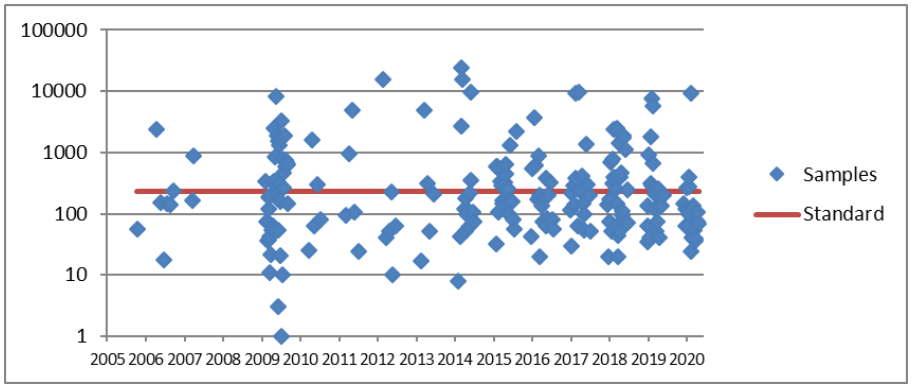
BS_13 TSS-4.8% exceedance, likely listed for the chronic standard with a 35% exceedance.



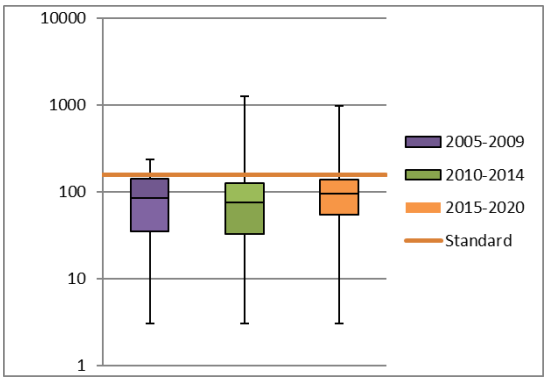


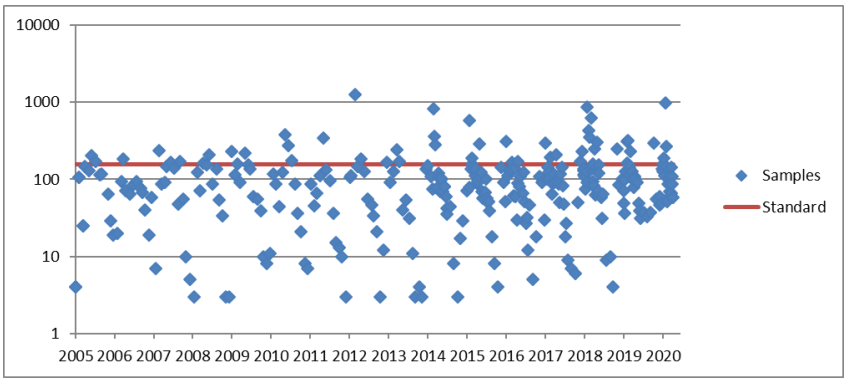
BS_13 E-coli-43% exceedance.



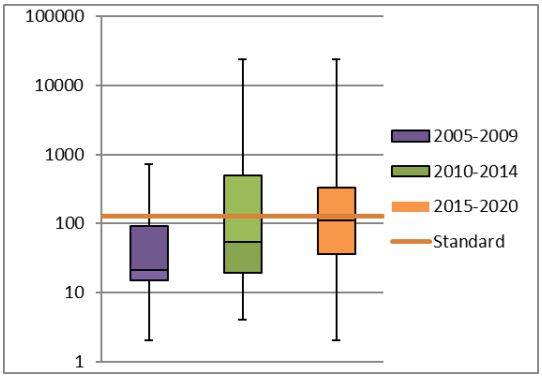


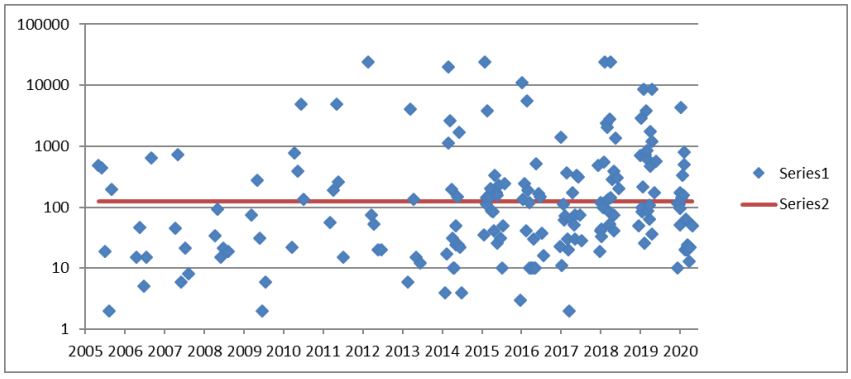
BS_14 TSS-17% exceedance.



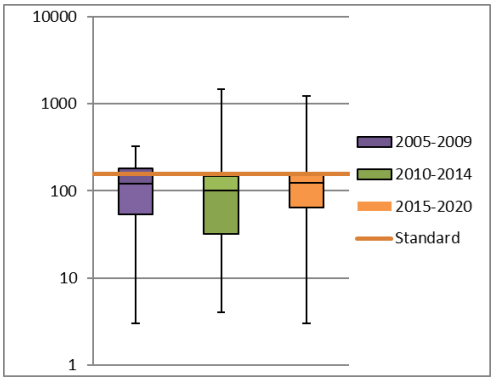


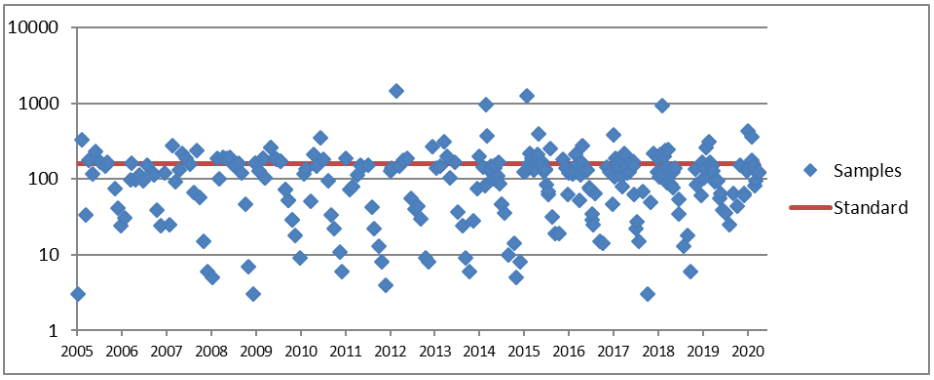
BS_14 E-coli-30% exceedance.



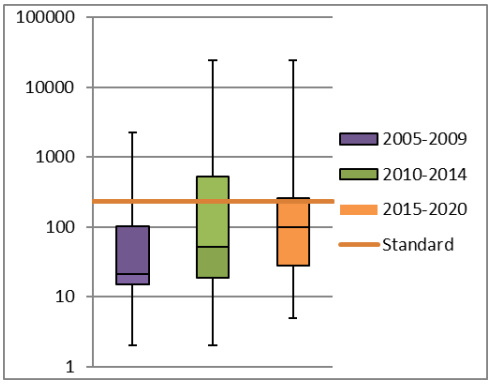


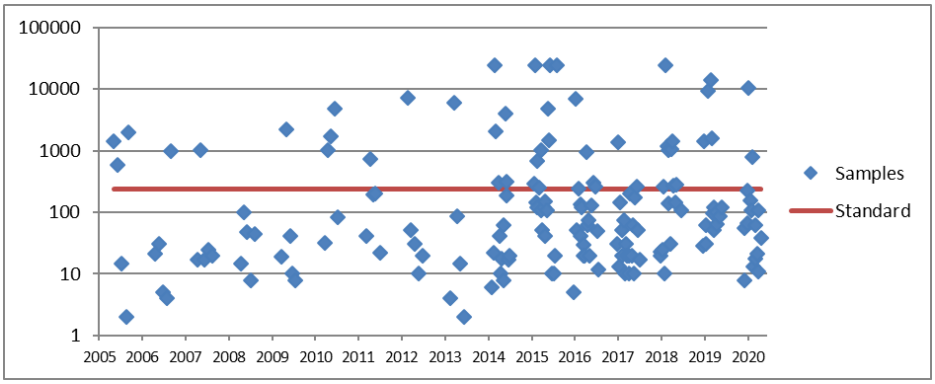
BS_15 TSS-25% exceedance.



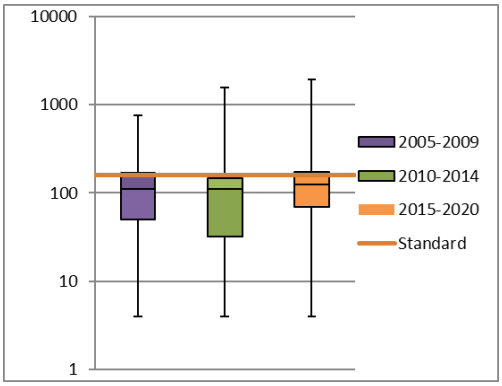


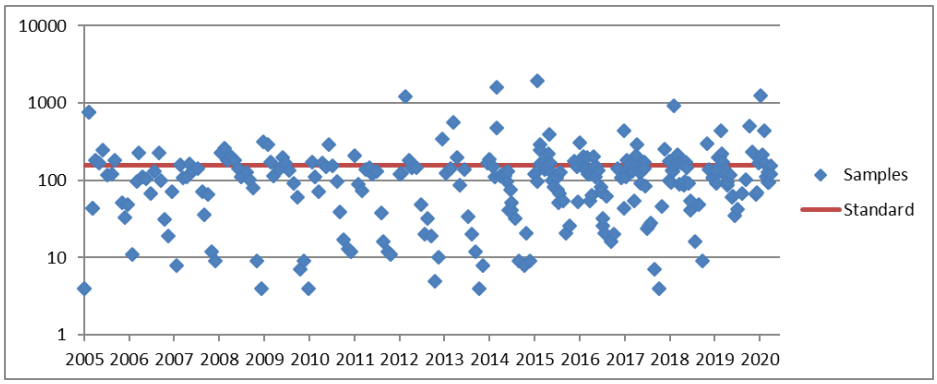
BS_15 E-coli-29% exceedance.



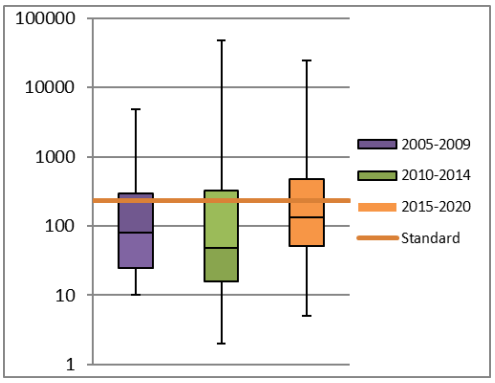


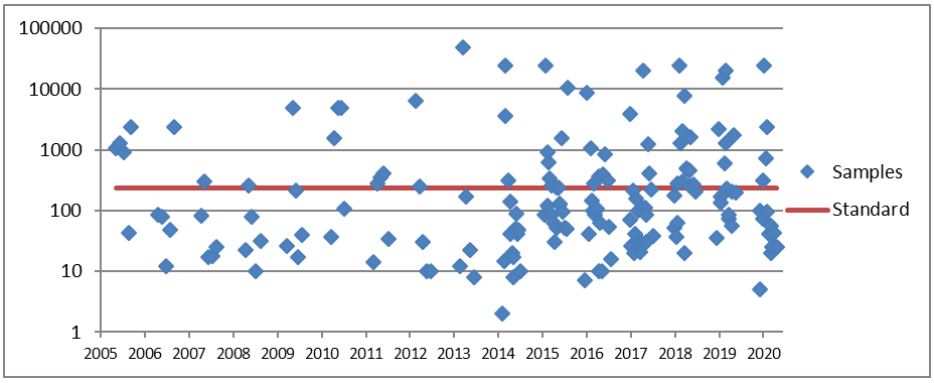
BS_16 TSS-30% exceedance.



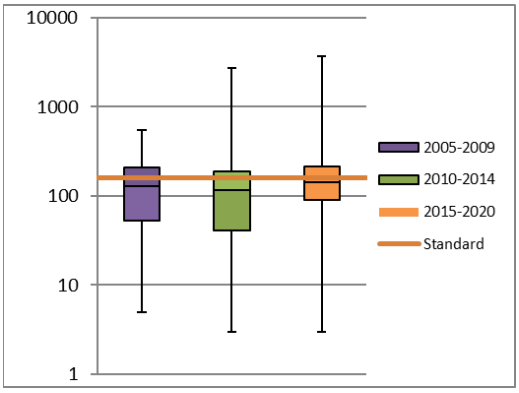


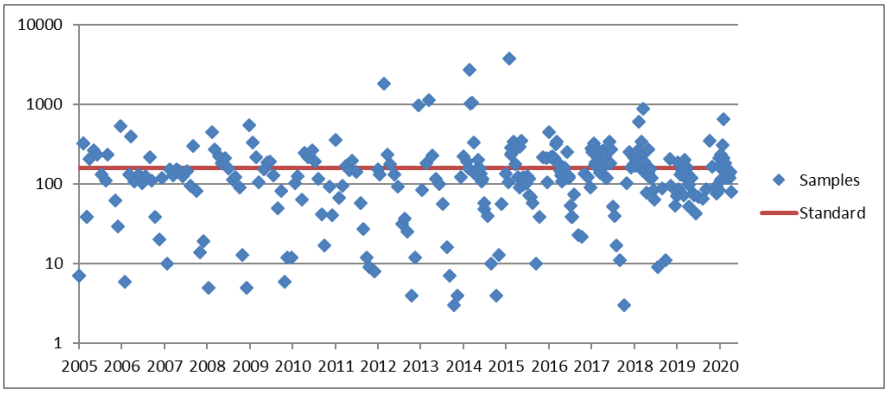
BS_16 E-coli-39% exceedance.



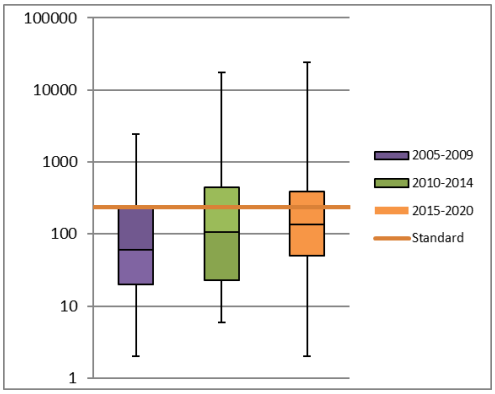


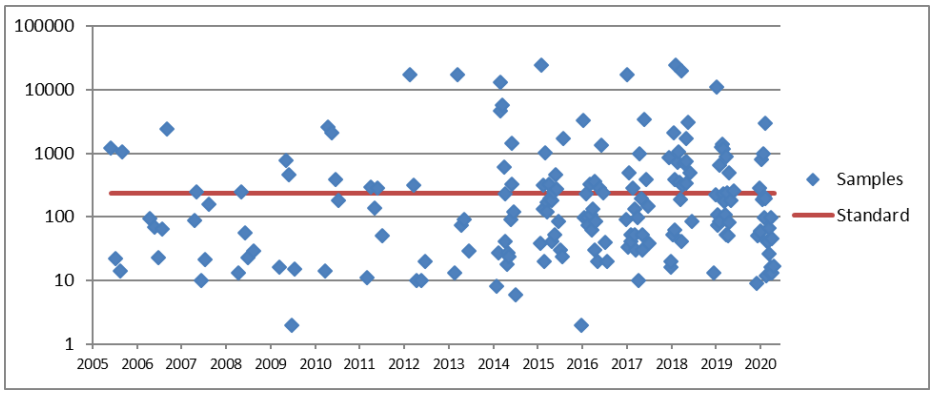
BS_17 TSS-44% exceedance.



