SECTION 319 NONPOINT SOURCE PROGRAM

WATERSHED PROJECT FINAL REPORT

CENTERAL BIG SIOUX RIVER WATERSHED IMPLEMENTATION PROJECT SEGMENT 2

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SOUTH DAKOTA ASSOCIATION OF CONSERVATION DISTRICTS

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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 #9998185-09, #9998185-10, #9998185-11

EXECUTIVE SUMMARY

PROJECT TITLE: Central Big Sioux River Watershed Project Segment 2

PROJECT START DATE: 20 July, 2011

PROJECT COMPLETION DATE: 31 July, 2015

FUNDING:

Funding Sources	Original Budget	Expended
U.S. EPA Section 319 Grant	$609,530.56	$456,336.64
City of Sioux Falls	$96,000.00	$93,392.20
City of Sioux Falls SRF NPS	$2,271,673.00	$1,412,851.35
CWSRF Water Quality	$86,000.00	$86,000.00
Conservation Districts	$32,050.00	$0.00
EDWDD	$43,900.00	$1,497.12
EQIP	$1,047,999.00	$1,135,583.53
USDA	$188,600.00	$442,098.09
Local Cash and In-Kind Match	$752,335.00	$1,961,438.47
Totals:	**$5,128,087.56**	**$5,589,197.40**

The project goal was to restore and protect the beneficial uses of the Big Sioux River and its tributaries (in South Dakota) from the confluence with Stray Horse Creek in Hamlin County to the mouth to the Missouri River. Goals were completed by implementing and promoting Best Management Practices (BMPs) in the watershed that reduced sediment loading and prevented bacterial contamination. Several river segments were required to reduce Total Suspended Solids (TSS) and/or bacteria (fecal coliform or E.coli) levels and to meet the 41 separate TMDLs developed for the river and its tributaries and lakes within the watershed.

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

- Merging the Central Big Sioux River Watershed Implementation Project with the Lower Big Sioux River Implementation Project to eventually become the Big Sioux River Watershed Implementation Project.
- Assembling a Big Sioux River Watershed Steering Committee comprised of a board of directors representing six County Conservation Districts, City of Sioux Falls, City of Brookings, South Dakota Department of Environment and Natural Resources (SDDENR) and East Dakota Water Development District (EDWDD) to develop TMDL implementation strategies based on the watershed assessments and TMDLs to guide future project segments.
- Initiating 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.
- Installation of BMPs were targeted toward identified high priority sub-watersheds.

During this segment of the project, the Lower Big Sioux River Watershed Project was merged with the Central Big Sioux River Implementation Project. The combined watershed Project Implementation Proposal (PIP) was completed, reviewed, and accepted in September 2012. The decision to merge the two watershed projects was based in part on geographic location, funding, and personnel restructuring. The milestones, budget, and BMPs were combined to satisfy the load reductions needed to fulfill the TMDLs set for the Central and Lower Big Sioux River Watersheds. The combination of the two projects resulted in the Central Big Sioux River Watershed Implementation Project Segment 2 which was later changed to the Big Sioux River Watershed Implementation Project Segment 2 to reduce confusion. The Moody County Conservation District accepted the lead sponsorship of the project. Brookings, Lake, Minnehaha, Lincoln, and Union Counties remained co-sponsors for the project and regularly attend steering committee meetings along with the City of Sioux Falls, City of Brookings, SDDENR and EDWDD.

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 started with AGNPS livestock operations ranking over 50, operations that were within one mile of the Big Sioux River and impaired Tributaries, and through the use of mapping tools. Riparian Area Management (RAM) and a new Seasonal Riparian Area Management (SRAM) programs were implemented to initially target Skunk Creek, a tributary of the Big Sioux, to address E-coli and TSS. The program's success and addition of State Revolving Fund Non-Point Source funds allowed for expansion to other impaired tributaries in the watershed and the Big Sioux River itself.

A total of 10 feasibility studies and 14 Animal Waste Management Systems (AWMS) were completed along with two clean water diversions during this segment of the project. Bank stabilization was completed on 1,270 linear feet of the Big Sioux River. One drain tile Bioreactor was installed in cooperation with South Dakota State University Water Resource Institute. The Water Resource Institute had previously installed 4 Bioreactors installed and decided to add the additional Bioreactor to their study and agreed to monitor it throughout the study. Cropland BMPs implemented during this segment were: 47.5 acres of Continuous Conservation Reserve Program (CCRP), 79.2 acres of filter strips, 8,202 linear feet of grassed waterways, 6,647 linear feet of terrace restoration with 93,222 linear feet of Environmental Quality Initiative Program (EQIP) terraces and 1,490.4 acres of conservation tillage adopted. Riparian projects included: 16.8 acres of conservation easements; 73.3 acres of Conservation Reserve Program (CRP) buffers totaling 12,073 linear feet of stream protection; 17.3 acres of RAM and 585.3 acres of SRAM totaling 91,886.4 linear feet of stream protection; 6 planned grazing systems with 6 alternative water sources and 7,999 linear feet of fence. The Water Quality Credit Trading Plan is in the final stages of development and will be finalized during Segment 3 of this project. Information and Education carried out included: 66 meetings with the City of Sioux Falls, Conservation Districts, and other partners associated with the watershed project; 21 press releases/news articles/news interviews related to the goals of the project and progress/innovative ideas being implemented. EDDWD collected 993 water quality samples at various monitoring sites throughout the watershed.

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INTRODUCTION

The Central Big Sioux River Watershed Implementation Project was a 10-year Total Maximum Daily Load, (TMDL) implementation strategy that was to be completed in multiple segments. The project goal was 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 TSS, dissolved oxygen (DO), Chlorophyll-a, fecal coliform and/or E-coli bacteria. Several TMDLs were developed for these segments (See Table 1). Activities were to improve and/or maintain current sediment and bacterial loadings targeted sub-watersheds within the project area. East Dakota Water Development District continued with water quality sampling throughout the project segment in effort to collect several years of data that would be used in future modeling and decision making. The monitoring sites are shown in relation to the watershed (Figure 4). 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 itself and the surrounding watershed.

In addition to the river segments and creeks specifically noted in Table1, additional sub-watersheds were found to be contributing impairments to downstream water bodies. In some instances, addressing pollution sources in areas not technically impaired (due to a lack of a defined beneficial use or uses) may be necessary to meet TMDLs.

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 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 Skunk Creek. Segments not technically exceeding the applicable standard still

have levels that contribute to impairments downstream. TSS levels in most tributaries are below beneficial use standards, suggesting that current land-use practices within these areas do not result in sediment loading. The exception is found in southern Minnehaha, Lincoln and northern Union Counties where natural conditions may exacerbate human impacts on sediment loading. Consequently, BMPs aimed at sediment reduction were focused on the Big Sioux River Mainstem and major tributary sub-basins. Riparian area management and terrace restoration were identified as the principle BMPs.

Table 1: Beneficial Use Impairments Identified in the Central Big Sioux River Watershed (2014 South Dakota Integrated Report for Surface Water Quality).

Impaired Water Body	Impaired beneficial use	Cause
Big Sioux River		
Near Volga to Bookings	WWSFLP	TSS
Brookings to Moody Co. Line	WWSFLP	TSS
S2-104N-49W to I-90	IR, WWSFLP	FCB & EC, TSS
I-90 to Diversion return	IR, LCR, WWSFLP	FCB & EC, TSS
Diversion return to SF WWTF	IR, LCR, WWSFLP	FCB & EC, TSS
SF WWTF to above Brandon	IR, WWSFLP	FCB & EC, TSS
Above Brandon to Nine Mile Creek	IR, LCR, WWSFLP	FCB & EC, TSS
Nine Mile Creek to near Fairview	IR, WWSFLP	FCB & EC, TSS
Fairview to Alcester	IR, LCR, WWSFLP	FCB & EC, TSS
Near Alcester to Indian Creek	IR, LCR, WWSFLP	FCB & EC, TSS
Indian Creek to Mouth	IR, WWSFLP	FCB & EC, TSS
Beaver Creek 2 (Minnehaha)	LCR, WWSFLP	FCB, TSS
Beaver Creek 1 (Lincoln)	LCR	FCB
Peg Munky Run	LCR	FCB
Pipestone Creek	IR	FCB & EC
Six Mile Creek	LCR, WWMFLP	FCB & TSS
Skunk Creek	LCR, WWMFLP	FCB, TSS
Split Rock Creek	IR	FCB
Brule Creek	LCR	EC
East Brule Creek	LCR, WWMFLP	FCB, TSS
Willow Creek	LCR	FCB
Lake Alvin	WWPFLP	Temperature
East Oakwood Lake	IR, LCR, WWSFLP	PH, Chlorophyll-a
Lake Herman	IR, LCR, WWSFLP	Chlorophyll-a
Lake Madison	IR, LCR, WWSFLP	Chlorophyll-a
West Oakwood Lake	IR, LCR, WWSFLP	Chlorophyll-a

LCR - limited contact recreation standard = 2,000 colonies per 100 milliliters of water;
EC - E. *coli* bacteria;
FCB - fecal coliform bacteria
WWSFLP - warm water semipermanent fish life propagation-applicable standard varies with water body;
WWMFLP - warm water marginal fish life propagation - applicable standard varies with water body;
WWPFLP - warm water permanent fish life propagation – applicable standard varies with water body;
TSS - total suspended solids;
IR - immersion recreation standard = 400 colonies per 100 milliliters of water;
DO - dissolved oxygen.