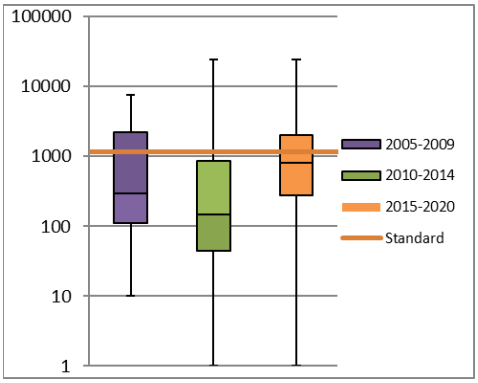


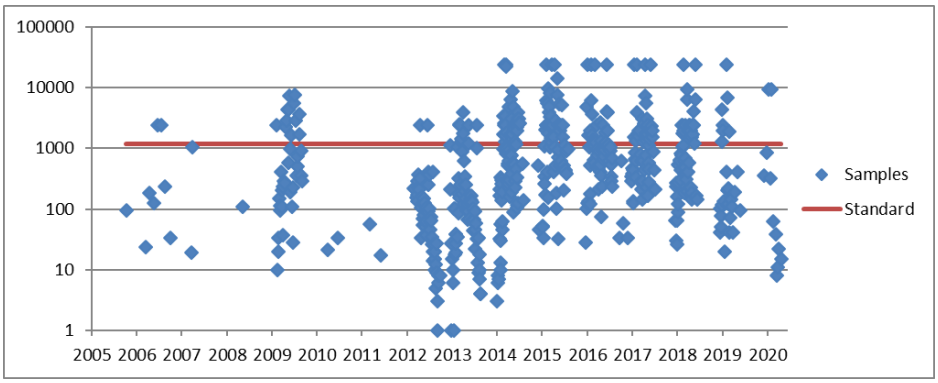
BS_17 E-coli-38% exceedance.



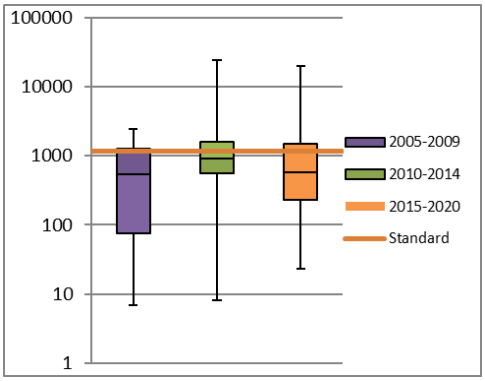


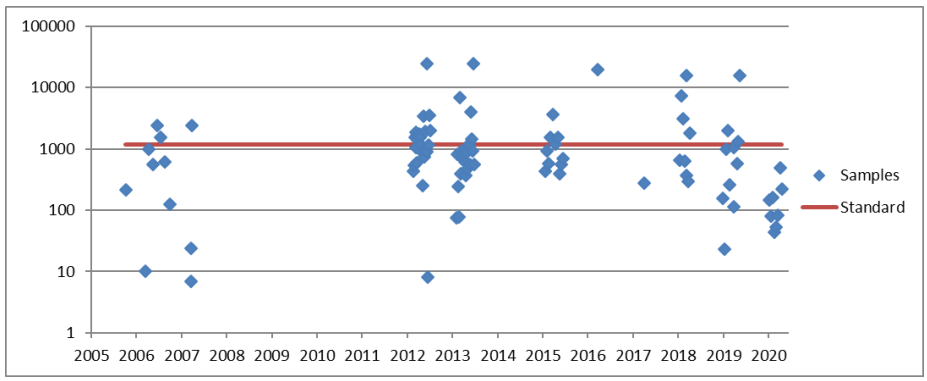
Skunk Creek E-coli-41% exceedance.



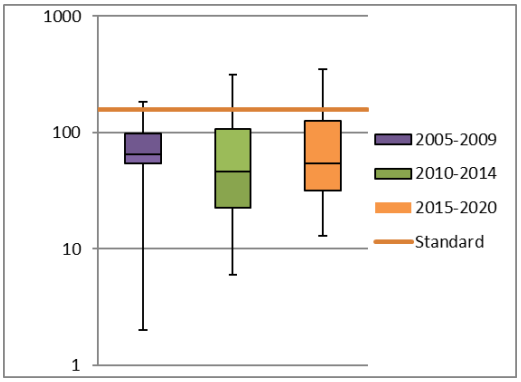


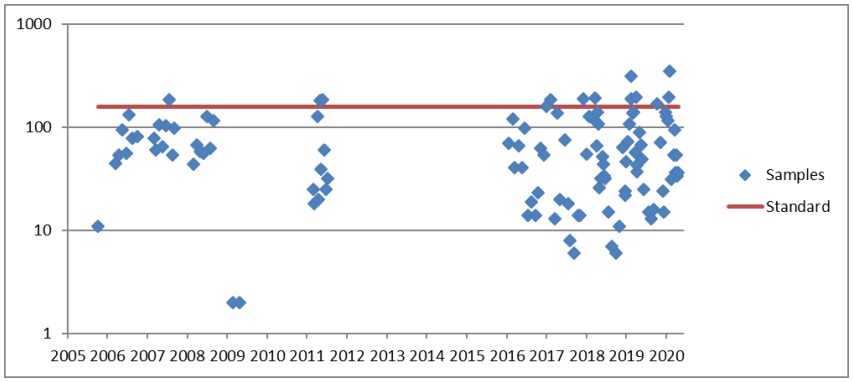
Sixmile E-coli- 32% exceedance.



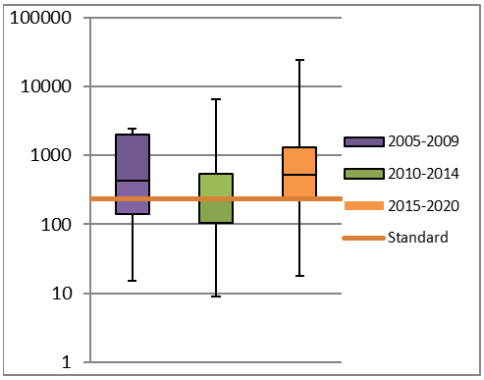


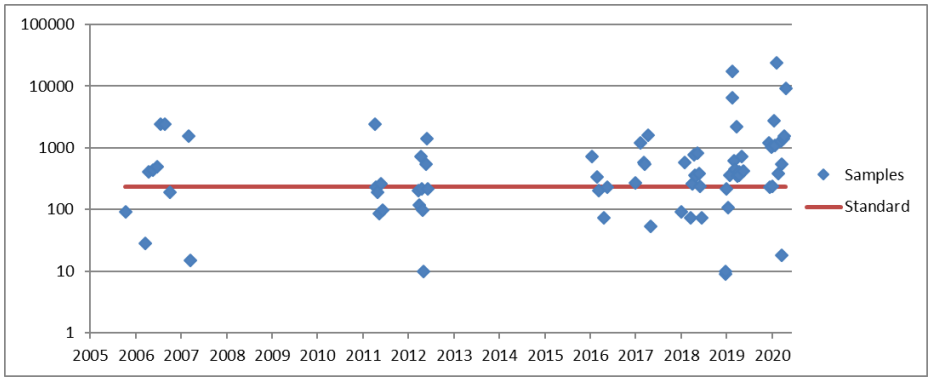
Pipestone TSS- 13% exceedance.



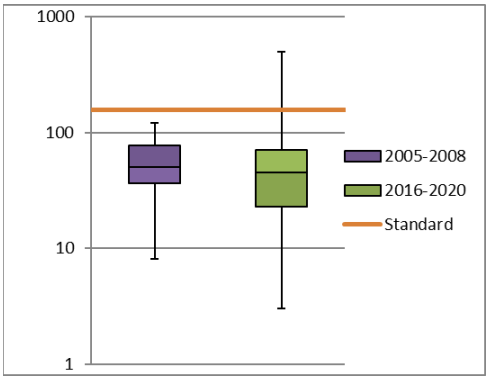


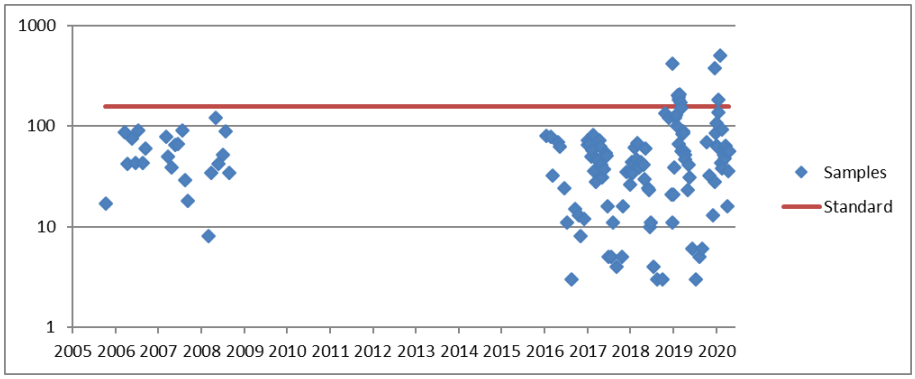
Pipestone E-coli- 75% exceedance.



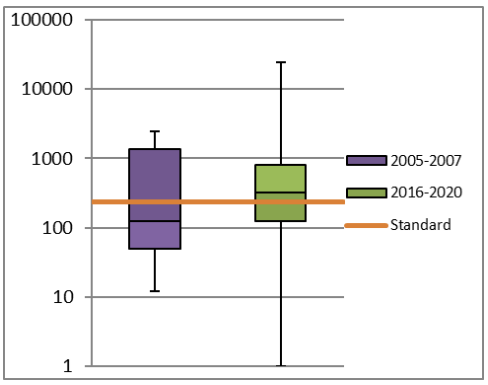


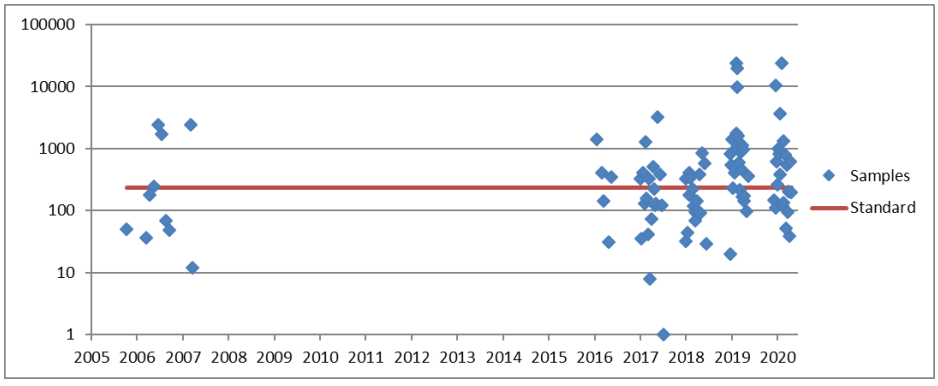
Split Rock TSS- 8% exceedance, likely listed for the chronic standard with a 16% exceedance.





Split Rock E-coli- 54% exceedance.





Appendix B

Public Outreach
&
News Articles

Program pays farmers to keep cattle away from waterways

South Dakota farmers are partnering with the Association of Conservation Districts (SDACD) and the city of Sioux Falls in a long-term project to improve water quality in the Big Sioux River and its tributaries.

The Seasonal Riparian Area Management (S-RAM) program currently targets Skunk Creek, with plans to expand to other waterways in coming years. The program pays farmers $60 per acre to keep their cattle away from the creek during April through September. Skunk Creek, which drains into the Big Sioux, was designated in 2010 as an impaired waterway because of E. coli bacteria levels that made the water unsafe for contact recreation, such as canoeing, fishing and wading.

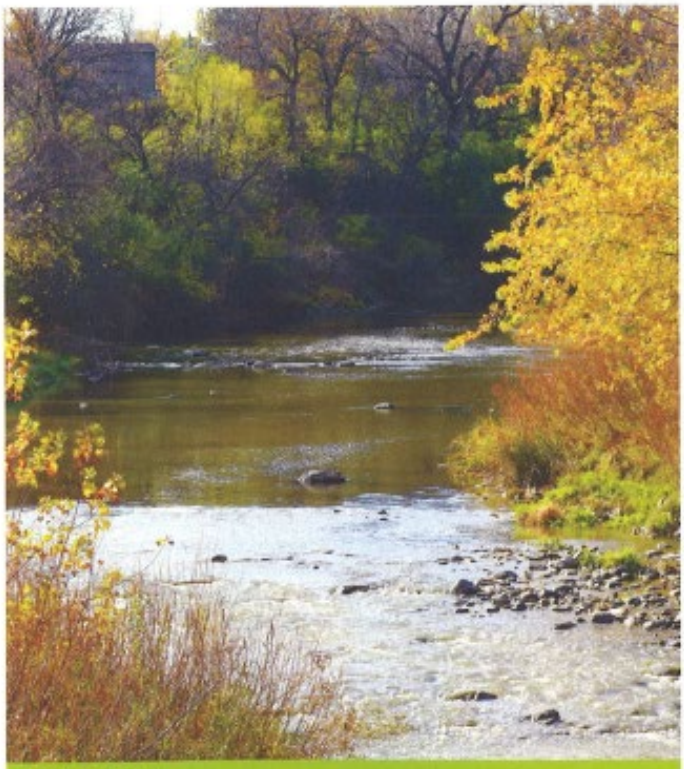
"That's pretty polluted," said Barry Berg of the South Dakota Association of Conservation Districts. "People were up in arms about it."

The program to clean up the creek has been going for three years and Berg said nearly 800 acres are enrolled. E. coli levels have progressively dropped.

Berg said farmers who participate in the program have been satisfied. They're allowed to bale hay in the pastures as long as the grass maintains a minimum height of 4 to 6 inches. And they can turn their cattle out into the pasture in October.

"Some producers take $60 an acre and say that's as good as I can rent it for, and I can still get hay off of it," Berg said. "It's a management program. We're not excluding them from the creek. Cattle can still graze after Sept. 30."

The city of Sioux Falls has committed $2.3 million over a five-year period. The Department of Environment and Natural Resources (NRCS) has given $600,000 for three years and is proposing another $400,000 for the next two years. A new Regional Conservation Partnership grant through the NRCS provided almost $2 million.



South Dakota Corn photo

Skunk Creek, a tributary of the Big Sioux River, is the focus of a water quality improvement program. The creek is in Minnehaha and Moody counties.

Water quality monitored

The East Dakota Water District monitors water quality at sites set up on four consecutive miles of Skunk Creek. The first mile has heavy grazing. The second mile has a half section that's grazed and a half section that's in the program, except for 40 acres. The entire next section is in the program.

Berg said if the improvement program hadn't been put in place, E. coli levels in Skunk Creek likely would have remained the same or gotten higher.

Jesse Neyens, an environmental analyst with the city of Sioux Falls, said the key to a successful water quality project is a strong partnership with one common goal.

"One of the big messages we like to get out is to understand this is a watershed problem," Neyens said. "It's not just ag, it's not just the city. We need everybody to come together."

Neyens said Sioux Falls realizes it impacts Big Sioux River water quality with its discharges and is taking measures to make improvements inside city limits, too. Those steps include natural grass projects, such as planting buffer strips along the river. City crews used to mow along waterways but have stopped doing that in places.

Pet waste a problem

One of the city's big focuses is pets.

"We're finding pet waste has a big impact," Neyens said. "Pet owners are leaving the waste in yards and it washes into the system. Once it's there, it kind of grows. That's definitely causing us a problem."

To address the pet waste problem, Sioux Falls is doing a lot of public education and also has installed 27 pet waste stations in its parks, with plans to add more. The city also increased its street sweeping, covering all streets three times a year. It also is upgrading its storm sewer and sanitary sewer systems.

As far as getting farmers involved in the Skunk Creek program, Neyens said that's a crucial role for conservation districts because farmers know those people and have worked with them before.

The city provides its support through the $2.3 million financial commitment. Sioux Falls generates that money as a result of taking out State Revolving Fund loans for infrastructure projects, particularly wastewater. Instead of paying full interest on those loans, the state gives 1 percent back to the city. That money goes to this project.

Berg said the program's success has caught the attention of other watershed districts and they're doing or planning water quality projects of their own.

Producers may receive conservation assistance to improve Skunk Creek Water Quality

South Dakota Association of Conservation Districts, Pierre, October 19, 2015— If you farm near Skunk Creek and hear a knock at your door, chances are it's Chuck Lebeda with the South Dakota Association of Conservation Districts (SDACD). He'd like to discuss the financial and technical help available to you if you're interested in lending a hand to improve the water quality in Skunk Creek.

He'll work with you to create a whole-farm conservation plan for your operation. It's voluntary and there's no charge. You decide which conservation practices to establish to protect and enhance the natural resources on your farm.

Lebeda said, "We're here to help farmers get started. As the word spreads hopefully neighbors will ask what they're doing and get involved. And hopefully farmers see a benefit whether it's economics or better land treatment, and continue with the process long after we're out of there."

Conservation practices that producers may consider include: crop rotation, residue and tillage management, no-till, strip till, direct seeding, cover crops, filter strips, grassed waterways, stream-bank protection, nutrient management and waste storage facilities.

The work to improve water quality on the Big Sioux River has been ongoing for about three decades through such projects as the Big Sioux River 319 water Quality Project. In addition in 2012, the National Water Quality Initiative (NWQI), was launched by the USDA Natural Resources Conservation Service (NRCS) to focus efforts on smaller impaired streams in South Dakota and in 2015 the Regional Conservation Partnership Program (RCPP) was also implemented.

Pressure is intensifying for farmers to get involved to accelerate the conservation work in Skunk Creek, according to Barry Berg, the Big Sioux River 319 Project Coordinator. Recent water quality samples indicate some progress, but not enough progress for Skunk Creek to be removed from a South Dakota Department of Environment and Natural Resources (DENR) listing of impaired streams.

Jesse Neyens, an Environmental Analyst for the City of Sioux Falls, said, "A portion of the available funding through the RCPP which was funded by the NRCS in the 2014 Farm Bill, was recently awarded to the Big Sioux River 319 Water Quality Project. This was a big boost of money to this watershed. Producers have been pretty receptive to the available conservation programs. We think the conservation programs are a win-win for the City of Sioux Falls and the agricultural community."

Organizations partnering with NRCS, DENR and the City of Sioux Falls, to assist landowners include: East Dakota Water Development District, and conservation districts in Lake, McCook, Minnehaha and Moody Counties.

Financial assistance is available at the state and federal level, in addition to the City of Sioux Falls through the Big Sioux River 319 Project explained Mike Kuck, the 303d Water Project Coordinator with SDACD.

Interested producers please contact Barry Berg at (605) 759-2650, or contact their local conservation district manager or NRCS field office located at the USDA Service Center or visit www.nrcs.usda.gov

Cleaner waters ahead: City sets lofty goals for Big Sioux River

John Hult, jhult@argusleader.com
5:46 p.m. CDT August 22, 2015

Buffer zones, upstream outreach key to Big Sioux pollution control

Freshly seeded natives grasses and flowers to help control water along the Big Sioux River on the northeast corner of 57th Street and Western Avenue.(Photo: Elisha Page / Argus Leader)

A rarely walked patch of Yankton Trail Park greenway that rolls off the northwest corner of the intersection at 57th Street and Western Avenue is a soggy mess.

It's supposed to be, at least for now.

City crews killed off the green, manicured meadow grass weeks ago in order to plow up the soil and hydroseed 3.9 acres of native prairie grass. Eventually, Big Bluestem, Switchgrass, Prairie June and Canada Wildrye will toss in the wind among wildflowers, as bees buzz above and rabbits scurry below.

To the passing driver, it will look like little more than an unkempt field.

But those acres connect directly to a decadeslong, multi-million dollar plan to decontaminate the centerpiece of South Dakota's largest city and a source of drinking water for its 169,000 residents: The Big Sioux River.

The grasses are the latest in a long string of small steps taken to control urban storm water runoff and stem the flow of pollutants into a river whose waters are unsafe for swimming and often unsafe for kayaking or canoeing. The millions spent on cleanup, however, are dwarfed by the millions in development envisioned for the 40-year-old River Greenway, investments that would prove more enticing on a clean river than a dirty one.

There are promising signs on the Big Sioux and success stories to aspire to, but watershed backers say it will take a sustained effort and investment, public education and a change in rural and urban attitudes if the goal of a clean river is to be realized.

There is a roadmap, and the prairie grasses are on it.

ARGUS LEADER

Schwan: Thinking bigger on the river

Dozens of new acres will be planted along the riverbanks in the coming years to create deep-rooted, water-absorbing buffer zones between the pet waste, fertilizer and sediment-heavy storm water that flows from the city into the Big Sioux River and its largest tributary, Skunk Creek.

The city also has contributed nearly $2 million to a five-year, $4.5 million watershed improvement plan that will compensate upstream ag producers for building modern barns and manure-trapping systems, creating buffer zones on cropland and fencing off livestock – and their bacteria-laden droppings – from the waters north of the city.

Mayor Mike Huether wants the city to be a statewide leader in urban water protection. Huether and the city's environmental engineers want to encourage residents and developers to become stewards of the river and put storm water control into conversations about urban planning.

The plans square with nationwide efforts to rethink runoff in cities, which were designed for years to move water as quickly as possible off of houses and lawns and into gutters.

Next door in Minnesota, a state mandate now requires cities of all sizes to submit storm water management plans. Smaller cities such as St. Cloud, Coon Rapids and Anoka are also working watershed districts to improve river quality, using some of the same measures pushed in Sioux Falls.

Minneapolis has been held to a higher storm water management standard for more than a decade, and the city has had some success. Water quality on the section of the Mississippi River that runs through the city is better than it is downstream, and some lakes have been removed from the state's list of impaired water bodies.

Preliminary bacterial testing along Skunk Creek, where the livestock management payments from the city began two years ago, show an encouraging downward trend for the Big Sioux. Those numbers will be on display as Huether takes his third annual Big Sioux River Summit on the road to Brookings next month.

Big Sioux boosters are aware of the enormous distance between hope and reality, though. Even if everything goes according to plan, flooding and most upstream pollutants are beyond the city's control.

"We're not going to solve the issue of Big Sioux River water quality during my lifetime," Huether said. "But I'll tell you one thing: We can make a real big difference. We can improve it for the next generation."

Buffer zone plan in test phase

The Yankton Trail buffer zone is the first of three planned in the initial phase of the project. Two similar zones will be planted at Dunham and Sherman parks.

The root systems of the native grasses are meant to capture and clean more of the storm runoff from the city before it hits the river, said environmental engineer Jesse Neyens. The mix of grasses and weed control measures might vary, based on locations and the results.

"This is kind of our test plot so we can learn how it's going to work and what we can do better in the

future," said Neyens.

Buy Photo

Jesse Neyens, environmental analyst for the city of Sioux Falls, shows off an area of freshly seeded natives grasses and flowers to help control water along the Big Sioux River on the northeast corner of 57th Street and Western Avenue, Aug. 13, 2015. (Photo: Elisha Page / Argus Leader)

The zones will be educational, too, as students will be able to visit and learn about native grasses and storm water management.

The idea is an outgrowth of a money-saving move. Prairie grasses and wildflowers replaced nearly 250 acres of mowed and manicured Kentucky bluegrass around the water treatment plant five years ago. That saved money, but it also reduced water flow into the plant's holding ponds.

The city stopped mowing the grasses around the drainage basin areas of the Big Sioux at the same time. Money was a factor in that decision, too, but it was also about river protection, Huether said.

The city felt pushback, but Huether said the initial hiccups – including weed problems during the dry first year and complaints about the loss of a manicured look – were worth battling through.

"We had to have the guts and the will to do it," Huether said.

Huether anticipates some pushback on the buffers, as well, but says the city has to grab as many opportunities as it can to bring riverbanks back to a more natural state.

"The larger the buffer, the better," Huether said.

Cattle payments show promise

For the past five years, the city has used federal matching funds to stabilize the banks of the Big Sioux and Skunk Creek. More recently, it's put its federal dollars into a program called Seasonal Riparian Area Management, or S-RAM. That program pays upstream farmers to fence off pastures and keep cattle – and their manure – out of Skunk Creek.

About $2 million in city funds have been marked for upstream water quality efforts, with the majority focused on S-RAM payments. The program has proven popular with landowners, who carry a share of the cost of fencing and watering systems for cattle in exchange for per-acre payments.

In three years, the program has enrolled nearly 789 acres, said Barry Berg, the watershed coordinator for the South Dakota Association of Water Conservation Districts.

Preliminary results show a drop in E. Coli and fecal coliform readings for the targeted zones along Skunk Creek. The more acres are enrolled upstream, the better the numbers look.

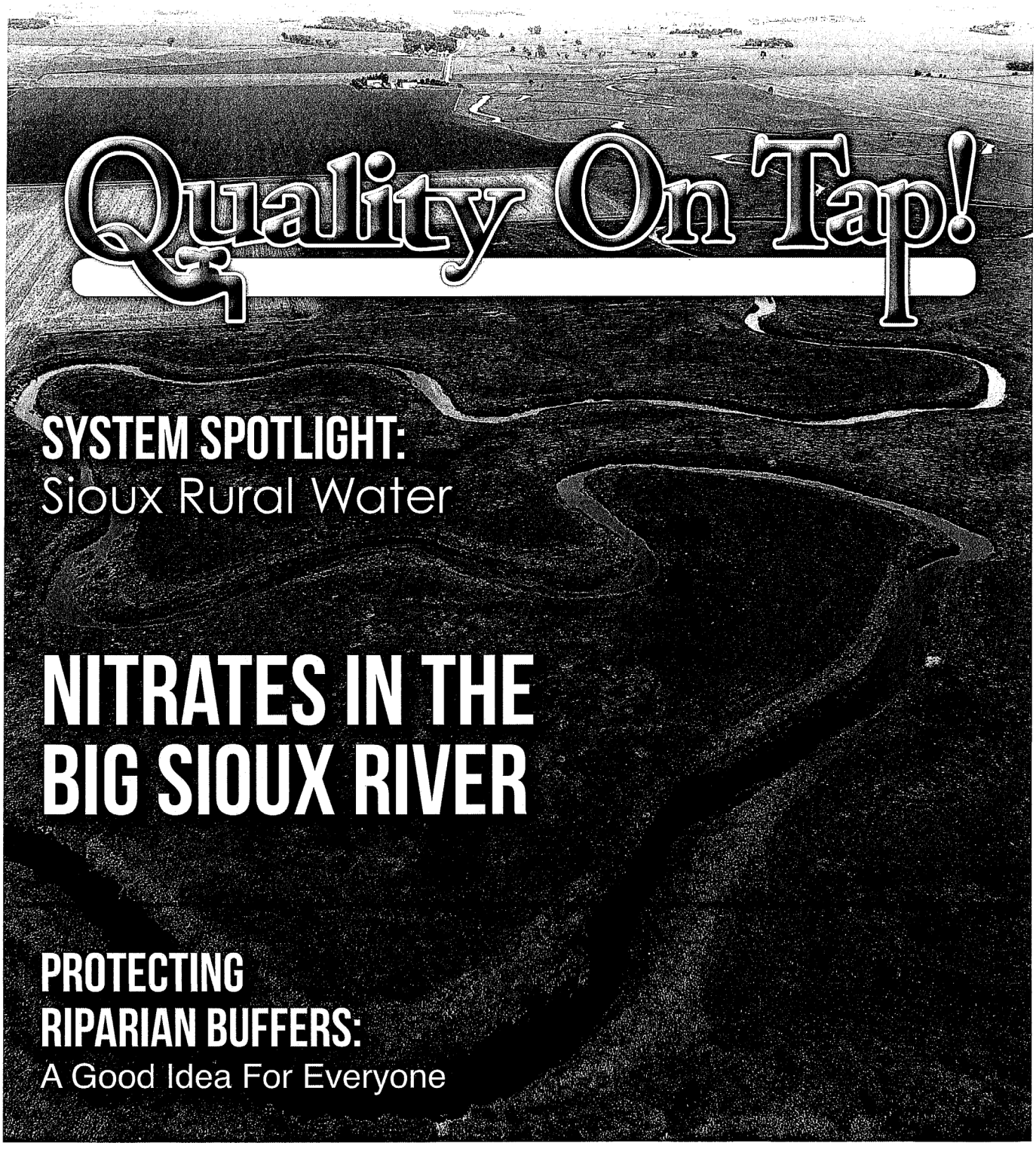
At the fourth test site, the nearest to Sioux Falls, E. Coli readings for the recreational season in 2014 were low enough to hit EPA safety standards for limited contact recreation like kayaking and canoeing. The same has held true so far this year, and Berg intends to say as much at the water quality summit next month.

"If that same trend exists in three years, we'd be able to say that's a pretty solid correlation," said Berg.
The program got a boost in January from a new federal program called the Regional Conservation Partnership Program, which poured $2 million into the Big Sioux watershed's five-year improvement plan. In total, the plan now has nearly $5 million to work with. The plan also has money for 13 animal waste management systems and payments for buffer zones, cover crops and habitat for bees and birds.
By 2020, Berg would like to see as many as 1,700 more acres enrolled in S-RAM along Skunk Creek, the Big Sioux River and Willow Creek.
"If we could get near the goal, we'd have just about every producer along Skunk Creek that's grazing enrolled," Berg said. "It's a lofty goal, but why set a goal if it's not a big one?"

Some success possible with sustained effort

Like Huether, Berg says it will take a long and sustained effort to make the Big Sioux River clean enough to be removed from the state's list of impaired water bodies, where it was placed in 1999. The numbers have scarcely budged since then.
The numbers are daunting, but Sioux Falls is not alone in its struggle to reclaim a river. Nearly 70 percent of the state's rivers are considered at least partially impaired.
Minnesota's figures are even more daunting. That state's legislature has taken drastic measures in recent years to tackle its pollution, most recently through a law mandating buffer zones between ag land and waterways.
Two years ago, about 200 cities were ordered to develop storm water management plans, similar to but smaller in scope than those in place for Minneapolis and St. Paul. Cities were meant to submit their plans to the state in June.
Minneapolis' efforts to control storm water began decades ago. There are now massive drainage ponds near rivers and lakes, grit chambers to capture sediment and trenches in boulevards to capture storm water.
Waterways in Minnesota still face huge obstacles, but the urban efforts have made an impact, according to Lisa Cerney, the director of surface water and sewers for the city of Minneapolis Public Works.
Three years ago, amid discussions about "Total Maximum Daily Loads" for sediment and pollutants along the Mississippi, "the water quality through the city of Minneapolis was actually better than it was downstream," Cerney said.
Unlike Sioux Falls, however, that city charges a storm water utility fee to residences.
"Having a dedicated funding source definitely helps," Cerney said.
Rick Knobe, the one-time mayor of Sioux Falls who was in office when the River Greenway project first tackled the issue of pollution in the mid-1970s, is glad that the city is aiming higher.
Residents need to aim higher, too, he said. Part of Minneapolis' storm water plan involves educating residents on water management for their own properties, and it's not uncommon for that city to pour money into educational programs on rain gardens or lawn management.
Sioux Falls is doing outreach and education, as well. Knobe hopes that takes hold. He says citizens need to take as much ownership and pride in the river's water as they do in the River Greenway if the city is to truly set an example.
"People in Sioux Falls want their yards green. They want no weeds. They want the perfect garden. They do all that with chemicals," Knobe said. "The city's doing the right thing with its drainage ponds and these buffers, but the residents have got to start doing the right thing."