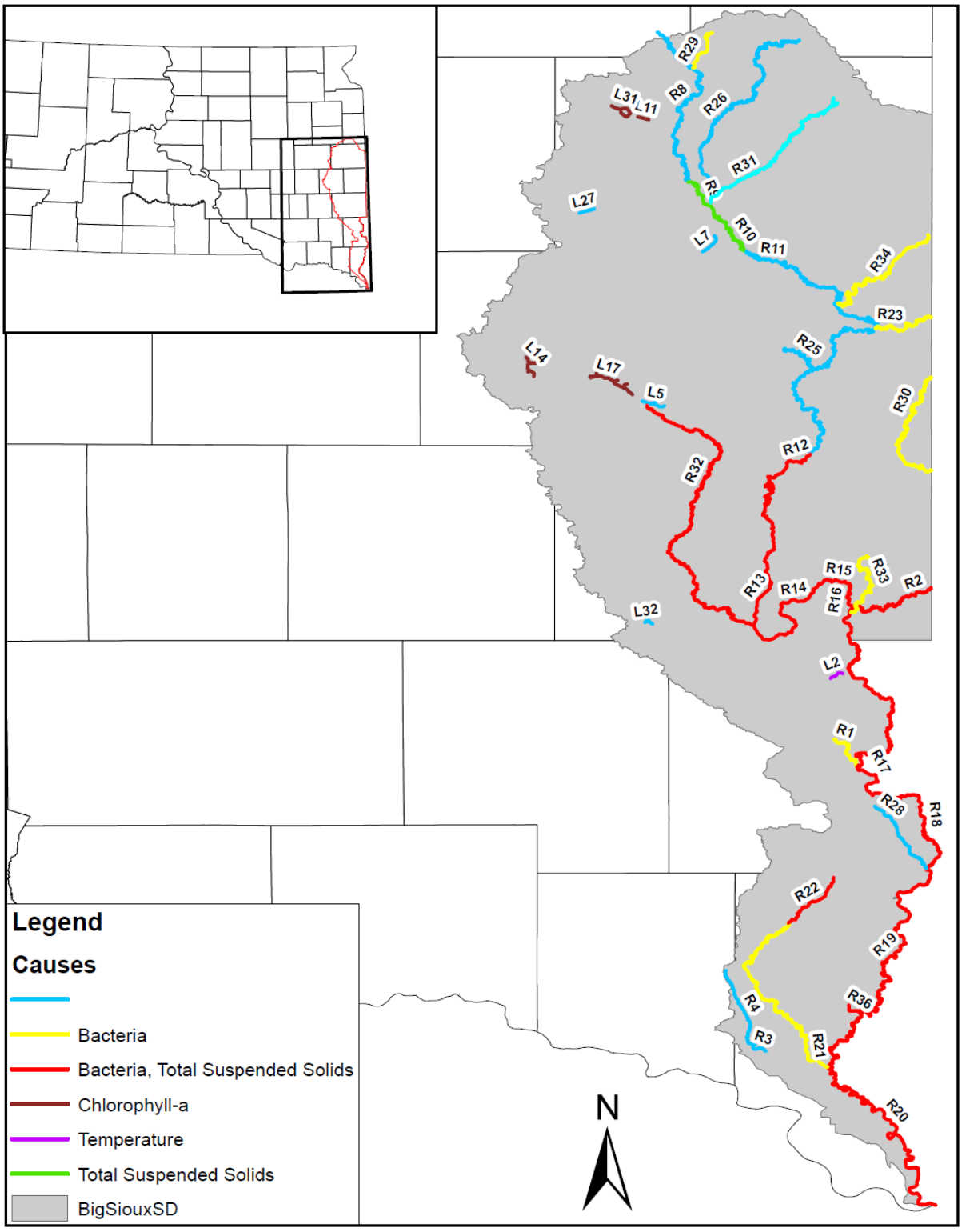


Figure 1: Big Sioux River Impaired Segments

Bacteria (fecal and E. coli) impairments were encountered throughout the study area, although the highest levels were detected in the southern end of the watershed. The source of the bacteria is believed to be primarily domestic livestock, although human, pet and wildlife sources have been found to contribute a portion of the total load encountered. Bacteria levels were analyzed at

several river/stream flow conditions in an effort to determine the timing of major loadings. The most significant loadings were measured during high flow events, which were coincident with either major storms or spring snow melt. The bacteria encountered there were carried into the receiving waters by runoff, most likely from animal feeding operations. One thousand five hundred twenty five (1,525) animal feeding operations were inventoried and assessed using the AGNPS Feedlot Subroutine throughout the watershed. Four hundred ninety two (492) of the feedlots had AGNPS ratings of 50 or higher, and are candidates for improvement to reduce loadings. However, elevated levels of bacteria were also encountered during periods of low flow, often many weeks after a runoff event. Under these conditions, animal feeding operations would not be expected to contribute, and the source is likely to be animals grazing in close proximity to the river and creeks. BMPs to address the bacterial impairments include installation of animal waste management systems at existing feedlots and restricting access to the water bodies by grazing animals.

Details and additional information of the results of the Central Big Sioux River Watershed Assessment Project; the North-Central Big Sioux River/Oakwood Lakes Watershed Assessment Project and the Lower Big Sioux River Watershed Assessment Project can be found in the Final TMDL reports. Visit the Department of Natural Resources webpage at the following address: http://denr.sd.gov/des/sw/surfacewaterquality.aspx for additional information.

See Milestone Table pg. 26

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

Table 2: Big Sioux River and its Basin Features.

Waterbody Name:	Big Sioux River, 18 impaired stream segments and 2 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, Skunk 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: **Total** **South Dakota** **Minnesota** **Iowa**	 3,921,000 acres 2,107,000 acres 937,000 acres 877,000 acres

The Big Sioux River and major tributaries are permanent water courses within the project area. There are also numerous intermittent tributaries which carry water only during spring snow melt or rainfall events. The Big Sioux River ultimately drains to the Missouri River at Sioux City, Iowa. 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.

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 studies, seven for total TSS, six for bacteria, one for nitrate and one for trophic state index (East Oakwood Lake). Since the completion of the Lower and Central Big Sioux River Watershed Assessment Projects, a total of 40 impairments have been identified: 19 for fecal and E. coli; 15 for TSS; one for temperature; one for PH and 4 for Chlorophyll-a. A total of 41 separate TMDL reports have been prepared as a result of the assessment projects. The reports formed the basis for the Big Sioux River Watershed Implementation Project.

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 Central 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 of only 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. Row crops, such as corn and soybeans, dominate, but significant tracts are also in grass and/or pasture land. The watershed assessments 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 250,000.