Q: What's wrong with the Big Sioux River?
It's been listed on the state's list of impaired water bodies since 1999.
Q: What does that mean?
A: There's too much E. Coli and fecal coliform bacteria in the river to make it safe for all its intended uses.
Q: What happens if I ingest E. Coli or fecal coliform?
A: You could be dealing with a host of digestive problems, with colitis lasting one to 12 days. The impacts are more serious for the elderly and children. A splash or two of polluted water is unlikely to cause problems for the majority of people, but swallowing it generally would.
Q: So should I swim in the river?
A: No. The bacterial readings are consistently over the state's and EPA's standard for immersion recreation.
Q: Should I kayak the river?
A. Depends on the day. Kayaking falls under a different beneficial use called limited-contact recreation (LCR). As the name implies, going fully into the water (immersion) is not anticipated, and therefore higher bacteria levels can be tolerated. The state standard for LCR is about 4 ½ times higher than for immersion, so even if swimming is not appropriate, it may be safe to paddle.
The city of Sioux Falls tests water quality twice a week at five sites along the Big Sioux and posts the results on a graph that shows the immersion recreation standard as a red line. Checking the web site can be a good indicator, but common sense goes a long way. A big rainfall can result in a spike in bacteria. The low readings usually correspond with a stretch of dry days. There's no foolproof calculation, but "There are certainly days, following rain events or before rain events, where it's a better or worse idea," said Andy Berg, an environmental engineer for the city of Sioux Falls.
Q: What about fishing? Is that okay?
A: Fishing falls under limited-contact recreation, so the water in which the fish are found may be problematic. As for the fish themselves, the river is considered impaired for warmwater semi-permanent fish life. That means the sediment load in the river is not always ideal for the fish themselves. However, this doesn't mean that they can't be found and caught.


Quality On Tap!
SYSTEM SPOTLIGHT:
Sioux Rural Water
NITRATES IN THE BIG SIOUX RIVER
PROTECTING RIPARIAN BUFFERS:
A Good Idea For Everyone

PROTECTING RIPARIAN BUFFERS: A Good Idea for Everyone

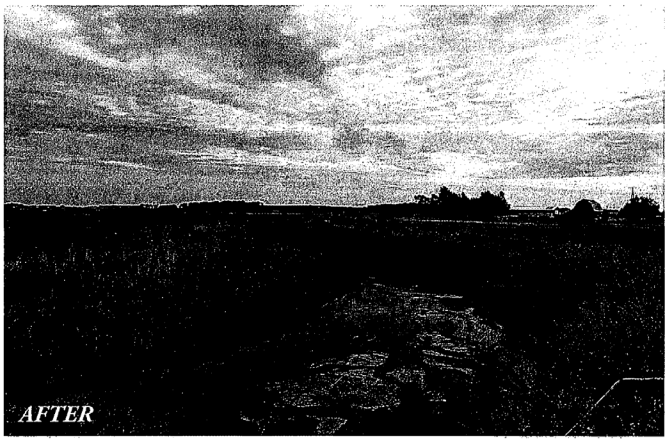
By Barry Berg & Matt Johnson, East Dakota Water Development District

What exactly is a riparian area? A riparian area is simply the transitional zone between land and water environments. Examples of riparian areas include flood plains, stream banks, lake shores, and wetlands. A healthy riparian area is extremely important to water quality as it will reduce sediment, nutrients, pesticides, and other materials in surface and shallow subsurface runoff.

One or more beneficial uses have been assigned to water bodies across the state. There are established state and federal standards for the levels of certain pollutants that can be in the water before it becomes a problem for a given beneficial use. Waters that exceed these standards are considered impaired for one or more of the assigned uses, and efforts to address the source(s) of the impairments are undertaken.

One of the most effective methods for addressing the more common impairments involves restoring and/or maintaining riparian buffer areas. As the name implies, these areas provide a buffer between potential contaminant sources and the particular water resource. The buffer typically consists of a strip of natural (or restored) grassy vegetation in which most conventional farming or ranching practices are prohibited or restricted. According to the 2016 South Dakota Integrated Report for Surface Water Quality Assessment, http://denr.sd.gov/documents/16irfinal.pdf, a significant number of rivers, lakes and streams are impaired due to excess levels of sediment, bacteria and nutrients.

Buffers along rivers, streams and lakes provide protection in several ways. The vegetation acts as a filter, trapping sediment that might be carried into it by runoff. Growth of the vegetation can also take up nutrients in the runoff, lowering inputs to the water body. The deep-seated root systems of the plants also help stabilize and strengthen the lake or stream banks, protecting



them from erosion and keeping sediment out of the river. Finally, exclusion of livestock prevents the direct introduction of manure (nutrients and bacteria) into the water. This also prevents degradation of the stream or lake bank due to animal traffic.

In recognition of the highly beneficial aspects of riparian buffers, there are numerous programs available to support and encourage landowners who want to maintain or restore these areas. Help can be sought from the US Department of Agriculture under the Conservation Reserve Program (CRP) and Wetland Reserve Easements, administered by the Farm Services Agency and Natural Resource Conservation Service (NRCS) respectively. The United States Fish and Wildlife Service provides support for the restoration and protection of riparian buffers. Options and assistance may also be obtained through a variety of private conservation organizations and land trusts for efforts ranging from fence building and grass seeding to long-term or permanent easements.

In the Big Sioux River watershed, watershed project sponsors have developed and implemented two local options. The Riparian Area Management (RAM) Program mimics the benefits and requirements of the federal CRP Program, and is applied to land parcels that do not meet CRP eligibility requirements. RAM is most often used to pick up the final few acres of a parcel that is enrolled in CRP, spreading the support between two sources and protecting buffers.

A relatively new program called Seasonal Riparian Area Management (SRAM) allows producers to change how they manage riparian grassland acres along certain stream segments in order to improve water quality while still keeping those acres in production. The SRAM program is essentially a 6-month, deferred grazing program for those portions of a pasture that lie within the 100-year flood plain of a stream. The program is currently only available to producers within the Big Sioux Watershed Project but may soon be opened to other watershed projects within the state.

Studies across the nation have demonstrated the positive impact that intact and functioning riparian buffers can have on adjacent waters. Working in concert with the SD Department of Environment and Natural Resources, the East Dakota Water Development District has been conducting intensive water quality monitoring along a stretch of Skunk Creek in north-central Minnehaha County for three years. Landowners along this stretch of the stream have voluntarily adopted various practices, particularly SRAM, that have restored riparian area vegetation and limited livestock access. The reductions in bacterial loads have been dramatic, and the overall condition of the area has improved greatly.

During the 2016 Session of the South Dakota Legislature, State Senator Jim Peterson brought forward a bill that would have reduced the property tax burden on riparian areas planted to permanent vegetation. It was a recognition of the voluntary effort by the landowner to forego a higher income from the property (through more intensive land uses) in favor of the broader public water quality benefit of maintaining or establishing a buffer zone. The bill had widespread legislative support, but was ultimately vetoed by Governor Daugaard due to questions about the actual implementation of the concept. The Governor has indicated that a "new and improved" version of this effort will be presented to the 2017 Legislature for consideration.

For more information about how you might help protect and preserve riparian buffers in your area, your local NRCS Office is the best place to start.

HEALTHY RIPARIAN AREAS IMPROVE WATER QUALITY

By Barry Berg, SD Association of Conservation Districts

What exactly is a riparian area? A riparian area is simply the transitional zone between land and water environments. A healthy riparian area is extremely important to water quality as it will reduce sediment, nutrients, pesticides, and other materials in surface and shallow subsurface runoff. Examples of riparian areas include floodplains, streambanks, lakeshores, and wetlands.

Livestock overgrazing in riparian areas can have negative impacts and may accelerate erosion and sedimentation, change stream fl w, increase nutrient and bacteria loading (such as Escherichia coli), and destroy aquatic habitats. While total exclusion is typically the preferred option for streambank protection, it may not always be the best solution in every situation.

SRAM allows producers to change how they manage riparian grassland acres along certain stream segments in order to improve water quality while still keeping those acres in production.

A relatively new program called Seasonal Riparian Area Management (SRAM) allows producers to change how they manage riparian grassland acres along certain stream segments in order to improve water quality while still keeping those acres in production. The SRAM program is essentially a 6 month deferred grazing program for those portions of a pasture that lie within a 100-year floodplain of a stream. The program is currently only available to producers within the Big Sioux Watershed Project but may soon be opened to other watershed projects within the state.

Main Program Guidelines

- Pasture acres within the 100-year floodplain of a stream eligible for SRAM enrollment (20 foot minimum for enrollment);
- Choice of 10 or 15 year contract;
- Rental rates for enrolled acres determined through the Big Sioux Watershed Project, with payment to be made in-full during the 1st year of participation (currently $60 per acre year) (e.g. 25 acres enrolled for 10 years = $15,000);

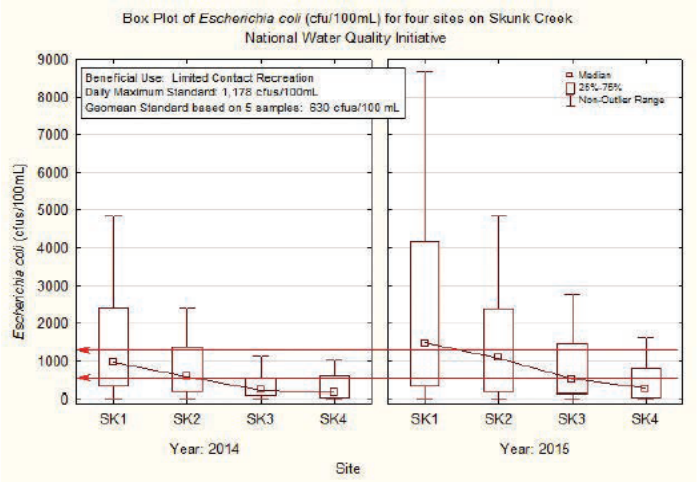
■ No grazing allowed on enrolled acres from April 1st – September 30th, however, those acres can be hayed after June 1st while maintaining a minimum vegetative cover of 4 inches;

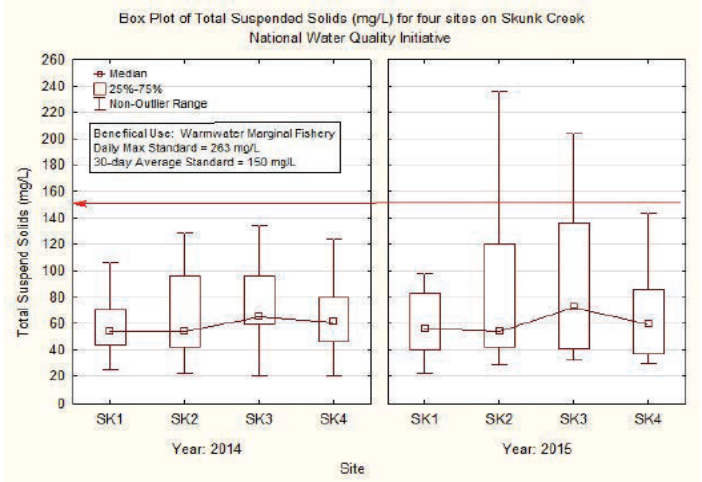
■ Acres under contract can be fall grazed after September 30th if a minimum vegetative cover of 4 to 6 inches is maintained. However, an alternative water source is required to reduce impacts on the riparian area;

■ Technical and financial assistance for conservation planning, fencing, alternative water development, cattle crossings, etc. available through the Big Sioux River Watershed Project.

The SRAM program is diffe ent from other buffer initiatives such as the Conservation Reserve Program (CRP). Landowners are still able to utilize the grass near streams for hay after June 1st and throughout the growing season. The allowance for fall grazing after September 30th is also a major diffe ence between the two programs. Producers can manage the SRAM acres by fall grazing but are required to have an alternative water source available to reduce impacts on the riparian area.

As of August 2015, the SRAM program had enrolled roughly 790 acres within the Big Sioux watershed with the majority of those acres along Skunk Creek that is a tributary to the Big Sioux River. The goal is to enroll an additional 1,700 acres in an attempt to improve water quality on the Big Sioux and its tributaries north of Sioux Falls by 2020. For more information on the SRAM program, contact Barry Berg, Watershed Coordinator at 605.759.2650.





QUICK READ

HAVE A STORY IDEA? Jacqueline Palfy Klemond, Metro news editor, 331-2317

Buffer strip boosters planning another go during 2017 session

JAMES NORD
ASSOCIATED PRESS

PIERRE — Seeking improved water quality in South Dakota, advocates of a bill vetoed this year to encourage buffer strips between farmland and waterways plan to try again in 2017.

They may get a boost from the source of their discontent: Gov. Dennis Daugaard, who rejected the plan to offer tax breaks for buffers in March. Daugaard cited constitutional and property tax concerns over the bill, which overwhelmingly passed the Legislature.

Daugaard supports the concept and will offer a buffer strip proposal later this year to the Legislature's Ag Land Assessment Task Force, spokeswoman Kelsey Pritchard said in an email, declining to offer additional details.

Buffers help trap fertilizer, pesticide and sediment before they reach water.

"We're firm believers that riparian buffers are one of the best things that we can possibly do to protect our rivers and streams and lakes" in South Dakota, said Jay Gilbertson, manager of the East Dakota Water Development District, which backed the 2016 legislation.

Supportive legislators didn't muster the support necessary to override Daugaard's veto of the bill, which would have allowed farmland along a lake, river or stream that was turned into a 50-foot buffer strip of vegetation to be classified as non-cropland for property tax purposes. That would have meant a lower tax burden for those landowners.

There were questions about the impacts of the measure this year that need to be answered, including which waterways would be subject to the policy, Gilbertson said.

The governor had also offered concerns that the bill would shift the property tax burden onto other property owners.

The South Dakota Corn Growers Association opposed the measure as messing with the tax structure without effectively inducing farmers to install buffer strips. The group instead wants to see more education efforts so farmers can learn about available programs, executive director Lisa Richardson said. "We are 110 percent behind buffer strips," she said. "This bill did not address the issue. It's not going to get more farmers to participate — that's what we're trying to do."

Democratic House leader Spencer Hawley, a main sponsor of the 2016 bill, said he hopes to offer a plan next session that addresses the governor's concerns and maintains lawmakers' support.

JAMES NORD/AP
Gov. Dennis Daugaard rejected a plan in March that would have offered tax breaks for buffer strips between farmland and waterways, despite overwhelming approval from the Legislature.

Daugaard administration proposes plan to boost buffer strips

- By JAMES NORD Associated Press
- Updated Sep 7, 2016

SIOUX FALLS, S.D. (AP) — Gov. Dennis Daugaard's administration is proposing a plan that would encourage people to install buffer strips of vegetation between agricultural land and hundreds of lakes and thousands of miles of streams, an adviser to the governor said Wednesday.

The draft bill is meant to improve water quality in South Dakota, said Hunter Roberts, a policy adviser to the governor. It would offer property tax breaks for land turned into buffer strips to help trap fertilizer, pesticides and sediments before they reach water.

The proposal allows for the tax incentives on 50- to 120-foot buffers along waterways including 575 lakes and roughly 11,000 miles of streams in South Dakota. Eligible buffer strips would be assessed at 60 percent of the land's agricultural income value.

The administration will present the draft bill to a legislative task force next week for its consideration.

"It's a proven thing to work for water quality," Roberts said, adding that it's a good next step for the state to "give producers and landowners the opportunity to have some financial benefit to doing buffer strips."

The measure would allow buffer strip vegetation to be harvested or mowed after July 10, but would require a minimum of 6 inches of cover at all times. Grazing would be prohibited from May through September to help keep livestock waste out of lakes and streams, Roberts said.

The proposal would be voluntary, but anyone who misrepresents facts to get a property tax break for a buffer strip would be subject to a monetary penalty.

The governor's administration is taking small steps to improve water quality, said Barry Berg, watershed coordinator for the Big Sioux River Watershed Implementation Project. Berg said he would like to see the option for both smaller and larger buffers to give landowners more flexibility.

"I don't think it's going to be a huge flood of people coming in because of it, but it may help a little bit," Berg said.

The administration's plan comes after Daugaard rejected a bill that used a different mechanism to offer tax breaks for buffers in March, citing constitutional and property tax concerns. The new measure is the administration's best effort to reap the benefits of buffer strips while complying with the state constitution, Roberts said.

The South Dakota Corn Growers Association opposed the earlier measure, saying it would change the tax structure without effectively inducing farmers to install buffer strips. The new proposal looks like something the group can work with, executive director Lisa Richardson said.

"We all want to do things that protect our water and this is one tool that could do it," she said.

Skunk Creek pollution drops

John Hult, jhult@argusleader.com 4:54 p.m. CDT August 11, 2016

(Photo: Joe Ahlquist / Argus Leader)Buy Photo

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Skunk Creek is cleaner than it has been since 2012, thanks in part to a city- and state-backed program that pays farmers to keep pastured cattle – and their bacteria-laden waste - out of the water.

A draft version of the 2016 Integrated Report on Surface Water Quality has removed one of Skunk Creek's three "impairments," de-listing it for total suspended solids.

It's still listed as impaired for E. coli bacteria and fecal coliform in the report, which is produced every two years by the state as required by the Clean Water Act.

Officials say the news is a sign that a targeted approach to water quality and funding partnerships can make a difference. Skunk Creek was chosen as a test site for a federal government-backed initiative that prioritized certain polluted water bodies with increased funding and testing.

Skunk Creek's importance was tied to its proximity to South Dakota's largest city.

ARGUS LEADER
Cleaner waters ahead: City sets lofty goals for Big Sioux River

"It has an effect on the Big Sioux River that flows through the city of Sioux Falls," said Kevin Lorenzen of the Department of Environment and Natural Resources.

About 60 percent of the water flowing through the still-impaired Big Sioux River comes from Skunk Creek, according to Jesse Neyens of Sioux Falls Environmental Division.

"We're extremely happy that Skunk Creek being de-listed for total suspended solids," Neyens said. "It shows that the work that's been put into the watershed is paying off."

The success story stems from a partnership, Neyens said..The city has taken out more than $5 million in state revolving fund loans to improve the Big Sioux River and Skunk Creek since 2013. Funding also has come from the federal government, the DENR and local conservation districts. The DENR set up a page on its website to outline the Skunk Creek project.

After bank improvements were completed, the focus shifted to a program called Seasonal Riparian Area Management, or S-RAM. Producers sign 10- or 15-year contracts to keep cattle out of the water through the recreation season.

More than half of the enrolled farmland along Skunk Creek, with 868 of 1,290 acres – 77,550 linear feet – is located near the banks of Skunk Creek.

To see changes so quickly is a boost to the notion that cities can work with producers in a way that helps water quality upstream, said Barry Berg, the Natural Resources Conservation Service in charge of S-RAM and several other farm-focused water quality programs in the Central Big Sioux River Watershed.

"To get some results like that in a matter of three years of working on a new program – that's pretty cool," Berg said.

Less than 10 percent of the water samples taken along Skunk Creek tested over the limits for total suspended solids in the draft report, which is under review by the Environmental Protection Agency.

The improvement is a boon for the fish population, but it also bodes well for the prospects of improvements along the Big Sioux River, into which Skunk Creek drains. The city has education programs on pet waste, fertilizer and rain barrels. It also began planting buffers along the river last year to catch more waste before it flows into the river, but upstream agriculture is outside the city's jurisdiction.

The city funding is meant to help producers pay for changes that improve water quality. Berg hopes to expand the program's footprint and add more options with the next round of city funding. One under consideration would offer payments for portable shade devices, which would allow cattle to cool off in the summer months without heading for the water.

The contracts for the current S-RAM acres are locked in, so the most recent round of city loan funding can be used in a variety of ways.

ARGUS LEADER

Precision testing shows danger in Big Sioux

"There's a lot of money to use, and we've got to step up our game," Berg said. "You can't just sit back and be complacent. You've got to shake things up."

Being responsive to the needs of producers when crafting programs is key to success, Berg said. Part of what made S-RAM attractive was that it allows farmers to cut the grass every year for hay, and cattle can graze on the enrolled acres during the off-season.

Jim Feeney of the DENR stressed that improvements to water quality can be lost if support dries up.

"If people walked away from those practices, things could turn around and (Skunk Creek) could be re-listed," Feeney said.

There is still plenty of polluted water for South Dakota to deal with. Of the 5,858 river and stream miles assessed by the DENR over the past five years, just over a fifth were clean enough to support all of their "designated uses," which could including fishing, irrigation, limited contact recreation like kayaking and canoeing or immersion recreation, shorthand for swimming.

The Skunk Creek results suggest that focusing limited dollars on specific cleanup projects can have a more immediate impact than a "shotgun" approach that spreads dollars throughout wider areas of a watershed.

The DENR has three other areas under consideration for targeting. Among them are the west branch of the Vermillion River, Firesteel Creek in the James River Basin and Willow Creek, which flows into the Big Sioux River near Watertown.

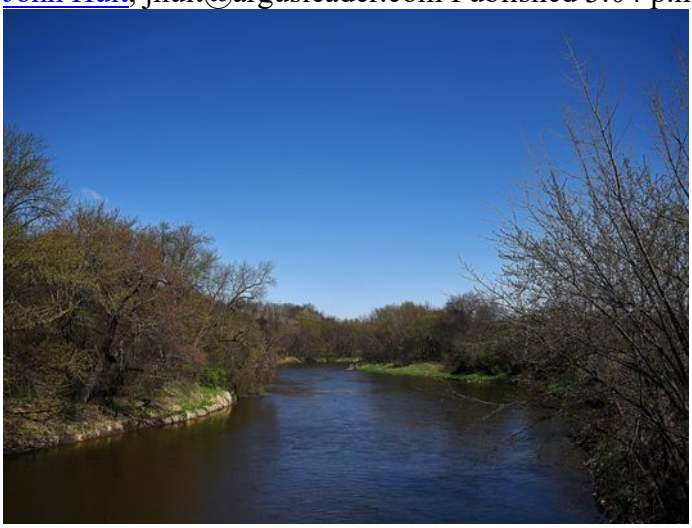
"We usually work in large areas, but we do target within those areas, and we are looking to expand this concept," the DENR's Pete Jahraus said.

The results of the 2016 report and the details of the cleanup projects will be discussed in greater detail at the Mayor's Big Sioux River Water Summit on Sept. 7.

John Hult is the Reader's Watchdog reporter for Argus Leader Media. Contact him with questions and concerns at 605-331-2301, 605-370-8617. You can tweet him @ArgusJHultor find him on Facebook at Facebook.com/ArgusReadersWatchdog

Funding cut threat concerns water quality advocates

John Hult, jhult@argusleader.com Published 3:04 p.m. CT Aug. 4, 2017 | Updated 1:09 p.m. CT Aug. 5, 2017



The Big Sioux River Thursday, April 21, 2016, between Baltic and Renner, S.D., near 254th Street.(Photo: Joe Ahlquist / Argus Leader)Buy Photo

It's an important program that produces real results, but it's not worth keeping.

That was the message East Dakota Water Development District's Jay Gilbertson took from a press release trumpeting the release of $2.5 million in funding for water quality projects in South Dakota.

The release came from the Environmental Protection Agency. The money came from the Section 319 program, which is designed to tackle "nonpoint" pollution – farm runoff, manure from pastures and the like.

It's grant money South Dakota's used for years to tackle pollution in the state's public waters, two-thirds of which are too dirty for some combination of drinking, fishing, kayaking or swimming.

"Providing funds directly to South Dakota emphasizes the importance of partnering with states to help address their unique and critical environmental challenges," said EPA Administrator Scott Pruitt.

What the July 25 news didn't mention was that two months before that, Pruitt's agency proposed a budget that would zero out Section 319 funding in the next fiscal year.

"It struck me as a little disingenuous for the secretary to be lauding the benefits of a program the administration believes is unnecessary," said Gilbertson, whose agency uses Section 319 funding for projects up and down the Big Sioux River.

The budget proposal is subject to Congressional approval, and there are signs the program will remain funded. The House's budget proposal would restore $170 million in funding.

Each member of the state's Congressional delegation – Sens. John Thune and Mike Rounds and Rep. Kristi Noem – said this week they'd offer the program due consideration.

Even so, Gilbertson's not the only one troubled by the symbolism of a proposed budget that leaves no room for Section 319.

There are a handful of funding sources to help farmers pay for what are known as "Best Management Practices, or BMPs.

Those include planting buffer strips to capture runoff, installing fences and clean water sources to keep livestock and their waste out of rivers and streams and building barns with underground pits that trap waste and keep it from washing away and into water sources.

Section 319 funding pays for some of the project costs, but it also pays the salaries of the people who pitch the projects to farmers and monitor their success.

"If there's nobody there to do the program, it just sits there," Gilbertson said. "The 319 funding in South Dakota, to a certain extent, has been the glue that holds everything together."

Barry Berg works for the East Dakota Water Development District.* He designed a program called S-RAM - Seasonal Riparian Area Management – that's credited with heavy reductions in pollution along Skunk Creek.

Last year, the Big Sioux River-feeding creek north of Sioux Falls was de-listed for total suspended solids after years of impairment.

Section 319 money's not only paid for Berg and an assistant over the years, but contributed S-RAM payments to farmers for keeping livestock out of the creek.

The city of Sioux Falls matches contributions and uses state revolving fund money to help pay for the program upstream of the city, but total funding cut would be significant.

"It's millions of dollars that we wouldn't have," Berg said.

A cut to the program would likely force the city of Sioux Falls to alter its approach to Big Sioux River cleanup, said Jesse Neyens of the Sioux Falls Environmental Division.

"We wouldn't be able to accomplish all of the things we want to accomplish," Neyens said.

Jim Feeney of the state Department of Environment and Natural Resources can't recall an EPA budget without any 319 money, but he has seen Congress increase funding after budgets that sought to cut payments.

The DENR uses the money to pay 60 percent of the salaries for the equivalent of 13 full-time employees who focus on water quality.

Feeney said the agency will continue to take applications for projects through the fall, evaluate them through the winter and wait if enough money's awarded to keep working.

"All we can do is proceed with thinking we're going to have 319 funding," Feeney said.

My Voice: Caring for Big Sioux River may unite community

Dana Loseke Published 3:27 p.m. CT Dec. 5, 2017

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In today's society, we seem to prefer cut and dried perspectives. We gravitate toward abruptly divided judgments. We describe beliefs as good or bad, right or wrong. However, as we try to compartmentalize complex issues and opinions into either-or categories we risk becoming entrenched in positions that avoid or neglect meaningful discussion and information. The consequence of this approach can be disrespecting to the sincere viewpoints of those whose positions may differ from our own. As we face important but difficult issues, we need to be open-minded so we can ask questions, seek information and find rational clarity.

Our nation was founded on the idea that we have the right to look out for our best interests, but also that a community's best interests must be considered. This is no simple matter, requiring that we consider a myriad of voices and recognizing that those voices cannot be easily classified as winners or losers, as right or wrong.

Protecting the Big Sioux River offers a unique opportunity for our community to break free from that binary approach to formulating and judging opinions and conclusions. This is an opportunity for all of us to tackle a challenge while honoring the complexity of issues and interests involved in a diverse river that is over 400 miles long, is impacted by many thousands of people and drains a watershed area measuring 9,600 square miles. The movement for a healthier Big Sioux River requires effort and support from homeowners, farmers, business owners, Democrats, Republicans, independents, gardeners, teachers, kayakers, golfers, dog walkers, cat lovers and everyone in between all of those.

The organization, Friends of the Big Sioux River, is poised to help lead this community effort. Our board of directors has decided that one of the most important goals to serve this effort must be to gather and present water quality data and other information relevant to the condition of the river. This will help inform all of us to better understand just what sorts of challenges face those of us desiring a healthier river.

Last summer, FBSR began an ambitious reconnaissance effort, surveying the river from near Brookings to south of Sioux Falls. Not only did we conduct this analysis from canoes, kayaks and on foot, we also chartered an airplane to view the river from above. We are assembling references and resources, photographs and documentation about the river and its shoreline, and we are using sophisticated mapping formats to identify the locations possessing a variety of circumstances and conditions along the river. We intend to share this information with the public on our website and through our newsletters. We also intend to expand our analysis to the entire river.

FBSR has also worked to better understand water quality in the river by conducting water testing at various locations in the Sioux Falls area and by studying water quality data collected by other organizations, institutions and agencies. If a cleaner river is our goal, we need to know the status of water quality through all seasons in the river. The results of these tests are available on our website. We endorse efforts by public agencies such as East River Water Development District, U.S Geological Survey, the South Dakota Department of Environment and Natural Resources and the City of Sioux Falls to monitor water quality in the river and its tributaries. We advocate for additional testing and that this information be easily reviewable by the public.

Information-gathering efforts conducted by FBSR are costly and they require lots of volunteer work, but they provide us with irreplaceable and valuable intelligence about the river. Facts, not rumors or public relations campaigns, must be the basis for our plans and for our actions.

It will not be a simple fix to restore and protect the Big Sioux River. We fully appreciate the challenges ahead of us. But already there are worthwhile, meaningful programs underway to revive the river. We sense an encouraging momentum. Greater public involvement and a unified public voice will add to the trajectory of progress now underway.

MY VOICE

Dana Loseke, 67, is the chairperson of Friends of the Big Sioux River, a non-profit 501(c)(3) organization and a board member of East Dakota Water Development District. A graduate of the University of Nebraska Omaha, he is a retired general manager from Dean Foods and has lived in Sioux Falls for 26 years. My Voice columns should be 500 to 700 words. Submissions should include a portrait-type photograph of the author. Authors also should include their full name, age, occupation and relevant organizational memberships.

Send columns to Argus Leader, Box 5034, Sioux Falls, SD 57117-5034; or email them to alletters@argusleader.com.

South Dakota's buffer strip tax break sees few takers in year one

The Big Sioux River Thursday, April 21, 2016, between Baltic and Renner, S.D., near 254th Street.

There was free money on the table for farmers this year, but most of them left it there.

Gov. Dennis Daugaard’s buffer strip program was designed as a reward for farmers who put runoff-absorbing grass or wildflowers between crops and polluted lakes, rivers or streams all across the state.

The deal was simple: Plant grass or wildflowers between your crops and the water, and your land is taxed at 60 percent of its value.

The program took effect too late to affect most 2017 planting decisions, but some farmers who already had buffer strips or idle areas of land were still eligible.

That news didn't move many of them.

All told, the state Department of Revenue accepted just 27 buffer strip applications from 11 counties in the fall. Three other applications are pending in Turner County.

The applications amount to 292 acres, and just 11.2 linear miles of water.

That represents just a tiny fraction of the 575 lakes and 11,000 miles of rivers and streams covered across 338,784 eligible acres of land.

The figures suggest that most of the landowners with uncropped acres in the Conservation Reserve Program (CRP) or enrolled in other water quality programs were either unaware of the tax break or didn't see enough value to bother signing up.

Some existing buffer strip programs require less than the state's 50-foot minimum, but plenty of acres would qualify, according to Department of Revenue Director Mike Houdyshell.

"Why they didn't all come in and apply, I don't know," said Houdyshell.

It takes time for a new program to percolate into public awareness, Houdyshell said, and water quality boosters are encouraged by some results. The buffer strips listed in the 2017 tally include parcels along the Big Sioux River, Flandreau Creek, Lake Campbell and Lake Sinai.

But critics of the rollout and some landowners wonder if more could have been done to push things along, and whether it does enough to make choosing conservation over crops economically sensible.

David Ganje, a Rapid City lawyer who specializes in natural resources, calls the buffer strip program "a good idea with weak muscles."

"The program is promoted by the wrong department," Ganje said. "The department has no expertise in environmental or agricultural matters and is not a 'go-to' agency for landowners with questions."

Existing buffer strips saw tax relief

Janell Christiansen of Lennox heard about the program through sheer luck.