Entire Big Sioux River Watershed

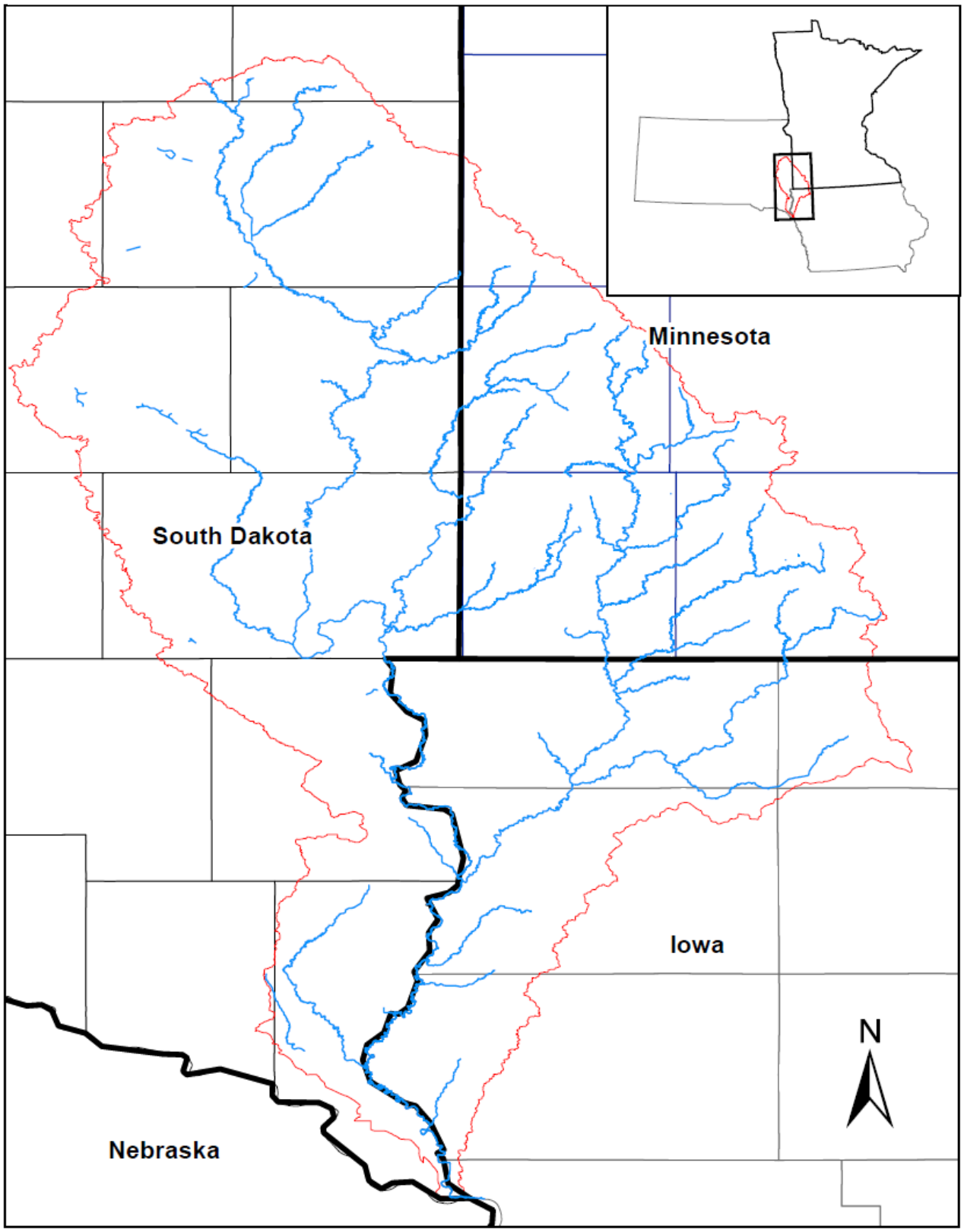


Figure 2: Entire Watershed

Big Sioux River Watershed

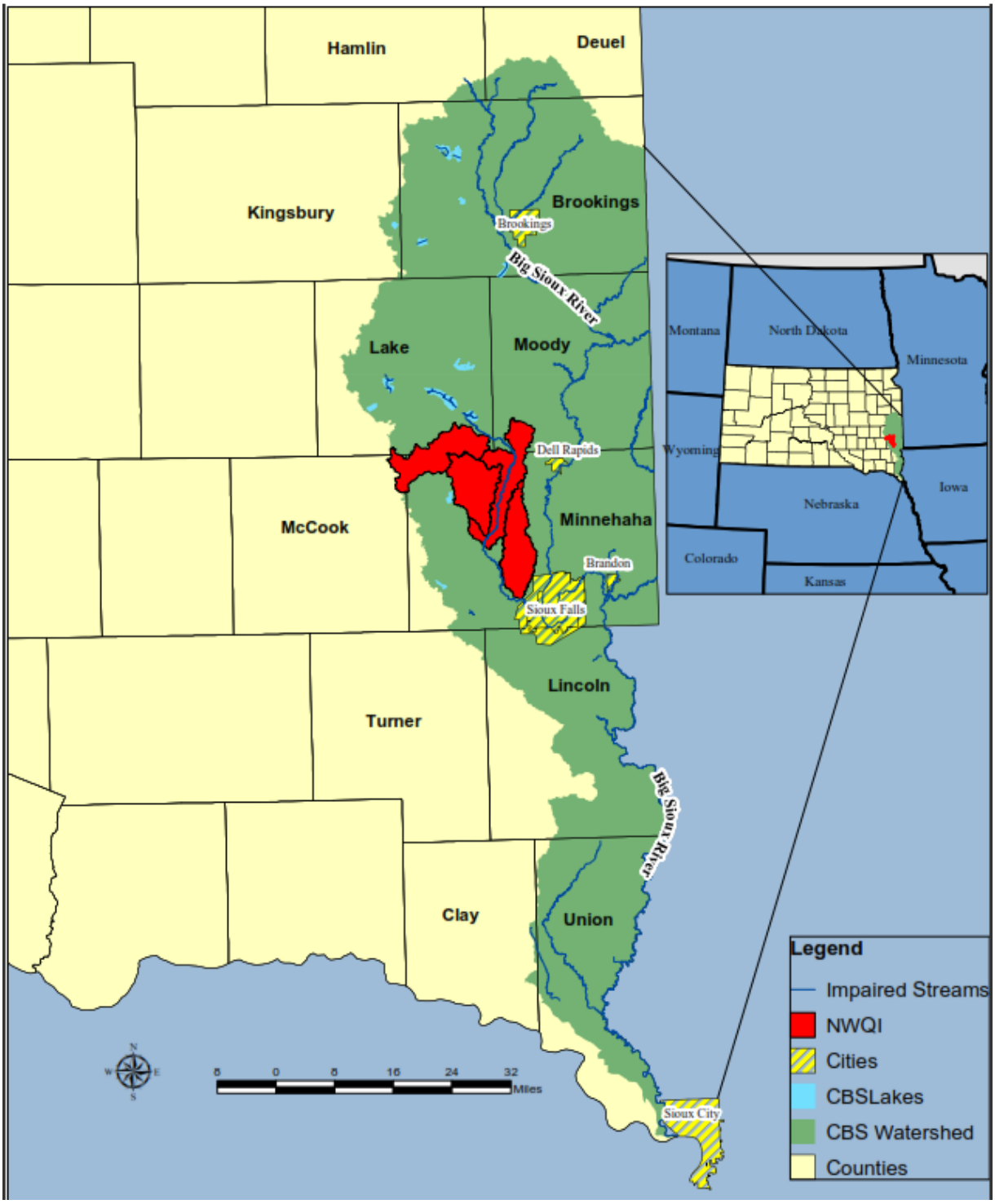


Figure 3: Project Area

Big Sioux River Project Area

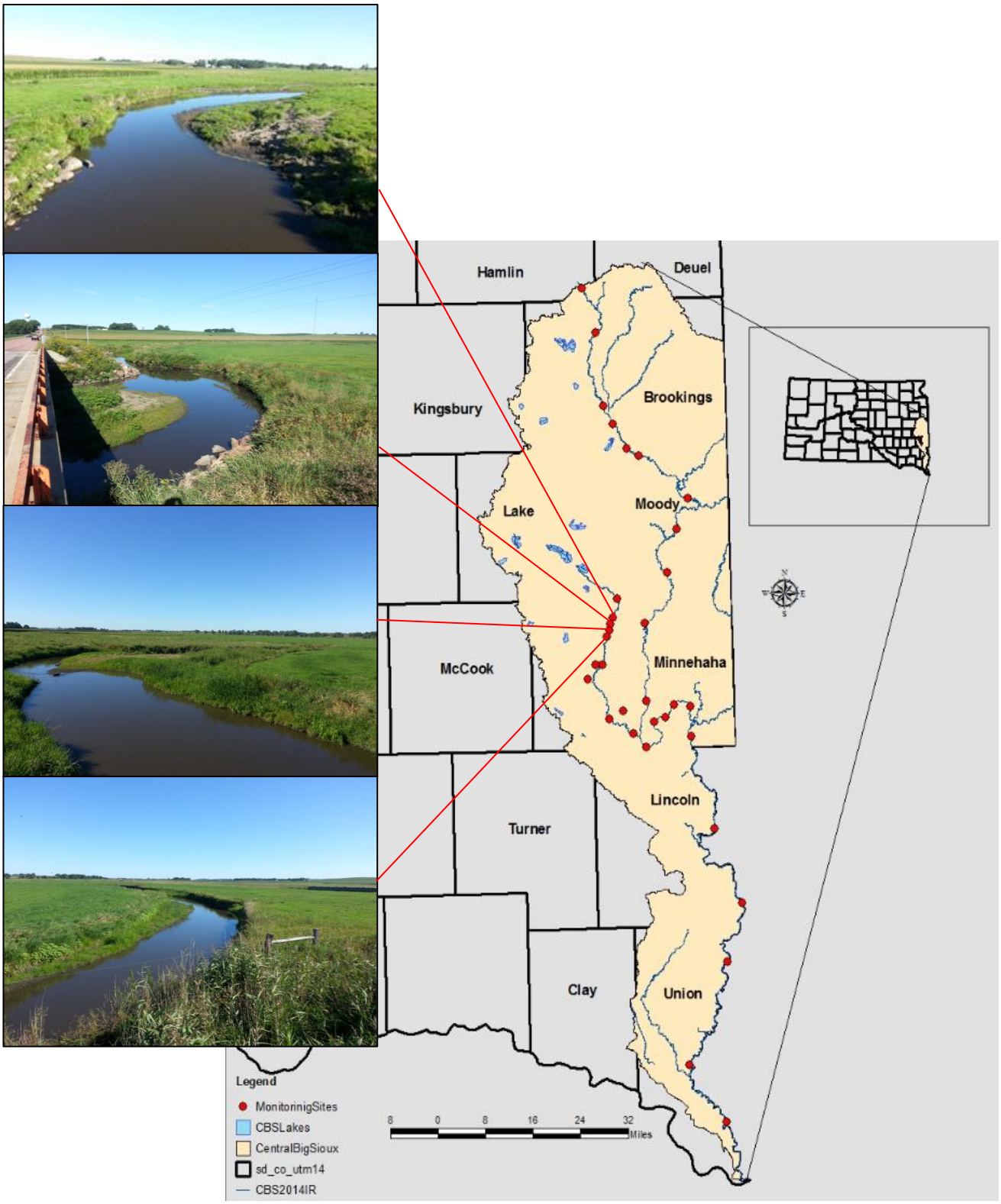


Figure 4: Current Water Quality Monitoring Project

Several of the monitoring sites shown in (Figure 4) were used during the Central Big Sioux River Watershed Assessment Project, many of which were reused during the current project to assess the impact of various BMPs.

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.

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. In this area, both feedlots and riparian area grazing are known issues.

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 limited to the Big Sioux River below Brookings. Excessive TSS levels in the tributaries only occur in the lower part of Skunk Creek and the Pipestone Creek/Split Rock Creek system. 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 indicate current land-use practices are successfully limiting erosion. High sediment levels found in the tributaries that span eastern and central Minnehaha County are attributed to the relatively high erosion potential of the soils 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. Of the 11 tributary sites, four were added to monitor the impacts of BMPS in the NWQI area. Also shown in Figure 4 are the NWQI monitoring sites in relation to their location in the watershed.

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

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 the access of livestock to impaired water bodies.

Task 1: <u>Livestock Nutrient Management</u>. Assist livestock producers to install 10 Animal Waste Management Systems (AWMS) at critical locations within the project area to reduce bacterial and sediment loading.

Products: Feasibility studies on 13 animal feeding operations; engineering designs and plans for 12 AWMSs; prepared by third-party engineering firms/technical service providers or United States Department of Agriculture, Natural Resource Conservation Service engineers (USDA-NRCS), 6 clean water diversions, and 10 AWMS installed for existing high priority feedlots or feeding areas.

Milestones:	**<u>Planned</u>**	**<u>Completed</u>**
Feasibility Studies	13	10
Engineering Design	12	14
AWMS Installed	10	7
Clean Water Diversions	6	2

Accomplishment: Three feasibility reports were started with the interim project with two reports being completed. The third report was completed in this segment of the project along with 9 additional feasibility reports completing a total of 10 reports. Fourteen designs have been completed with 7 AWMS's constructed. Two clean water diversions were installed as supporting practices with two of the AWMS's. Producers interested in AWMSs were taken on two separate tours to look at barns that were built with assistance from the project. It gave them the opportunity to discuss pros and cons of the barns and see the different configurations. This also allowed them to see the finished product and if it was something that would fit their operation. Only one conventional open lot system was constructed while Mono-slope confinement barns constituted 6 of the AWMS's that were implemented. Several other AWMS's were under construction toward the end of Segment 2 and are scheduled to be completed in Segment 3 of the project. Figures 5 – 7 are before and after pictures of a few of the systems that were constructed in the watershed.

Figure 5: Before and after Deep Pit Barn.

Figure 6: Before, Open lots

Figure 7: After, Manure Pack Barn & Conventional Open Lot System

Task 2: <u>Riparian Area Protection</u>. Provide resources to livestock owners to limit or prevent access to impaired water bodies and provide alternative water sources to replace the impaired water bodies.

Products: 100 Acres of riparian area management, 500 acres of seasonal riparian area management, 100 acres of riparian area easements, two prescribed grazing management plans developed and 1,270 linear feet of bank stabilization, and rehabilitation of existing stabilization structures as needed.

Milestones:	**Planned**	**Completed**
Riparian Area Management (RAM)	100 ac.	17.3 ac.
Seasonal Riparian Area Management (SRAM)	500 ac.	585.3 ac.
Riparian Area Easements	100 ac.	16.8 ac.
Prescribe grazing management plans	2 plans	3 plans
Bank Stabilization	1,270 LF.	1,270 LF.

Accomplishment: Two producers were contacted and plans started for CCRP buffers, RAM and easements along the Big Sioux main stem during the interim project. The process has been continued in segment two of this project and completed in the fall of 2012. The end result was a 16.8 acre easement with Northern Prairies Land Trust, 9.9 acres of RAM and 18.7 acres of CRP on the Big Sioux River. The project completed 7,908 linear feet of fence to exclude the livestock from the river. Three water tanks were used for alternative water that was already constructed during the interim project. The two projects together protected 6,329 linear feet of the river. Other CRP projects completed on the Big Sioux River included an additional 73.3 acres and 12,073 linear feet of riparian area protected. RAM was completed on two sites along Skunk Creek. One site was a buffer for cropland and did not require an exclusion fence. The other site required 1,682 of fencing with two alternative water developments. Together both sites protected 3,324 linear feet of Skunk Creek (Figure 8 & 9). Three grazing management plans were developed for the sites as well. One plan was started in Segment 2 for CRP and Ram on Willow Creek and will be completed in Segment 3.

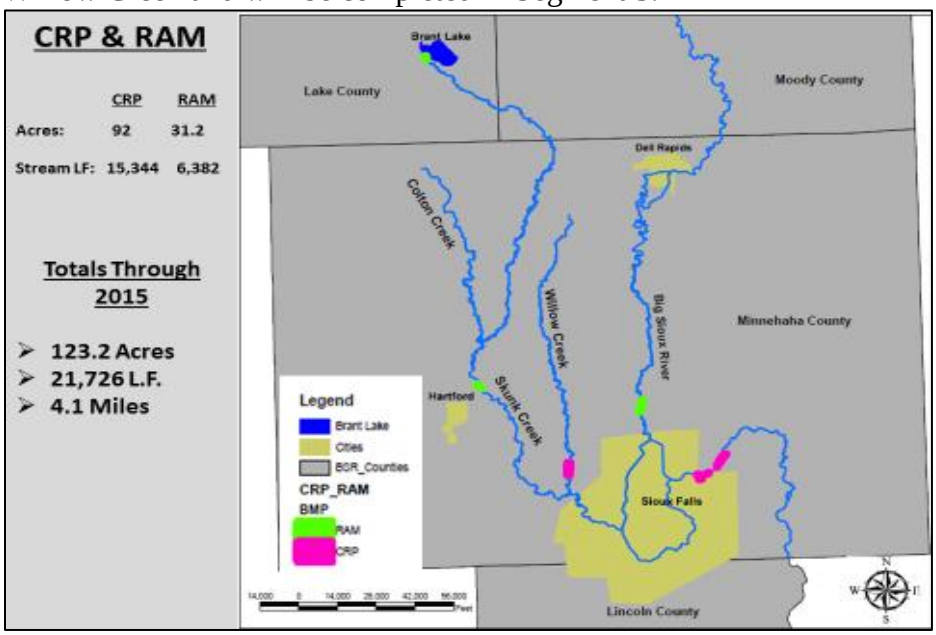


Figure 8: CRP/Easement/RAM Areas

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 April as long as a minimum vegetative stand of 4 to 6 inches remains. If requested, alternative water was provided during the dormant grazing period to minimize impacts on the riparian area. 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 has been 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 is planned to be 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. Figures 1- 6 below are before and after pictures of photo points where the SRAM program was implemented.

During Segment 2, 585.3 acres were enrolled in the SRAM program totaling 57,458 linear feet of stream bank protection. Most of the producers opted to just hay the SRAM acres and not carry out a fall grazing. One producer that wanted to conduct fall grazing was assisted with installing an alternative water source, a rock crossing and 1,062 linear feet of fence.

Figure 9: Pasture Before and After SRAM

Figure 10: SRAM Before and After

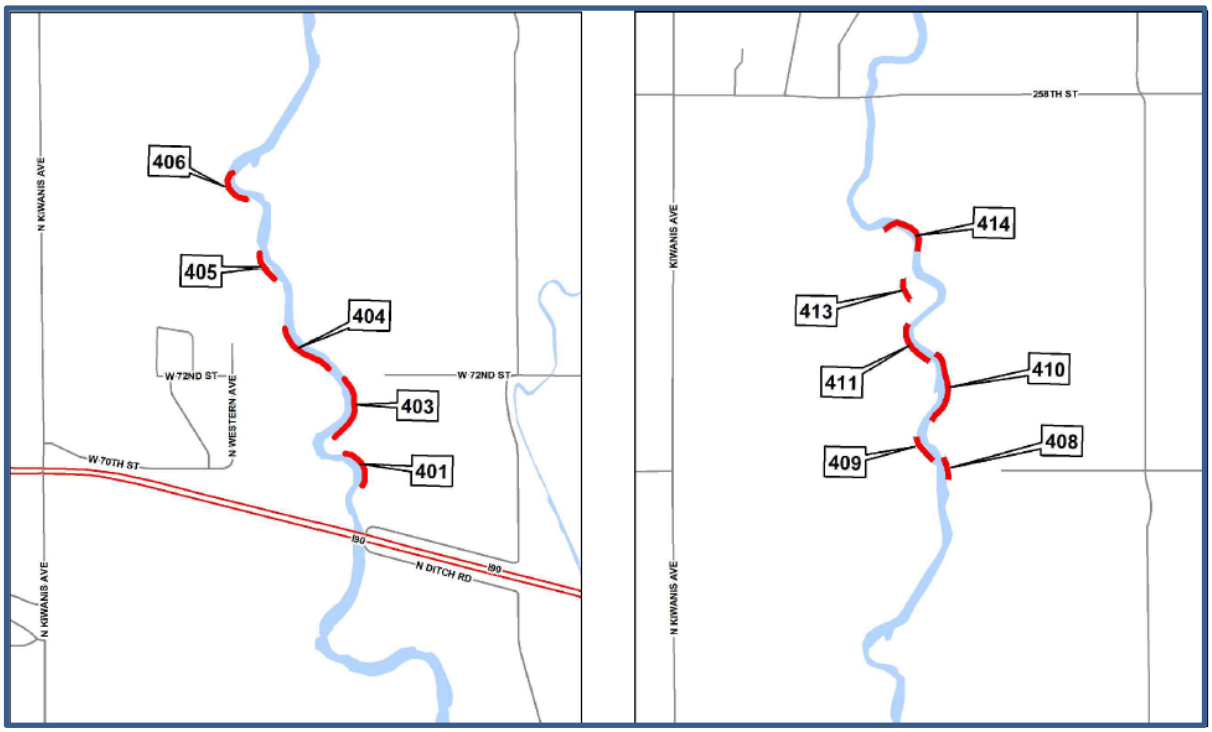


Figure 11: Phase 4 Site Locations

The Bank stabilization along the Big Sioux in this segment of the project was completed in 2012. There was 1,270 linear feet of damaged sites repaired at multiple locations on the Big Sioux River between Baltic and Sioux Falls. The sites were originally completed in 2011 and did not have enough time to revegetate when severe flooding damaged them. Two sites in Phase 4 were not completed in the winter of 2011 (sites 411 & 413) because the ground was warming and the sites were not accessible when the contractor was to start construction. Site 411 and 413 were planned for completion during Segment 2. Site 413 was completed during January 2012, but Site 411 had been selected for a log jam demonstration based on findings from ARS, and has not been completed to date.