She enrolled 3.03 acres for an estimated $3,900 reduction in taxable value. Those acres were already there when she stumbled on a buffer strips article online.

"It was land that we had exchanged, and it already had that in place," Christiansen said. "It was a no-brainer."

The application process was simple enough, she said.

County directors of equalization take the applications, and eligible water bodies are checked through a Department of Environment and Natural Resources map online.

Christiansen was surprised to learn that just 27 landowners had applied. The number of CRP acres alone would surely open the doors for more tax relief, she said.

Not every acre of CRP land abuts a creek or lake, but with 500,000 acres statewide, at least some land does.

“That was not advertised very well,” Christensen said. “I think I really did luck out.”

Daugaard’s office pushed out a midsummer press release, and the Revenue Department used Twitter and Facebook to send reminders of deadlines, but there was little formal outreach beyond that.

Mark Tschetter of Moody County’s Pleasant Valley Colony was in the middle of extending a buffer strip along Flandreau Creek through a CRP program when he heard about the tax incentive.

He can’t recall whether he first heard about the tax break through his colony’s lawyer or through a news release on an upcoming deadline, but he knew his 35 acres would qualify at the 50-foot level.

In either case, the buffer strip would have been there anyway. The $17,635 decrease in valuation from the state could amount to property tax savings of “a couple dollars an acre.”

The CRP program was a factor, but “we probably would have built the buffer anyway,” Tschetter said.

“We were too close to the water,” he said.

Codington County had the highest application total, with six approved for nearly 63 acres.

Michael Barrett got a letter about the tax break from the local watershed district, which focuses on the Upper Big Sioux River Watershed and the Lake Kampeska area.

“They actually sent landowners north of Watertown a letter about it,” Barrett said.

Barrett had some land in CRP and some along a mile and a half of shoreline that "isn't very useful to us."

"It's all right for pasture, but we don’t use it as pasture," Barrett said.

The buffer strip program seemed like a good idea, though Barrett's curious to know what the savings will be.

Questions on eligibility, value remain

More than 70 percent of the state’s waters are impaired by fecal coliform, E. coli or other bacteria and total suspended solids, according to the state’s most recent survey for the Environmental Protection Agency.

Agricultural runoff is a major source of that pollution.

Ganje is supportive of the buffer strips program, he said, because it recognizes the state’s pervasive water pollution problems and encourages a land management practice proven to slow the flow of manure, sediment and fertilizer.

Ganje wonders if tax enticements are enticing enough.

“The economic incentives to participate are not strong enough to get the attention of the landowning public,” Ganje said. “Money talks, and this program does not do enough talking.”

Dana Loseke, director of Friends of the Big Sioux River, has a rosier view of the incentives. The tax break brings the decision to plant buffer strips closer to a place that makes economic sense, particularly if they come in tandem with existing programs.

The buffer strips bill was a big step on the state level, because it is what Loseke calls “a disincentive for doing the right thing.”

Before the bill became law, land set aside for conservation was taxed as though it were covered with profit-generating crops. Without payments from other incentive programs, buffer strips didn’t make economic sense.

It’s too early to say if the change will be enough to encourage new buffer strips, but every incentive helps.

“We need to give it a good two years before we can say it worked or it didn’t work,” Loseke said.

Jay Gilbertson, head of East Dakota Water Development District, was pleased to see so many parcels in the Big Sioux River basin on the list of applications.

About 185 acres of the land enrolled for the tax credit in 2017 is in Brookings, Codington, Grant, Hamlin and Moody County.

“This is well short of what we would like to see, but at least some folks participated, and their experiences will give us something to base outreach efforts next year,” Gilbertson said.

Education, word of mouth needed

There’s a lot left to do on that front.

Minnehaha County, home to more than 1,600 acres of buffer strips along Skunk Creek, had no applications for the tax credit.

Part of the issue could be with each program’s specifics. CRP acres don’t have crops, but only some of those acres are near eligible water bodies.

Other programs have slightly different guidelines than the state requires. Fifteen buffer strip applications were rejected, Houdyshell said.

South Dakota State Senator Shantel Krebs, left, talks with Barry Berg, right, watershed coordinator for the Central Big Sioux River Watershed Implementation Project, as Lucas Lentsch, former secretary of agriculture with the South Dakota Department of Agriculture, looks on in an enrolled pasture in the Seasonal Riparian Area Management (SRAM) progam on Skunk Creek near Colton, S.D., on Wednesday, Aug. 6, 2014, during a tour of the different enrolled pastures in the SRAM and Riparian Area Management programs on Skunk Creek and the Big Sioux River. The SRAM program pays farmers to fence livestock away from Skunk Creek's 100-year floodplain from April 1 to Sept. 30. (Photo: Joe Ahlquist / Argus Leader)

The Seasonal Riparian Area Management (S-RAM) program along Skunk Creek sees the city of Sioux Falls paying landowners to keep cattle out of the water, using buffers of at least 20 feet.

“The state requires 50 foot,” said Barry Berg of the Big Sioux River Watershed Project. “For the buffer program, it doesn’t count.”

Some of the S-RAM areas have wider buffers that would qualify, though.

Berg said it’s not clear whether the landowners he’s working with were aware of the possible tax break. It’s also unclear if the savings in taxes would be worth the hassle of applying.

S-RAM payments are higher than the tax break.

“I think the amount of money that we’re paying for that land, they’re satisfied with that,” Berg said.

Berg’s program has made an appreciable difference in water quality, but it took some time for word to get out about it.

Berg had to pitch it to the first few landowners. After the first season, neighbors started asking questions. Now, he adds about 300 acres a year, mostly from landowners who call the city to ask.

The more acres enrolled, the bigger the impact. Last year, Skunk Creek was de-listed for total suspended solids, though it remains impaired for E. coli.

Getting the word out is key, said Krystil Smit of the South Dakota Farm Bureau. Smit heard plenty of interest when the buffer strips bill was being debated in Pierre.

“It does emphasize a need for people to be out talking about it,” Smit said.

Farmers and ranchers pride themselves on being stewards of the land and water, Smit said. Landowners want to manage runoff and water resources as wisely as they can while still making a living.

“It’s not just about the payments,” Smit said. “Producers are looking for ways to stop erosion and to assist in clean water practices. There’s a lot of land benefit to creating those buffer strips.”

Study: Big Sioux River bacteria includes the kind that can make you sick

John Hult, jhult@argusleader.com Published 6:14 p.m. CT Nov. 16, 2017 | Updated 7:07 a.m. CT Nov. 17, 2017

CLOSE

A video explainer on the pollution troubles in the Big Sioux River Wochit

The Dells of the Big Sioux River provide a glimpse of nature's beauty in Dell Rapids. The scenic cliffs provided a great draw to early settlers. (Photo: Jesse Christen / Dell Rapids Tribune)

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The Big Sioux River has long been polluted by bacteria, but how much of it could make you sick?

New research from the South Dakota School of Mines and Technology found plenty of strains of E. coli that pose a risk to human health.

Not all strains of E. coli are harmful. The goal of the research was to get a better sense of how much of the Big Sioux's bacteria is potentially pathogenic.

The study was funded by East Dakota Water Development District and the city of Sioux Falls and was conducted as part of the doctoral thesis work of Dr. Kelsey Murray.

More: Mayor says more action needed on Big Sioux River pollution

Some genetic studies around the world have looked at water bodies with high E. coli concentrations and found that very little of it had disease-producing genetic characteristics.

To find out if those concentrations pose real danger, Murray told the East Dakota board on Thursday, "we thought we really should be looking at these bacteria on a genetic level."

Murray's team analyzed samples from Skunk Creek to look for the presence of genes like Shiga toxin, which turn E. coli into something potentially dangerous.

 Buy Photo

Dr. Kelsey Murray explains the results of her study on Big Sioux River bacteria to members of the East Dakota Water Development District Board of Directors on Thursday, Nov. 16, 2017 in Sioux Falls. (Photo: John Hult / Argus Leader)

The researchers gathered samples each month for a year at four sites along Skunk Creek and the Big Sioux River.

The numbers fluctuated from month to month, but they found Shiga toxin genes that cause mild to moderate diarrhea in 34 to 50 percent of the water sampled in total, and genes linked with a risk to intestinal lesions in 72 percent.

Other trouble genes connected to more serious health problems were found in between 11 and 22 percent of samples. The researchers also found bacteria that had more than one of the pathogenic genes, suggesting that the genes are being swapped between organisms.

“While E. coli does give us a baseline to assess the risk of using our waters recreationally, this virulence gene profiling is really the first step in establishing a more defined risk of using our waters,” Murray said.

The next step could be to attempt to connect the E. coli genes studied to the cases of Shiga-toxin E. coli (STEC) reported to the South Dakota Department of Health.

There were 80 cases reported in South Dakota last year, 16 of which were in the Sioux Falls metropolitan area, but the source of those STEC infections is unclear. The infections could be related to food contamination and not from contact with contaminated river water.

The figures wouldn’t count cases of mild diarrhea that go unreported, but the reported cases could offer some insight into the source of infections.

“Looking at the clinical results, that would be able to tie that together,” said Jay Gilbertson, the Director of East Dakota.

NO COWS: Tony Gelderman looks over a 90-acre pasture that Skunk Creek runs through. He defers grazing on the pasture until fall to help improve the quality of water in the creek during the summer recreation season.

FARM OPERATIONS>CONSERVATION

Cleaning up Skunk Creek: A conservation success story

Farmers use a homegrown working lands conservation program to defer grazing along important waterway.

Lon Tonneson 1 | Jul 25, 2017

Tony Gelderman is helping clean up Skunk Creek, a major tributary of the Big Sioux River that flows through the eastern third of South Dakota.

Gelderman, Hartford, S.D., enrolled a 90-acre pasture that straddles Skunk Creek into a unique, homegrown conservation program called S-RAM, or Seasonal Riparian Area Management. S-RAM has been so successful that it is being considered a model for other projects in the Dakotas and across the country.

One-time payment

S-RAM pays landowners $60 to $75 per acre over a 10- to 15-year period to defer grazing along the Big Sioux River and its tributaries from April 1 to Sept. 30.

Acres enrolled in the program can be hayed after June 1 and can be grazed after Oct. 1.

The program was a good fit for Gelderman, who has other pastures that he can use for summer grazing. He also needs grass hay. He feeds cows grass hay and distillers grains in the winter.

“The only other alternative was to put the pasture into CRP [Conservation Reserve Program],” Gelderman says, “but

then I wouldn’t have been able to hay or graze it.”

Cleaner water
About 40% of the pastureland along Skunk Creek is enrolled in S-RAM, reports Barry Berg, East Dakota Water Development District watershed coordinator.

The district has monitoring stations along the creek. Tests show the water quality is much improved downstream from the S-RAM acres. In 2016, for the first time in four years, the sediment load dropped low enough that Skunk Creek was taken off the state’s impaired waters list for sediment.

Skunk Creek’s water enters the Big Sioux River in Sioux Falls, the state’s largest city. Sioux Falls has built parks and trails along the river. Recreational and environmental groups in South Dakota are pushing to make the river fishable and swimmable by 2020.

Though work on cleaning up the Big Sioux has been going on for some time, it’s been hard to make any real progress. All of the larger farms in the watershed that are required to have permits for their feedlots and livestock barns containing manure and runoff, so they don’t reach the river. But smaller farms don’t have to follow the same rules. Programs such as the Environmental Quality Incentive Program are available, but the producer cost-share portion may still be too expensive for many small operations to justify. Also, until S-RAM came along, there wasn’t a program to keep cattle on pasture out of the water that didn’t involve taking land out of production.

In 2012, Big Sioux River Watershed Project officials came up with the S-RAM idea. They ended up receiving about $1 million in grants from the state and $3 million from the city of Sioux Falls for the program.

Win for farmers, too
Some farmers have seen their herd’s average weaning weights rise as much as 25 pounds per head after enrolling in the S-RAM program. That’s because after they fenced off Skunk Creek, many took advantage of a 75% cost-share program and hooked up livestock waterers to rural water or private wells. The water is cleaner than what was in the creek, and the calves have gained more weight over the summer.

“S-RAM on Skunk Creek has been a win for conservationists and for farmers,” Berg says.

S-RAM details

The following are some of the details about S-RAM, or the Seasonal Riparian Area Management program:

• No grazing allowed April 1 through Sept. 30.

• Grazing allowed Oct. 1 through March 30.

• Haying allowed after June 1.

• A minimum of 4-6 inches of vegetative cover must be maintained on enrolled acres.

• Payment is $60-75 per acre for land that lies within the 100-year flood plain.

• Payment for acres outside of the 100-year flood plain is $30-$37 per acre.

• Contracts are for 10 to 15 years.

* Payment is made in full the first year of the contract.

• A 75% cost-share for fences and repair of damaged areas and livestock tracks is available.

• A 30% cost-share of alternative water sources such as rural water hook ups, wells, pipelines and tanks is available.

• A 50% cost-share is available for trees and fabric.

For more information about the program, contact Barry Berg, watershed coordinator, East Dakota Water Development District, 1307 N. Clark Ave., Dell Rapids, SD 57022; call 605-759-2650; email *barry.berg@sd.nacdnet.net*.

Buffer bill: What to know as Daugaard mulls whether to sign

JAMES NORD, Associated Press Published 2:02 p.m. CT March 24, 2016 | Updated 2:05 p.m. CT March 24, 2016

Gov. Dennis Daugaard is weighing whether to sign a bill that would offer farmers tax breaks for taking cropland along waterways out of production and putting in buffer strips of vegetation.

The Republican governor has until Saturday to decide how to act on the bill. State lawmakers will return to Pierre on Tuesday to consider any vetoes that Daugaard may issue.

ARGUS LEADER
Political volleying continues over conflict of interest laws

Here's a look at what people are saying about the measure:

HOW STUFF WORKS

The bill would allow farmland along a lake, river or stream that has been turned into a 50-foot buffer strip of vegetation to be classified as non-cropland for property tax purposes, which would mean a lower tax burden for landowners. The measure is voluntary, but anyone who seeks a change and misrepresents the land's use would be subject to a monetary penalty.

WHY DO PEOPLE WANT IT?

The answer is simple: to improve water quality. Buffers help trap fertilizers, pesticides and sediments before they reach the water. If a farmer is growing crops right up to the edge of a waterway uses manure or commercial fertilizer and it rains, there isn't much stopping runoff from hitting the water, said Barry Berg, with the South Dakota Association of Conservation Districts.

Berg said the measure would be an attractive tool to use with farmers and would complement existing conservation programs. "I really believe that this bill would help out," he said.

SOME WORRIED ABOUT THE UNKNOWN

The governor's administration expressed concerns during the legislative session about the potential tax implications of the bill, but a spokeswoman for Daugaard would only say that his position will be announced when he takes action on the bill.

The South Dakota Corn Growers Association opposed the measure because it would create a tax shift, and the full fiscal impact is unknown, said Teddi Mueller, legislative and industry affairs director. The group supports conservation efforts, Mueller said, but she noted that there are other programs available to farmers.

"It's going to be bigger than what we think," she said.

POLITICS

If Daugaard decides to reject the buffer bill, supporters still have a shot at getting it into law when legislators head to the Capitol for veto day. During its trip through the Legislature, the measure passed unanimously through the Senate and secured more than the two-thirds margin in the House required to override a veto.

"You've got to be the optimist if you're going to Pierre," said Democratic House leader Spencer Hawley, a main sponsor of the bill.

NEIGHBOR TO THE EAST

Officials in Minnesota are working to implement the state's buffer strip law, which will require farmers to leave vegetation buffers of up to 50 feet along streams and ditches. A state department will produce final maps by July of public waters and ditch systems that will require buffers.

Minnesota's minimums previously called for filter strips of 16.5 feet along public drainage ditches and 50 feet along shorelines on designated waters. Enforcement was left up to counties, and was sporadic at best.

Applications Now Open For Buffer Strip Incentives; Daugaard Administration Rolls Out Interactive Map

PIERRE, S.D. – South Dakotans can now apply to receive riparian buffer strip property tax incentives, Gov. Dennis Daugaard announced today.