Some sites had shown failures after the water receded in late 2011 (Figure 12). Water levels remained high until July/August and caused damage to about half of the bank stabilization sites from Phase 3 and 4. The perceived cause for the failure of these sites was not having adequate protection between the top of the rock and the top of the bank since vegetation was not given enough time to fully establish before the extended high flows. The sites that were damaged were repaired in the fall of 2011 (Figure 12-13). Since waters levels were high for so long most of the trees couldn't be planted. The trees were planned for later in this Segment but were not planted because the sites were growing with the existing seed from trees along the riparian area. Phase 1 and 2 sites from Segment 1 handled the extra water without any major failures. These sites had higher rock elevations and adequate time for vegetation to establish.

Figure 12: Damaged Site 406 (August 2011)

Figure 13: Repaired Site 406 (August 2014)

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

Products: Twenty acres of filter strips, 9,847 LF of terraces, and 10,000 linear feet of grassed waterways on cropland. BMPs installed will be funded by the landowner/operator, USDA conservation programs (EQIP and CCRP) and by state conservation programs.

Milestones:	**Planned**	**Completed**
Filter Strips	20 ac.	79.2 ac.
Terrace Restoration	9,847 LF.	6,647 LF.
Grass Waterways	10,000 LF.	8,202 LF.

Accomplishment: 79.2 acres of filter strips were installed throughout the watershed. Producers were assisted with planning through the Farm Service Agency and NRCS to enroll the acres into CRP. Assistance was provided to four landowners with terrace systems that had exceeded their lifespan or had filled in over time to restore capacity and functionality reducing sediment delivery. Terraces were cleaned out and graded to their original design specifications. The project also worked with landowners to repair terrace systems damaged by large rain events and wildlife to restore them back to their original state. New terrace systems were directed towards the EQIP program for funding. Over the course of the implementation project, the terrace restoration project restored 6,647 linear feet of failing and damaged terraces. Technical assistance was provided by the project coordinator and NRCS to determine eligibility of terrace restoration projects. The terrace restoration program though this project and the increased size of farm implements has increased interest in the EQIP terrace program. Several producers have either put in new terraces or rebuilt older terraces to fit larger farming equipment. Most of the terrace work has taken place in Lincoln and Union Counties primarily because of the Loess soils and more rugged landform. During this segment, 93,222 linear feet of terraces were completed through the EQIP program. 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.

Task 4: <u>Alternative Water Quality Treatments</u>. Provide demonstration treatment to tile outlets to reduce nitrate levels of tile discharge entering impaired water bodies. BMPs will be implemented and monitored as demonstration projects to provide treatment for agricultural land tile discharge. Emphasis will be tile lines that discharge directly into the Big Sioux River or tributary streams.

Products: Two demonstration projects for treatment of tile outlets that discharge directly into the Big Sioux River or tributary streams. Monitoring will be completed on tile outlet treatment inflow and outflow to determine the effectiveness of the demonstration projects.

Milestones:	**Planned**	**Completed**
Tile Bioreactor	2	1
Sampling	10	10

Accomplishment: One Bioreactor was installed on the Dewey Gevik Learning Center (Hartford Site) West of Sioux Falls. It was installed in cooperation with the SDSU Water Resources Institute (Figures 14 & 15). The Water Resources Institute planned to assimilate the Bioreactor

in their already ongoing research project. Their current project collected water samples from the 4 Bioreactors that were installed in previous years. SDSU collected 10 samples above the Bioreactor and 10 samples below during Segment 2. A copy of the annual report has been included in a separate appendix to this report.

Figure 14: Bioreactor Lining

Figure 15: Bioreactor with Woodchips

Objective 2: 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: Public Information and Outreach. 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. Through the services of East Dakota Water Development District complete a survey of landowners within the project area to determine their concerns and activities that they are willing to undertake.

Products: Completion of landowner survey within the watershed. Conduct at least one public meeting within each county and major cities to discuss the project and the activities that will be undertaken. Develop web site links to existing web sites of Conservation Districts, East Dakota Water Development District and City of Sioux Falls to provide information to the public on what activities are happening within the watershed.

Milestones:	**Planned**	**Completed**
Public Meetings	4	4
News Releases	2	21
Landowner Survey	1	0

Accomplishment: An advertisement was printed in the local newspapers for informational meetings to be held at various locations throughout the watershed. The public was informed of the project goals and opportunities for participation at those meetings. Since the start of Segment 2 of the project, 21 Newspaper articles/news interviews/media events were completed. The Mayor of Sioux Falls has been very instrumental in helping bring the Big Sioux River Watershed Project and water quality issues to the public's attention (Figure 16). Other events and news releases that showcase what is being done to improve water quality are in separate appendix to this report. Questions were developed for a landowner survey, but the survey was not implemented.

Figure 16: Mayors Big Sioux River Annual Summit

Objective 3: Water Quality Credit Trading (WQCT) Pilot Program and Master Plan development.

Task 6: <u>Develop a pilot WQCT program</u> that can be used by communities such as Sioux Falls to improve water quality conditions within the Central Big Sioux watershed.

Products: A pilot program that can be used by communities to fund BMPs in the watershed that will help the meet future TMDL requirements.

Milestones:	**Planned**	**Completed**
Submit WQCT Report to USDA & US EPA	1	0

Accomplishment: A Water Quality Credit Trading Program was developed and informally tested on one AWMS and two SRAM practices in the Watershed. No actual credits were traded, but the process was evaluated and documented. The final report is set to be completed during Segment 3 of this project.

Task 7: <u>Develop a Water Quality Master Plan</u> for the Central Big Sioux River Watershed (CBSRW). Create a plan that can be used by water quality professionals, planners, and stakeholders as a decision-support framework to guide them in the cost effective watershed scale investments to help bring stream segments into compliance with assigned beneficial uses. Following are the major components of this Water Quality Master Plan:

- Obtain and integrate all pertinent water quality studies, model results, and data into a centralized spatial GIS database.
- Establish a technical steering committee and an informal watershed stakeholders group to facilitate the development of the master plan and provide necessary public outreach and involvement.
- Expand the existing watershed model developed for the Sioux Falls TMDL study using Hydrologic Simulation Program – Fortran (HSPF) to include the entire CBSRW project area.
- Develop decision-support framework to assist in the selection, prioritization, and placement of water quality BMPs to improve water quality of impaired reaches of the CBSRW.
- Evaluate federal Water Quality Trading regulations and develop methodologies to incorporate these opportunities between point source and non-point source entities within the CBSRW.
- Develop an adaptive prioritized BMP Implementation Plan component to incorporate cost effective schedules associated with funding alternatives.

Products: Organize, public notice, and facilitate four CBSRW Steering Committee meetings.
Organize, public notice, and facilitate four CBSRW Stakeholders meetings.
Organize and facilitate one CBSRW field tour early in the project.
Develop and deliver a Water Quality Master Plan to CBSRW Steering Committee.

Milestones:	**<u>Planned</u>**	**<u>Completed</u>**
Stakeholder Meetings	4	4
Steering Committee Meetings	4	16
Watershed Tour	1	7
Draft Water Quality Master Plan	1	1
Final Water Quality Master Plan	1	1

Accomplishment: A Stakeholder Group and Steering Committee were set up for this project. Later, the two groups were merged into a Steering Committee and structured with voting members. The voting members were comprised of the 6 Conservation Districts, City of Sioux Falls, City of Brookings, City of Brandon and EDWDD. Several watershed tours were completed during as well. One tour illustrated BMPs that were implemented by producers to protect and improve water quality in the Big Sioux River and Skunk Creek (Figure 17). The individuals that participated in the tour were the Watershed Coordinator Barry Berg, South Dakota's Secretary of Agriculture Lucas Lentsch, South Dakota Senator Shantel Krebs, Moody County Conservation District Chairman Jack Majeres, Minnehaha County District Conservationist Deron Ruesch and a reporter for the Argus Leader Peter Harriman. The Group met with producers during the tour and discussed what conservation and clean water meant to their operations. After the tour, the Sioux Falls Argus Leader produced a front page article on

the work being done to improve water quality and how producers were helping achieve the project goals. Another tour was set up to show the City of Sioux Falls Environmental Division personnel the work being done in the watershed and results it had on water quality. RESEC Engineering was hired as the consultant for completion of the master plan. A draft Master Plan was delivered to the Steering Committee during 2013 for review and was finalized during September of 2013. Copies of the final Master Plan were given to members of the Steering Committee.

Figure 17: Big Sioux River & Skunk Creek Tour

Task 8: ARS Design Criteria and Citing on Bank-toe Protection

Products: The design criteria and sites will be identified from using the concepts model on the Big Sioux River.

Milestones:	**Planned**	**Completed**
Design Criteria/Final Report	1	0

Accomplishment: Three draft reports and an Engineered Log Jam (ELJ) design guidelines paper were produced by ARS for review. Final versions of these reports are expected to be completed during the next segment of this project.

The reports consist of

- "Physical-Scale Models of Engineered Log Jams for the Big Sioux River, SD"
  - This report was drafted without information from a movable bed model that was constructed for this report, but that information is intended to be placed in the final version of the Log Jam report.
- "Preliminary Results, Design Guidelines for ELJs"
- "Analysis of Bank Erosion Along Skunk Creek, South Dakota"
- "Bank Erosion and Stabilization of the Big Sioux River between Dell Rapids and Sioux Falls, South Dakota"
  - See Figure 18 for a map showing the erosion potential along the Big Sioux from this report.

A site that was not completed during phase 4 of the bank stabilization project is planned to implement an ELJ based on findings from the ELJ report and Design Guidelines during the next

segment of this project. Large trees with the root ball still attached are already at this site. It was suggested by ARS to complete another study to gage the effectiveness of the ELJ that will be installed, but no commitments have been made at this time. Stabilization through future segments of the Big Sioux River Watershed Implementation Project will consider findings from the other reports drafted by ARS.

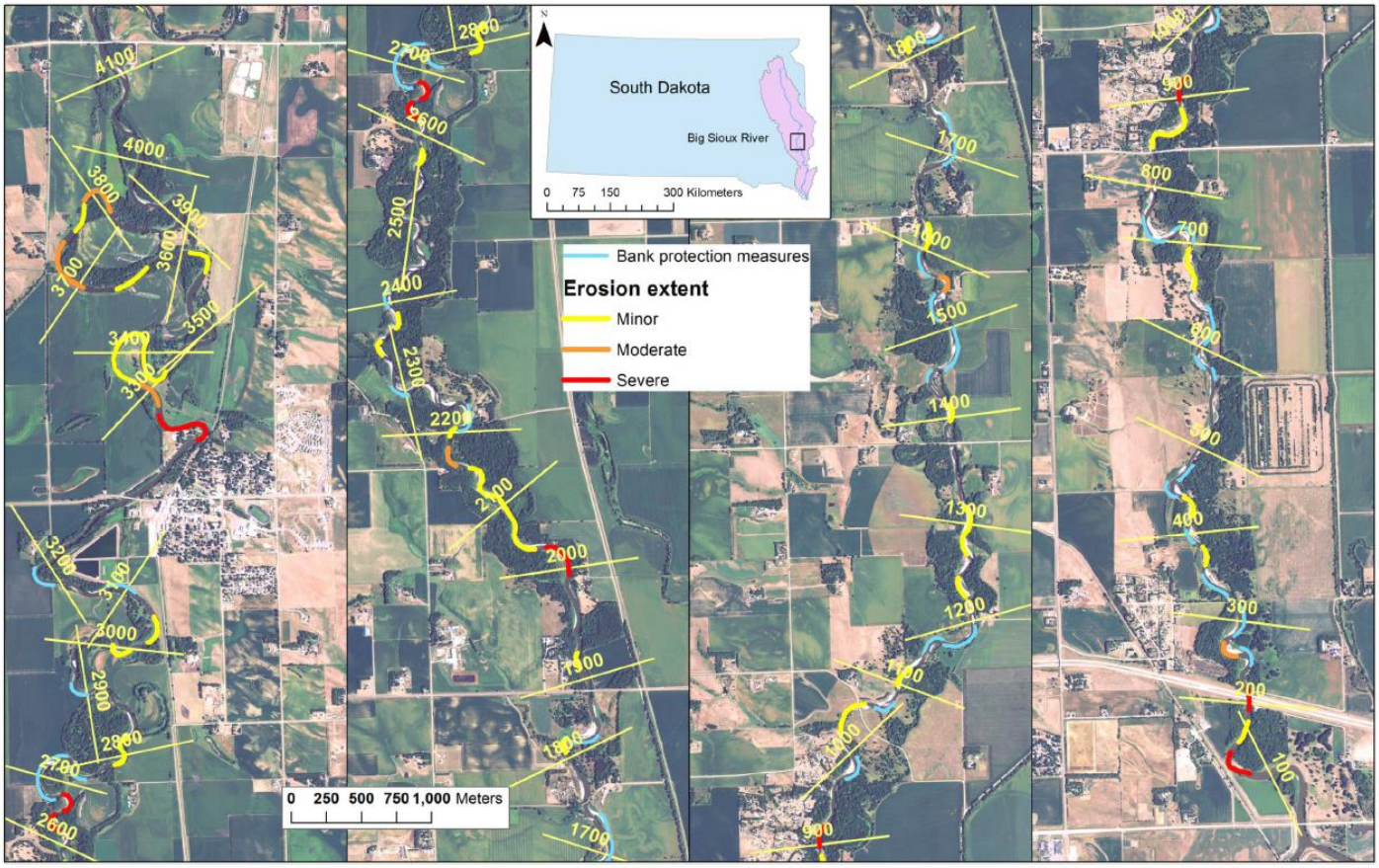


Figure 18: Erosion Potential along the Big Sioux River

Objective 4: <u>Conduct water quality monitoring</u> to assess project impacts on impaired water bodies.

Task 9: Monitor water quality at the 33 river and tributary locations.

Products: 560 water quality analyses for TSS and bacteria (fecal and E. coli), and other parameters, from 33 sites in the project area. 120 replicate or blank quality assurance/quality control samples were collected.

Milestones:	**<u>Planned</u>**	**<u>Completed</u>**
Water Samples/Testing by EDWDD	680	993

Accomplishment: EDWDD has completed all sampling during this project. Below is a list of sites and location in the watershed.

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
TBD	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

Objective 5: Reporting

Task 10: 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 (Second Segment) Final Report.

Milestones:	Planned	Completed
Annual GRTS reports	4	4
Segment 2 Final Report	1	1

Accomplishment: All required reports have been completed for Segment 2 of the project.

Summary of Project Goals and Objectives

Table 5: Planned Versus Completed Project Milestones.

Objectives/Tasks/Products	Milestones	
	Planned	Completed
Objective 1: BMP Installation		
Task 1: Livestock Nutrient Management		
Feasibility Studies	13	10
Engineering Designs	13	14
Nutrient Management Plans	12	8
System Installation	12	7
Clean Water Diversions	6	2
Task 2: Riparian Area Protection		
CRP/RAM ac.	150	138.1
Grazing Mgt. System Planned	2	6
Easements Developed ac.	201	16.8
Water Developments pipelines, fences, wells, pumps	8	6
Bank Stabilization/Rehabilitation ft.	1270	1270
SRAM	0	585
Task 3: Cropland BMPs		
Terrace Restoration ft.	9,847	6,647
Grassed Waterways ft.	10,000	11,043
Filter Strips ac.	20	79.2
Task 4: Alternative Water Quality Treatments		
Engineering Services	2	1
Bioreactor Installation	2	1
Monitoring Inflow & Outflow	20	10
Objective 2: Information & Education		
Task 5: Public Outreach		
Landowner Survey	1	0
Informational Meetings	6	66
News Releases	6	21
Objective 3: Master Plan Development		
Tasks 6 & 7 Master Plan & Pilot WQ Trading Program		
Consultant Hires	1	1
Pilot Trading Plan Implemented	1	1
Final WQ Trading Plan	1	0
Task 8: ARS Design Criteria & Citing Bank Toe Protection		
Gather Data	1	1
Model and Experiment	1	0
Develop Report on Design Criteria	1	0
Objective 4: Monitoring and Evaluation		
Task 9: Water Quality Monitoring		
Water Samples/Testing	420	793
QA/QC for Samples	84	200
Objecting 5: Reporting		
Task 10: GRTS & Final Reports		
Annual GRTS Reports	4	4
Final Report	1	1

New BMPs Developed

The Seasonal Riparian Area Management (SRAM) was a new program developed in 2012 by the 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 has been 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.

Preliminary statistics from the additional monitoring sites along Skunk Creek (Figure 19) have shown that the SRAM program has a definite impact on the direct loading of E-coli concentrations. The graph below is a comparison of the E-coli colonies/100ml in 2014 and 2015 as Skunk Creek flows downstream from heavily pastured riparian areas (NWQI SK1) through pastures that have been enrolled into the SRAM program (NWQI SK2 - NWQI SK4). Results show a trending decline in the E-coli concentrations based on direct stream loading during normal to low flow levels. Outliers and extremes were thrown out due to the 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.

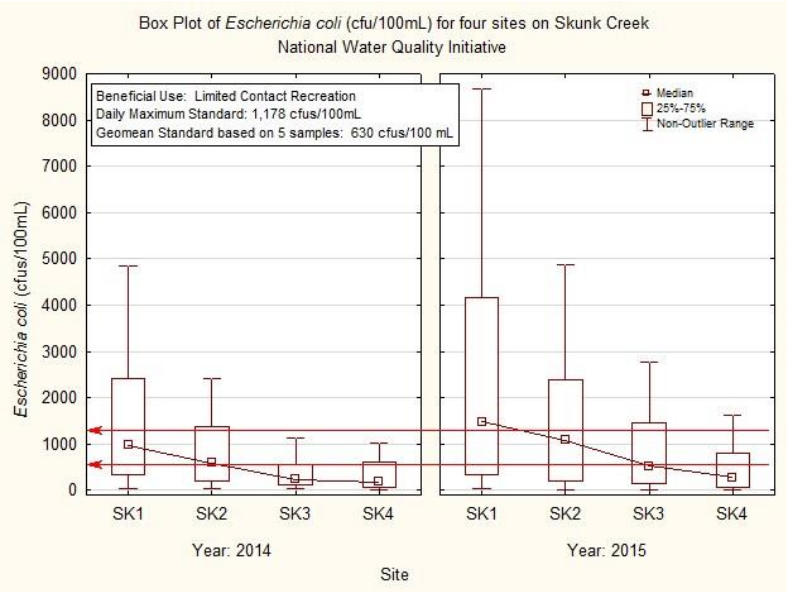


Figure 19: Preliminary E-coli Stream Monitoring

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. A map of these locations is shown in Figure 20 and BMPs installed through previous projects are shown in Figure 21. Along with the type of BMP that was installed, these maps show that several BMPs were installed throughout the watershed. With the frequency and location of the BMPs, the project was able to assist in improving condition of the stream reaches within the project area.