To aid prospective applicants, the Daugaard Administration has rolled out a new web map to help landowners determine which waters qualify under the new riparian buffer strip program.

“South Dakotans place a very high value on the water quality of our lakes and streams,” Gov. Daugaard said. “I expect many South Dakotans will choose to participate in this program to help improve water quality in our state, and this new map makes it easy to understand who qualifies.”

The web map, developed by the Department of Environment and Natural Resources, allows landowners and county directors of equalization to view and download maps of eligible lakes and streams. The map can also be used to estimate buffer strip lengths and acres. The interactive map database is located at denr.sd.gov/datagis.aspx.

Under the new law, eligible riparian buffer strips are assessed at 60 percent of the land’s agricultural income value. The bill specifies 575 lake listings and 11,000 miles of streams that are eligible. Only land within 120 feet of a listed lake, river or stream may be classified as a riparian buffer strip and grazing is prohibited from May 1 through Sept. 30.

Property owners with eligible riparian buffer strips have until Oct. 15 to apply for a property tax incentive. Applications must be submitted to the director of equalization in the county where the property is located. Eligible applicants will receive tax relief for their 2018 assessment for taxes payable in 2019. To obtain an application or learn more about the property tax incentive, visit dor.sd.gov/bufferstrips.aspx.

Senate panel passes bill that would encourage buffer strips

Associated Press Published 11:54 a.m. CT Feb. 2, 2017 | Updated 24 hours ago

PIERRE - A South Dakota bill that would encourage people to install buffer strips of vegetation between agricultural land and hundreds of lakes and thousands of miles of streams is headed to the full Senate.

The chamber's Agriculture and Natural Resources Committee voted unanimously Thursday to approve the bill. It would offer property tax breaks for land turned into buffer strips of vegetation to help trap fertilizer, pesticides and sediment before they reach water.

Such buffers can improve water quality by acting as a filter, said Hunter Roberts, a policy adviser to Gov. Dennis Daugaard.

"Buffer strips are a proven winner when it comes to water quality," Roberts said. "Good water quality benefits all of us."

The proposal would allow for the tax incentives on 50- to 120-foot buffers along waterways including 575 lakes and roughly 11,000 miles of streams in South Dakota. Eligible buffer strips would be assessed at 60 percent of the land's agricultural income value.

The measure would allow buffer strip vegetation to be harvested or mowed after July 10, but would require a minimum of 4 inches of cover at all times. Grazing would be prohibited from May through September to help keep livestock waste out of lakes and streams.

The proposal would be voluntary, but anyone who misrepresented facts to get a property tax break for a buffer strip would be subject to a fine.

Committee Chairman Gary Cammack said the bill isn't a huge incentive, but that he views it as a "thank you note" from government for doing the right thing.

Will it ever be safe to swim the Big Sioux?

John Hult , jhult@argusleader.com 8:47 a.m. CT April 21, 2017

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(Photo: Argus Leader file photo)

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It’s not safe to swim in the Big Sioux River.

Sediment and bacteria from farms, fields, neighborhoods and businesses drain into the Big Sioux watershed faster than the river can sweep them away. It’s listed as an “impaired water body” for the purposes of swimming and even "limited-contact" recreation such as kayaking and canoeing.

That’s been the case for as long as the Department of Natural Resources has been classifying the state's water bodies, but there are plenty of groups working to fix that.

East Dakota Water Development District monitors water quality up and down the watershed. The city of Sioux Falls spends millions on watershed improvement. Natural Resource Conservation Service offers cash to farmers for water-friendly practices, and Friends of the Big Sioux River moves between them all to advocate for pollution control.

Friends of the Big Sioux, a 2-year-old local group, hopes to see a swimmable river by 2025. Its volunteers will host workshops at the Sertoma Butterfly House on Saturday, Earth Day, to educate the public and rally more troops to the cause.

More: Earth Day includes cleanup, games and marches

“We’re people who basically got tired of bringing visitors to our city, going down to see our number one attraction, then coming back and saying ‘oh, it looks great, but why does it smell so bad?,” Loseke told Minnehaha County Commissioners recently.

The river's still a mess, but there have been some recent successes.

Skunk Creek, which feeds the Big Sioux River, was de-listed for total suspended solids last year, thanks largely to a program that pays farmers to keep cattle out of the river.

More: Skunk Creek pollution drops

Governor Dennis Daugaard signed a riparian buffer strip bill this year that will offer tax breaks to farmers who plant absorbent grasses between cropped ground and water.

But there are complex challenges built into tackling the “non-point” pollution responsible for the Big Sioux’s dirty designation.

“Point” sources – think pipes that pump waste – have been regulated since 1972’s Clean Water Act. Controlling them is relatively easy.

Non-point sources – anything that flows from anywhere into a river, lake or stream – are far trickier.

That's especially true as the city surrounding the river grows – from 26 square miles in 1972 to 73 square miles today. Anything that hits the ground has the potential to flow into storm drains and into the river.

Loseke likes to use lawn fertilizer to illustrate how little messes can turn into a lot of pollution. Here's how he explained it to county commissioners:

“You can drive down any street in Sioux Falls in the summer after a lawn care company and see a couple cups of fertilizer that should be swept up and put back on the lawn. You think ‘oh, it’s just a little bit. It’s just from my lawn.’ But if your neighbor does it, if everybody on your block does it, if you take that times 60,000 households in Sioux Falls and do that three or four times a year, that’s like dumping truckloads of fertilizer into the river,” Loseke said.

Lawn lovers are hardly the only source of potential pollution, of course, but their passion represents a place where regular people can do their part to cut down on pollution.

Phyllis Schrag works in her garden on the boulevard along 19th Street and Main Avenue. The city hopes to incorporate more green space into future development as a way to handle stormwater runoff and improve water quality. (Photo: Argus Leader file photo)

What you can do

Reduce your lawn size: A smaller lawn footprint means less fertilizer, less mowing, less yard waste, less runoff and cleaner storm sewers. Plant native grasses and cover more of your lawn with perennials like flowers and brushes, and your waste footprint shrinks.

City counselor Theresa Stehly and flower-friendly gardening enthusiast, pushed the city to ease up on rules that required short grasses in boulevards in favor of leniency toward water-absorbent perennials. She's a big fan of the "less lawn" approach to landscape design.

“We need to let go of the attitude that we need to have golf course around our home," Stehly said.

Build a rain barrel: The gutters along your house collect and dump water onto the pavement, your lawn, and eventually into the storm drains, which empty directly into the Big Sioux River. If you build a rain barrel, you can catch water and use it for your garden when the rain’s not so plentiful and do the river a favor.

The city holds rain barrel workshops from time to time, at which you can get the supplies for free. Here's how to build one:

Pick up after your pets: All that poo and its attendant E. coli wash right into the river. You can’t clean up after the geese along the bike trail, but you can bag the doggie doo and drop it in any of the pet waste stations along the bike trail.

What can others do?

Try as we might to do our part at home, there are bigger steps that need to be taken by bigger people if the goal of a swimmable river is to be achieved.

Use low impact development: This kind of development is built on the idea that developers should work to fit the natural landscape, rather than changing the landscape to fit the development, and minimizing the amount of impermeable surfaces like asphalt.

That means using more permeable surfaces, like brick sidewalks, planting trees to absorb runoff and installing "rain gardens" in curbs and boulevards to soak up rainfall. Narrower streets with parking along one side of the road can help, too, as can replacing more topsoil after grading.

Practice water-friendly agriculture: Keeping cattle out of rivers and streams is a big step, but there's plenty of room for change in agriculture. Water boosters hope the new tax breaks encourage more buffer strips, as the tall grasses along them can soak up the fertilizers before they run into rivers and streams.

Conservation-minded ag educators push for no-till practices, as untilled soil absorbs more water reduces sediment runoff. Installing manure containment systems - think slatted floors and underground lagoons - is a vast improvement to an open feedlot.

As with low impact development, there are cost barriers to water-friendly practices in agriculture. The crops that might go where the buffer strips might are worth more than the tax breaks would be, for example. Switching from till to no till means changing equipment, and it takes years for untilled soil to improve enough to produce the yields farmers are accustomed to.

As Loseke told commissioners: If there isn't enough profit to sustain the business, there's surely no money to spend on water quality. The NRCS, DENR and even the city of Sioux Falls offer cash for some conservation practices, but there's always an investment from the producer.

With low impact development, business owners say the cost of water-friendly neighborhoods is sure to be passed along to homeowners.

They say that directly to Mayor Mike Huether, who sees Big Sioux improvements as a signature issue.

"They'll flat out tell us, 'we're going to pass this cost on to the consumer,'" Huether said last fall.

The city's still looking for partners to test out some of its proposed low impact development standards and show that profits and responsible development aren't mutually exclusive, but no company has stepped up to invest in them just yet.

So is the goal of a swimmable Big Sioux attainable by 2025?

East Dakota Water Development Director Jay GIlbertson doubts it. There have been improvements, and there are days when E. coli levels drop far enough to be considered safe for kayaking and canoing, but the standard for safe swimming is a high target in a state where most water protection is voluntary.

"Swimmable is a laudable goal, but I think it is overly optimistic. It's taken a century to get us to where we are today. It's getting better, but … we remain a long way away from being able to improve those numbers," Gilbertson said.

Big Sioux River Watershed Partnership to Receive Conservation Award

NATURAL RESOURCES CONSERVATION SERVICE (NRCS), Huron, SD, June 20, 2017— The U.S. Department of Agriculture's Natural Resources Conservation Service State Conservationist Jeff Zimprich, Huron, is inviting media to an award presentation. With the Cooperative Conservation Award, Zimprich will spotlight the conservation efforts of nine entities in the Big Sioux River Watershed: the City of Sioux Falls, the City of Brookings, East Dakota Water Development District, and six South Dakota Conservation Districts.

Zimprich will give an overview of conservation efforts of the nine entities in the Big Sioux River Watershed to improve soil, water, air, plant, and animal resources, and emphasize the value and importance of the Big Sioux River Watershed Partnership as it helps farmers and ranchers, but also provides benefits to society of clean air to breathe, quality drinking water, habitat for wildlife, and recreational opportunities.

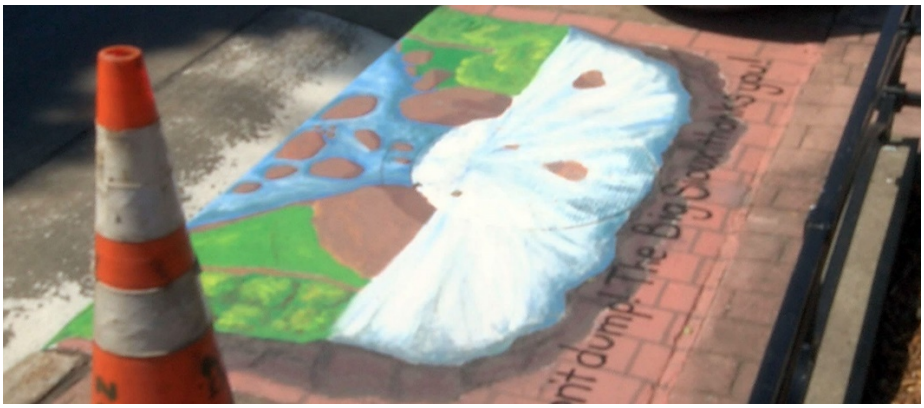
To be recognized are the members of the Big Sioux River Watershed Partnership:
City of Sioux Falls
City of Brookings
East Dakota Water Development District
Brookings County Conservation District
Lake County Conservation District
Moody County Conservation District
Minnehaha Conservation District
Lincoln Conservation District
Union County Conservation District

Friday, June 23, 2017
11:30 a.m. CST
Falls Park West Shelter, Sioux Falls, SD

Arrangements can be made for interviews by contacting Jack Majeres

Helping People Help the Land

Artists Paint Storm Drains For A Purpose In Sioux Falls



Sioux Falls, SD

It may not be raining, but people in downtown Sioux Falls are taking notice of the city's storm drainage system.

Artists are taking to the streets to send an important message. All of these freshly-painted drains lead to the big Sioux River. The water that goes through the storm system isn't treated, so the city wants people to be careful of what ends up in these inlets.

BEFORE AFTER BEFORE AFTER

The above photos show portions of Skunk Creek after one year in a livestock management pilot program that gives the riparian areas time to heal, while keeping the land in production. Contributed photos

Unbounded waters

Moody County, S.D. and Pipestone County, Minn., sharing Pipestone Creek, may share a program that could help clean it

Debra Fitzgerald

On April 1 in neighboring South Dakota, some livestock producers began moving their cattle away from pastures where Skunk Creek runs. The cattle won't return until Oct. 1, and when they do, they'll be healthier, as will the water.

That's what the preliminary data is showing on a pilot program called the Seasonal Riparian Area Management (SRAM) program. The program provides incentives to producers –– $60 an acre, currently –– who keep cattle away from riparian grazing areas between April 1 and Sept. 30. Haying after June 1 is allowed.

A tributary of the Big Sioux River, Skunk Creek travels through southwestern Moody County before entering Minnehaha County and eventually ending up in the Big Sioux River where it travels through Sioux Falls.

The creek is aptly named, said Jack Majeres, chair of the Moody County, S.D., Conservation District –– it's highly polluted with e.coli (bacteria from fecal pollution) and total suspended solids (TSS, or turbidity). It was suspected that grazing livestock were a primary culprit for the impairments because the e.coli levels spiked during the summer months, Majeres said. The cattle have free access to the cool water during hot weather, defecating and urinating into their own drinking water supply all season. Walking into and out of the water, they collapse embankments, creating cloudy, sediment-filled water, or turbidity.

Pipestone Creek in Pipestone County is impaired also, meaning it fails to meet water quality standards and is no longer drinkable, swimmable, fishable or useable in other ways. Its particular impairments are the same as Skunk Creek's –– bacteria and turbidity –– and Moody County is downstream. When Pipestone Creek crosses into Moody County, it becomes that county's problem, as well. Enter Majeres, along with Moody County's district manager, Harvey Shafer.

"You've got to have a boundary somewhere, but water doesn't recognize this," Majeres said.

Majeres and Shafer attended the Pipestone SWCD's March meeting to introduce the SRAM program being piloted on Skunk Creek. It's one program, Majeres told the Pipestone supervisors, that he believes could address the water quality issues in Pipestone Creek.

Cleaner water, healthier cattle

Barry Berg is the watershed coordinator for the East Dakota Water Development District out of Dell Rapids. He began the SRAM pilot program on Skunk Creek in 2013 and currently has 1,229 acres enrolled amounting to 30.7 miles. Berg said they're looking at enrolling another 320 acres through 2017.

Environmental Protection Agency (EPA) standards for the presence of e.coli in limited contact recreational waters –– the designation needed on Skunk Creek –– is 630 colony forming units (cfu) per 100 milliliters (mL) of water. What's been found in Skunk Creek is twice that standard, or 1,178 cfus/100mL.

> "YOU'VE got to have a boundary somewhere, but water doesn't recognize that.
>
> –Jack Majeres, chair of the Moody County, S.D. Conservation District

However, as enrolled SRAM producers moved cattle away from the waterway, e.coli levels began dropping. At an SRAM sampling site the furthest away from grazing cattle, the EPA standard had been achieved for e.coli.

There are not enough enrolled acres to clean Skunk Creek of its e.coli issue, and it remains on South Dakota's impaired waters list. But the numbers are far closer to being achieved, and the turbidity or TSS issue was completely cleared up.

"We did delist for Total Suspended Solids," Berg said. "That came out from the 2016 Department of Natural Resources."

The data SRAM has produced seems to be working for water quality, but it's also working for producers, Berg said. Their biggest benefits are healthy animals. The livestock, no longer drinking the polluted water, or splashing it around into their faces, which can cause pink eye, had higher rates of gain and lower vet bills.

"It's a win-win situation for everybody," Berg said.

The SRAM program will continue for two more years, at which point Berg will publish the data. Meanwhile, the preliminary data has already convinced Berg, Majeres and Shafer that keeping cattle out of riparian areas, while still keeping those areas in production, can improve water quality and livestock health.

"I'm not shocked," Berg said. "The riparian area is very resilient. It heals itself up very quickly. I had a good idea it would give us some results."

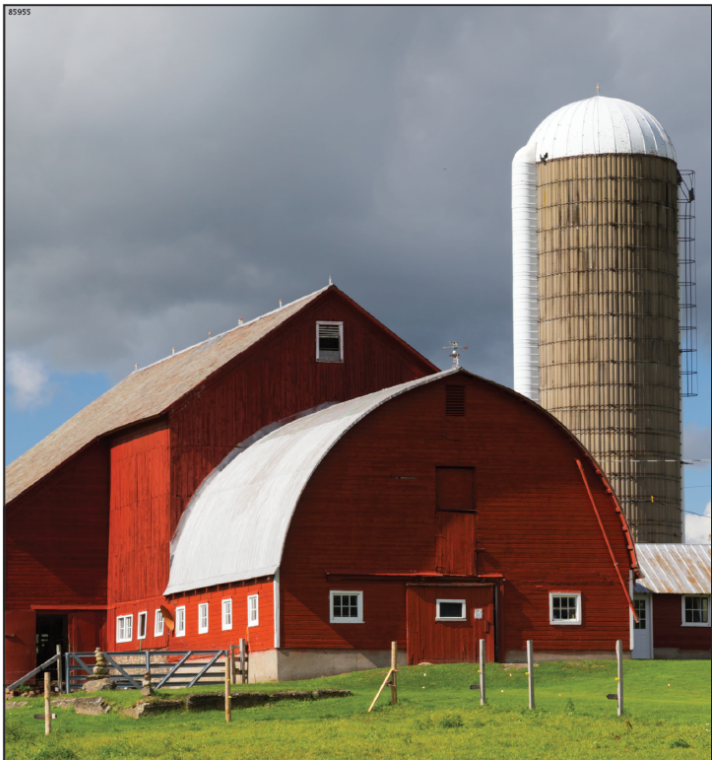
Back at the Pipestone SWCD

The SWCD supervisors were impressed with the data Majeres presented last month because, as Supervisor Ken Christensen said, it seemed to prove that one program was addressing two known pollutants.

If the program were offered in Pipestone County, it wouldn't look exactly the same, given the different funding sources and different states, but "there's ways to make it work," said Kyle Krier, SWCD administrator.

Supervisor Ian Cunningham, who is also a livestock producer, highlighted the incentive portion of the program, and how it would allow the SWCD to pay producers "for an ecological service. They're agreeing that for this money, they'll provide the service of not having cattle there."

Jack Majeres, chair of the Moody County, S.D. Conservation District (above, right) shares with Pipestone County Soil and Water Conservation District supervisors preliminary results from a pilot project that seeks to clean specific water quality issues. Above, left, is Harvey Shafer, Moody County district manager. Pipestone Publishing photo by Debra Fitzgerald



Urban Responsibility For The Big Sioux River

By Advertiser Friends of the Big Sioux River

If you live in the Big Sioux River Watershed District, you are influencing the river. Even if you have never seen the shining waters of the Big Sioux or set foot on its rocky shores, with your hands, your property, or by some extension, you have touched rainwater that has reached the river. Everyone in the Big Sioux Watershed has a stake in the river. Whether you're a homeowner, car owner, pet owner, hunter, fisherman, or businessman, you can take action for the Big Sioux. If eastern South Dakota is your home, this river is yours.

Here are the ways you can help.

1. **Native Grasses**: Landscape your yard instead of trying to maintain grass. This lessens runoff. Landscape your yard with native plants. These plants are better suited for SD and will require less chemical treatment.

2. **Runoff Reduction**: Redirect downspouts away from foundations and onto permeable surfaces. This will allow for better penetration and filtration, and it will keep basements dry!
3. **Mowing Strategies**: Mow your lawn a notch higher and allow grass clippings to stay on the lawn. These clippings act as organic fertilizer.
4. **Storm Drain Protection**: Only rain down the drain! Don't wash paintbrushes outdoors. Keep chemicals such as these from running down the storm drain. When doing home improvement projects, locate your storm drain and protect it from debris.
5. **Lawn Management**: In the fall, aerate lawns and spread compost instead of fertilizer. Keep fertilizers and lawn chemicals off hard surfaces. Minimize the amount of watering and fertilizing you do; do not water or fertilize before predicted rains. Apply water only where it will be absorbed. If you own riverfront property, allow a 50-foot chemical-free buffer strip.
6. **Contaminant Free Runoff**: Make sure you're sending clean water to the river! Regularly check your septic system to make sure there are no leaks or overflows. In the winter, use salt sparingly; shovel whenever possible.
7. **Low Impact Development**: Low Impact Development is an environmental and economical response to the limitations of traditional storm water management. LID pays attention to each site's unique hydrology.
8. **Vehicle Maintenance**: Your vehicle habits can influence the river. Don't dump oil or chemicals down your storm drain. Maintain your vehicle so oils and fluids don't leak onto paved surfaces, including roads and parking lots. Wash your car on your lawn to prevent soaps from running into storm sewers.
9. **Responsible Pet Ownership**: Pick up your pet's waste and dispose of it in the trash. Otherwise, the feces will run off into storm drainage systems and get into the Big Sioux River. Pet waste can have a huge impact on water quality. On the West Coast, cat feces in freshwater runoff killed local sea otter populations.
10. **Bioswales**: Bioswales and bioretention cells improve water quality and divert rainwater from poorly drained areas. They are ideal for parking lots, roadsides, and other urban areas that have large expanses of pavement.
11. **Permeable Pavers**: Pervious paving is a low-impact development strategy that allows excess rainwater to soak through the landscaping and become absorbed by underground aquifers.
12. **Rain Gardens**: A rain garden is a strategically designed depression meant to capture runoff from downspouts, driveways, sump pumps, parking lots, and rooftops.

By taking the above actions, we can work on repairing our watershed, giving our future generation the opportunity to enjoy the river like we once did.

Buffer Strips

Improving South Dakota's water quality and providing wildlife habitat

BY PAUL COUGHLIN, HABITAT ADMINISTRATOR

Buffer strips are the small vegetated areas or strips of land along streams, lakes, wetlands and riparian areas. They are found throughout South Dakota. These areas are important to providing us with clean water, but are often overlooked and underappreciated. They are critical to the habitat fish and wildlife resources.

South Dakota agricultural producers and landowners often use buffer strips and a variety of other best-management practices, to help reduce soil erosion and improve water quality on their lands.

Properly placed and maintained buffer strips along waterways diminish soil erosion and improve water quality by removing sediments and preventing fertilizers and pesticides from entering lakes, rivers and streams.

Because buffer strips are planted to or maintained as native perennial vegetation, they also serve to enhance fish and wildlife habitat. This habitat is often particularly beneficial to local pheasant populations. This is yet another example of agricultural land stewards providing for the public good and benefit through their individual conservation decisions and actions.

When strategically placed on the landscapes, buffer strips effectively diminish the movement of sediment, nutrients and pesticides from agricultural fields. When uncontrolled runoff occurs from tilled lands, soil accumulates as sediment in lakes, rivers and streams, and suffocates living organisms and reduces the sunlight needed by a variety aquatic plants and animals.

Sediment can also carries pollutants such as phosphorus, a nutrient commonly used in fertilizers. When phosphorus enters our lakes, it causes excessive algae growth, resulting in a depleted oxygen level in the water and degraded water quality. Grass buffer strips serve to reduce, transform and take up these pollutants, thus protecting our waters for public use and enjoyment.

Studies show, when properly installed and maintained, buffer strips have the capacity to remove up to 50 percent or more of nutrients and pesticides and up to 75 percent or more of sediment.

Buffer strips can also provide important habitat as cover and shelter for numerous wildlife species including songbirds, waterfowl, pheasants and fur bearers. In intensively farmed landscapes, buffer strips often serve as critical travel corridors for wildlife, enabling them to move safely between more secure habitat areas.

When properly used and applied as part of an overall conservation plan, buffer strips are an efficient, effective use of areas better left as non-cropped. Perennial grass buffers along lakes, rivers and streams also make sense economically for producers and landowners. Various financial incentives are available through USDA conservation programs such as the Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP).

Many state, local and private conservation organizations also offer financial incentives to producers and landowners who install and maintain perennial buffer strips. To learn more about buffer strips and the option available to producers and landowners visit with a habitat advisor; find their contact information on the Habitat Pays website at habitat.sd.gov.

South Dakota Districts Lead Clean-up of Big Sioux Watershed

Urban and rural areas can – and do – work together to improve water quality. Take the Seasonal Riparian Management Areas (SRAM) project, one of the first conservation initiatives spearheaded by the Big Sioux River Watershed Project in South Dakota.

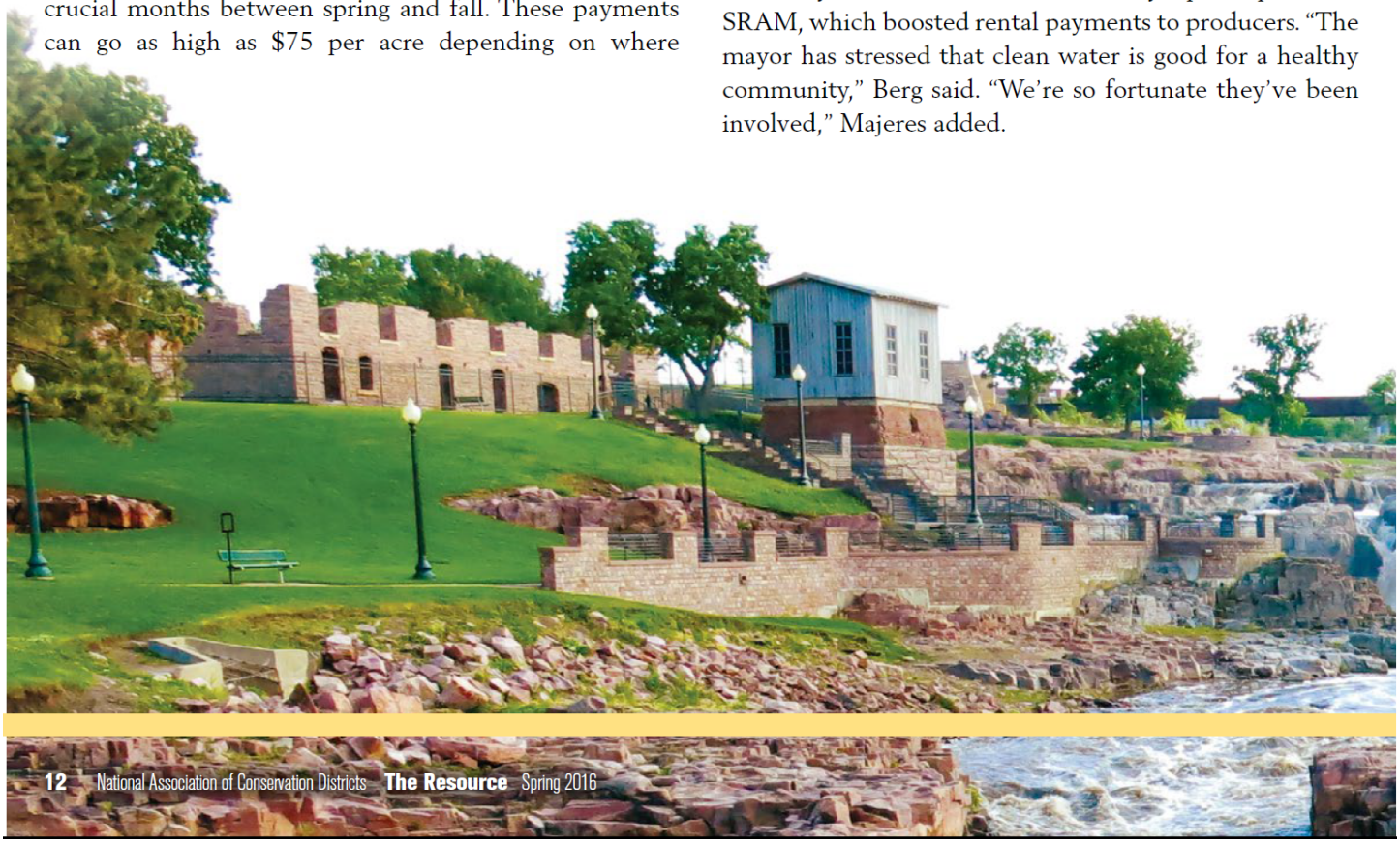
The project partners – South Dakota conservation districts, private partners, and the City of Sioux Falls – have teamed up to launch a model payment-for-ecosystem-services project that they say will generate significant water quality improvements in the Big Sioux Watershed.

High bacteria counts and suspended solids in the Big Sioux prompted the EPA to list sections of the river and some of its tributaries as impaired waters in need of restoration. In recent years, using simple but proven conservation measures has helped to lower bacteria levels.

Through SRAM, producers are paid rental rates to erect fencing or provide alternative water sources for their livestock to keep them out of riparian areas during six crucial months between spring and fall. These payments can go as high as $75 per acre depending on where producers' operations fall within the watershed. As a bonus, producers can harvest hay from the riparian areas and allow livestock to graze after September 30. Watershed Coordinator Barry Berg designed the SRAM program with a simple premise: "If you don't allow grazing to take place during hot summer months when cattle like to cool off in the stream, bacteria won't be going into the water," he said.

Water quality within the Big Sioux has improved in the two years since the program was instituted, Berg said. This has been especially good news for the rapidly growing city of Sioux Falls, which relies on the river for business development, recreation, and tourism. The Big Sioux River, Skunk Creek, and their tributaries are also important sources of drinking water for Sioux Falls residents.

The Moody Conservation District is the lead on the project, says Jack Majeres, board chair of the district and a long-time leader within NACD. He and Berg credit Sioux Falls Mayor Mike Huether for the city's participation in SRAM, which boosted rental payments to producers. "The mayor has stressed that clean water is good for a healthy community," Berg said. "We're so fortunate they've been involved," Majeres added.



The Big Sioux Watershed Project started in 2008, helped early on by an NRCS Conservation Innovation Grant. EPA 319 funds administered by the state also boosted the effort. A $2 million Regional Conservation Partnership Program (RCPP) award in 2014 provided resources for a five-year period, helping to expand the project area in the watershed as a whole. The Minnehaha Conservation District is lead sponsor on the RCPP.

"It is great to have this partnership, and NRCS has been with us all the way," Berg said. In all, six conservation districts, including the East Dakota Water Development District, are involved in the current partnership addressing this segment of the Big Sioux Project. Two other South Dakota cities – Brookings and Brandon – have joined the partnership too.

When the Moody district took the lead in 2012, Majeres set up a steering committee that includes districts, cities, and other partners. The steering committee continues to meet quarterly. A joint powers agreement enables the partners to provide oversight to the work of Berg and two other watershed coordinators. Majeres has also reached across state borders, working with conservation districts in Minnesota.

Majeres has invested plenty of personal time along the way in his work to clean up the Big Sioux. "We've had a great concern for improving water quality in the river," he explained.

Former South Dakota Secretary of Agriculture Lucas Lentsch (center) and state Senator Shantel Krebs tour a protected riparian area with Barry Berg in 2013.

About a dozen producers, mostly along Skunk Creek, participated in SRAM last year. In a four-mile stretch with increasing SRAM enrollment, fecal coliform counts dropped below the total maximum daily load limits set by the EPA and sediment loading dropped slightly.

"You could see the bottom of the creek as clear as day," Majeres said. And producers noticed improvements as well.

"There was a big benefit in the health of the animals, and the rate of weight gain on the cattle," Majeres added. "One guy with a cow-calf operation said he couldn't believe the health of his calves. Now producers who were pushing us away are asking how to sign up."

For more details on the market-based water quality initiatives NACD is involved in, contact NACD Communications Specialist Bill Berry at bill-berry@nacdnet.org.