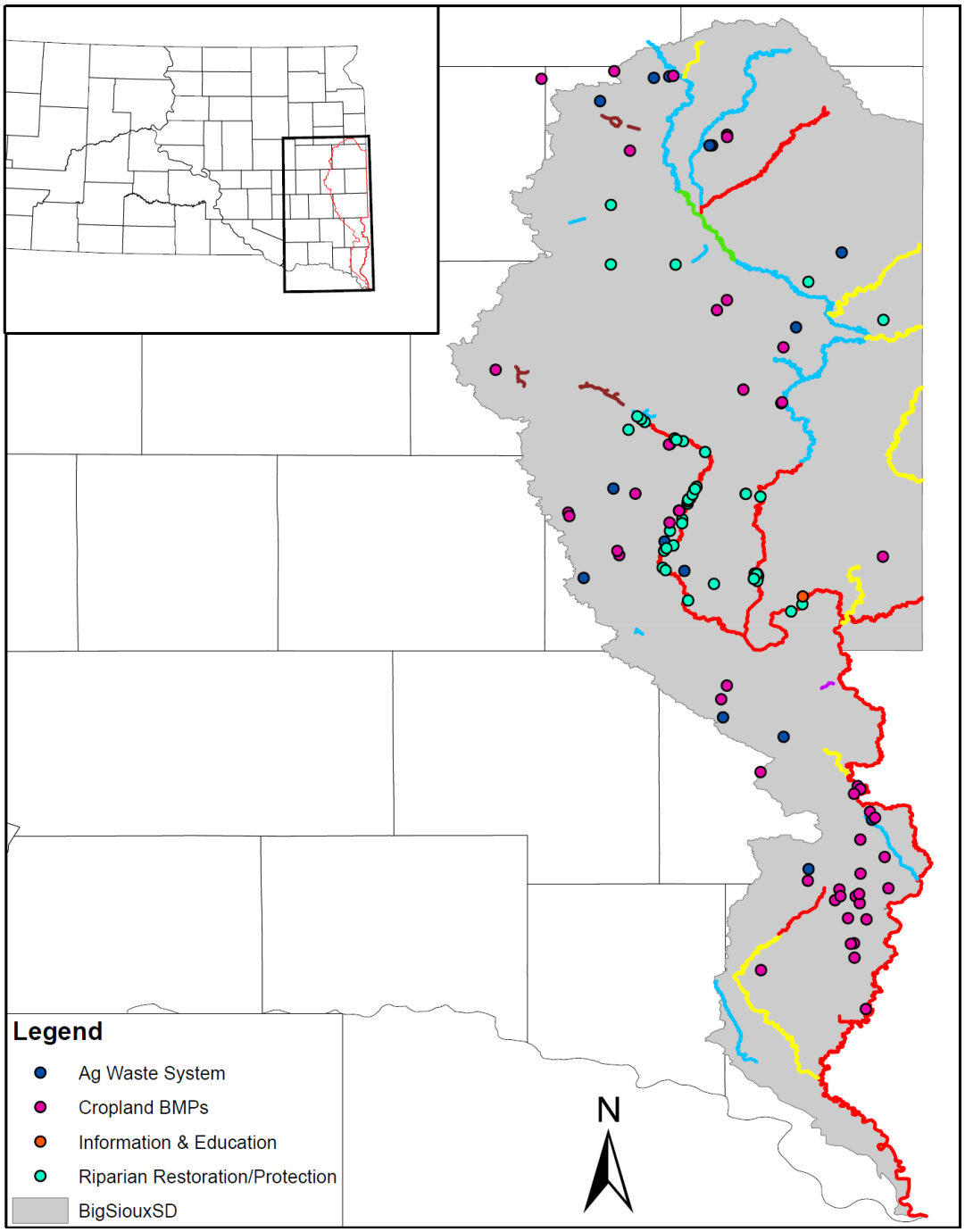


Figure 20: Central Big Sioux River Implementation BMP locations

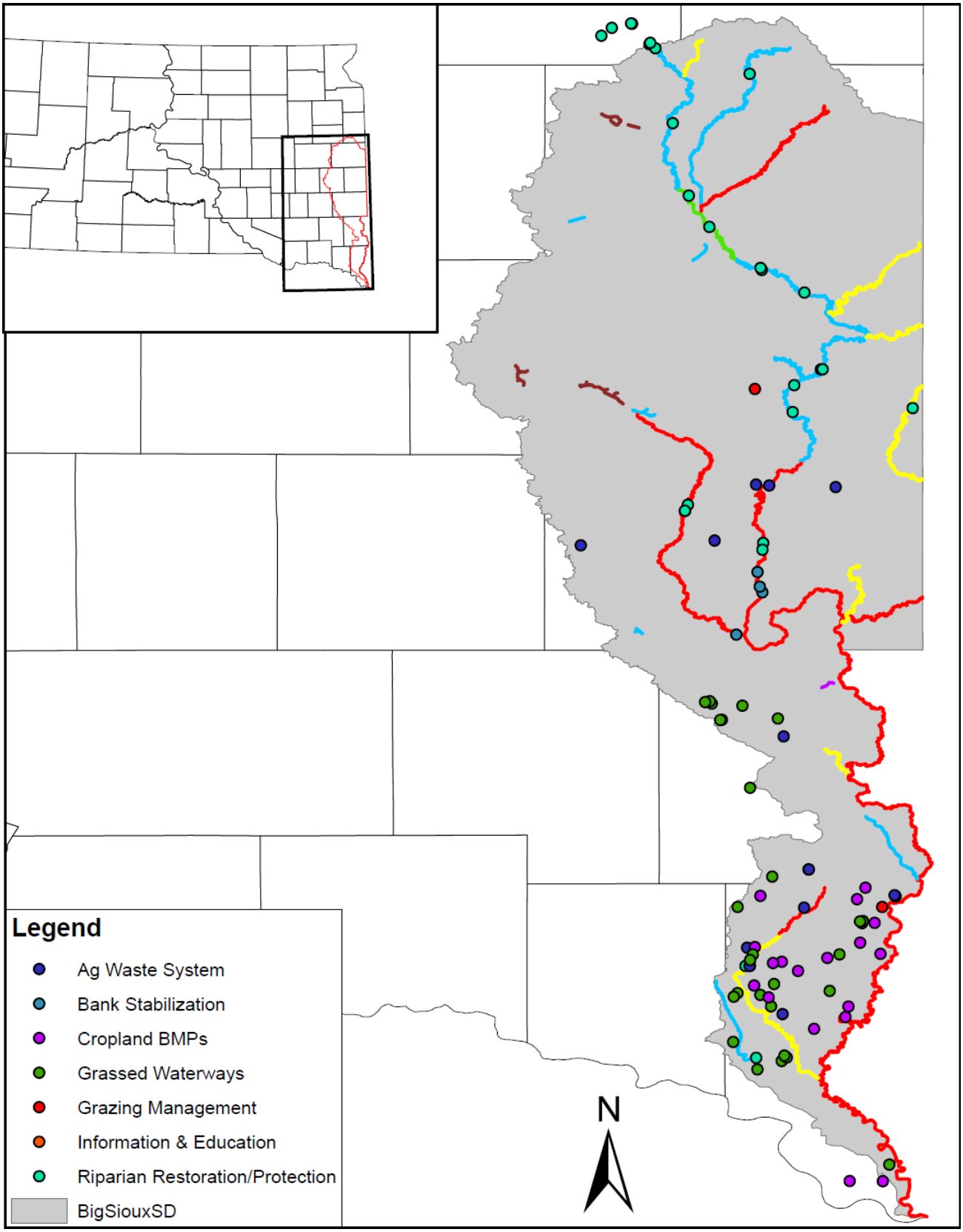


Figure 21: BMP locations from Previous Implementation Projects

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 6.

Table 6: Big Sioux Implementation Load Reductions by River Segment.

Streem Reach or Lake Affected	Sediment (Tons)	N (Pounds)	P (Pounds)
SD-BS-L-ALVIN_01	10	45	15
SD-BS-L-MADISON_01	166	794	246
SD-BS-R-BEAVER_01	290	1,261	413
SD-BS-R-BIG_SIOUX_04	1,078	8,149	2,246
SD-BS-R-BIG_SIOUX_06	7	133	33
SD-BS-R-BIG_SIOUX_07	70	8,751	1,992
SD-BS-R-BIG_SIOUX_08	120	2,695	754
SD-BS-R-BIG_SIOUX_11	148	599	202
SD-BS-R-BIG_SIOUX_14	419	1,701	607
SD-BS-R-BIG_SIOUX_15	234	809	322
SD-BS-R-BIG_SIOUX_16	927	3,099	1,206
SD-BS-R-BRULE_01	672	2,447	882
SD-BS-R-EAST_BRULE_01	728	2,476	977
SD-BS-R-JACK_MOORE_01	16	3,467	784
SD-BS-R-NORTH_DEER_01	401	5,256	1,323
SD-BS-R-PATTEE_01	591	2,139	865
SD-BS-R-PEG_MUNKY_RUN_01	22	8,334	1,875
SD-BS-R-SKUNK_01	2,496	16,878	5,143
SD-BS-R-SPLIT_ROCK_01_USGS	274	944	374
SD-BS-R-UNION_01	231	777	306
Other	23	929	155
Total	**8,923**	**71,683**	**20,720**

Load reductions from past projects and the current project broken out by BMP type are listed in Table 7. The total number of projects that were completed to make up the load reductions is also listed in this table. The previous projects are made up of the Central Big Sioux River Implementation Segment 1, Central Big Sioux River Interim Project and Lower Big Sioux River Implementation Segments 1& 2.

Table 7: 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	23	222	76	298	138,287	30,734	169,021	28,865	6,864	35,729
Cropland BMPs	99	8,882	8,347	17,229	33,762	32,007	65,769	12,109	11,615	23,724
Riparian Restoration/Protection	67	23,739	500	24,239	68,006	8,942	76,948	22,985	2,241	25,226
Total	189	32,843	8,923	41,766	240,055	71,683	311,738	63,959	20,720	84,679

Monitoring Results

Stream water quality monitoring for the Big Sioux River main stem and tributaries was completed by EDWDD. They will continue the monitoring of the Big Sioux River and tributaries and provide their results to SDDENR and the project in 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.

Coordination Efforts

The Moody Conservation District was the lead sponsor of the Central Big Sioux River Watershed Segment 2 Project. 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 8). The agencies and their roles are summarized below.

South Dakota Association of Conservation Districts

The SDACD provided budgetary administration of salary funding for the watershed coordinator. One half of the coordinator salary administered for the project was generated from the statewide 303d watershed project and Farm Bill Implementation Technical Assistance fund. These funds were specifically used for projects either outside of the watershed or projects not listed in the Project Implementation Proposal in order to expand the suite of BMPs offered. In an effort to increase the suite of BMPs and project funding, the watershed coordination team 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 in full swing and plans to start implementing in Segment 3 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 has completed the Master Plan and submitted copies to the City of Sioux Falls and the Steering Committee. They are currently in the process of completing the Water Quality Credit Trading Program final report and plan to submit their results to the U.S. EPA and 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. Audiences were given a presentation of the project, its goals, and funding opportunities for implementation activities in the watershed. 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. The first two summits during this project segment were held in Sioux Falls. Future plans are to conduct summits in other cities that are also part of the watershed.

Aspects of the Project that did not Work Well

Several bank stabilization sites failed due to prolonged high waters from spring into summer of 2011 and 2012 and required restoration in the fall. The lack of standing vegetation along with the a lower top of rock elevation compared to phase 1 and 2 made phase 3 and 4 more susceptible to erosion. Some of the erosion that occurred at these locations caused complaints from local land owners. The City of Sioux Falls cooperated with these landowners and the contractors to create solutions that worked for those involved.

Grass waterways and CRP have not been very attractive during this Segment of the project. Cropland prices and commodities have been on an upward trend through most of the segment and made it difficult to implement them. Also with the movement of tiling, many existing waterways were taken out and replaced with drainage tile.

Project Budget

Table 8: Big Sioux River Segment 2 Implementation Project Original Budget.

Big Sioux River Watershed Implementation Project Segment 2	Seg. 2 Combined Project Expenses			Project Funding							
Project Personnel and Administration	**Year 1**	**Year 2**	**Year 3**	***Total***	**319-EPA Grant**	**CWSRF**	**USDA**	**Local Cash**	**City of Sioux Falls**	**City of Sioux Falls (SRF-NPS)**	**East Dakota WDD**
Project Coordinators	**$55,647.00**	**$88,916.00**	**$88,915.00**	**$233,478.00**	**$233,478.00**						
Travel/Lodging/Meals/Expenses	**$9,531.00**	**$14,642.00**	**$14,641.56**	**$38,814.56**	**$10,173.56**					**$28,641.00**	
Administration	**$66,279.33**	**$74,263.33**	**$74,263.34**	**$214,806.00**	**$83,674.00**			**$32,050.00**		**$99,082.00**	
Objective 1 - Best Management Practices											
Task 1. Livestock Nutrient Management											
13 feasibility studies 12 designs	**$84,615.38**	**$95,115.38**	**$75,269.24**	**$255,000.00**	**$58,648.00**	**$13,800.00**	**$42,752.00**	**$63,750.00**		**$76,050.00**	
Implementation of 12 Animal Waste Management Systems	**$815,949.00**	**$832,225.00**	**$832,226.00**	**$2,480,400.00**	**$74,553.00**	**$72,200.00**	**$1,005,247.00**	**$620,100.00**		**$708,300.00**	
Task 2. Riparian Area Protection											
Riparian Area Management Program, 150 acres @ $1,460/acre	**$73,000.00**	**$73,000.00**	**$73,000.00**	**$219,000.00**	**$20,000.00**		**$99,000.00**	**$30,000.00**		**$70,000.00**	
Easements, 201 acres @ $2000/ac	**$129,333.00**	**$135,833.00**	**$135,834.00**	**$401,000.00**	**$13,000.00**					**$375,000.00**	**$13,000.00**
Grazing management system (2 @ $20,000) & Water developments	**$14,500.00**	**$72,750.00**	**$72,750.00**	**$160,000.00**	**$5,000.00**		**$72,500.00**	**$30,000.00**		**$52,500.00**	
*Bank Stabilization, 1270 linear feet @ $100/ft		**$202,925.00**	**$202,925.00**	**$405,850.00**						**$405,850.00**	
Task 3. Cropland Best Management Practices											
Terrace Restoration - Critical Area Planting, 9,847 feet		**$5,169.00**	**$5,170.00**	**$10,339.00**	**$7,754.00**			**$2,585.00**			
Grassed Waterways, 10,000 feet at $1.70/ft	**$5,666.00**	**$5,667.00**	**$5,667.00**	**$17,000.00**			**$15,300.00**	**$1,700.00**			
Filter Strips, 20 acres @ $100/ac	**$666.00**	**$667.00**	**$667.00**	**$2,000.00**			**$1,800.00**	**$200.00**			
Task 4. Alternative Water Quality Treatments											
Tile outlet treatment demo 2 systems/20 samples	**$8,000.00**	**$10,000.00**		**$18,000.00**	**$12,000.00**			**$4,000.00**			**$2,000.00**
Objective 2 - Information & Education/Public Participation											
Task 5. Public Outreach											
News releases, meetings, mailings, landowner survey, website	**$8,125.00**	**$18,125.00**	**$6,250.00**	**$32,500.00**	**$16,250.00**					**$6,250.00**	**$10,000.00**
Objective 3 - Master Plan Development											
Task 6. Develop Pilot WQ Trading Program*											
Consultant costs	**$35,500.00**	**$35,500.00**		**$71,000.00**	**$25,000.00**				**$46,000.00**		
Task 7. Develop Master Plan for Watershed Restoration*											
Consultant Costs	**$100,000.00**	**$100,000.00**	**$100,000.00**	**$300,000.00**	**$50,000.00**				**$50,000.00**	**$200,000.00**	
Task 8. ARS Design Criteria and Citing of Bank-Toe Protection*											
Consultant Costs	**$100,000.00**	**$150,000.00**		**$250,000.00**						**$250,000.00**	
Objective 4 - Monitoring and Evaluation (Section 5.0)											
Task 9. Water Quality Monitoring											
River WQ Monitoring QA/QC - 420 @$35 each (10 sites * 14/yr * 3 yr)	**$5,880.00**	**$6,510.00**	**$6,510.00**	**$18,900.00**							**$18,900.00**
Totals	**$1,512,691.71**	**$1,921,307.71**	**$1,694,088.14**	**$5,128,087.56**	**$609,530.56**	**$86,000.00**	**$1,236,599.00**	**$784,385.00**	**$96,000.00**	**$2,271,673.00**	**$43,900.00**

Table 9: Big Sioux River Segment 2 Implementation Project Actual Budget.

Big Sioux River Watershed Implementation Project Segment 2								
Project Personnel and Administration	319-EPA Grant	CWSRF WQ	USDA	Local Cash	City of Sioux Falls	City of Sioux Falls (SRF-NPS)	East Dakota WDD	Totals
Project Coordinators	**$177,486.74**							**$177,486.74**
Travel/Lodging/Meals/Expenses	**$48,937.06**			**$250.00**				**$49,187.06**
Administration	**$31,853.43**		**$21,072.00**			**$577.90**		**$53,503.33**
Objective 1 - Best Management Practices								
Task 1. Livestock Nutrient Management								
AWMS	**$106,166.68**	**$86,000.00**	**$1,230,983.53**	**$1,918,978.37**		**$288,657.35**		**$3,630,785.93**
Task 2. Riparian Area Protection								
Riparian Area Management						**$27,379.95**		**$27,379.95**
Easements, 201 acres @ $2000/ac						**$35,399.11**		**$35,399.11**
SRAM	**$81,513.65**					**$434,565.00**		**$516,078.65**
Grazing management system (2 @ $20,000) & Water developments			**$171,115.18**	**$12,813.26**		**$14,205.88**		**$198,134.32**
*Bank Stabilization, 1270 linear feet @ $100/ft						**$261,563.15**		**$261,563.15**
Task 3. Cropland Best Management Practices								
Terrace Restoration - Critical Area Planting, 9,847 feet	**$5,437.49**			**$4,117.55**				**$9,555.04**
EQIP Terraces			**$76,465.91**	**$20,719.31**				**$97,185.22**
Grassed Waterways, 10,000 feet at $1.70/ft								**$0.00**
Filter Strips, 20 acres @ $100/ac			**$78,045.00**					**$78,045.00**
Task 4. Alternative Water Quality Treatments								
Tile outlet treatment demo 2 systems/20 samples	**$1,341.83**							**$1,341.83**
Objective 2 - Information & Education/Public Participation								
Task 5. Public Outreach								
News releases, meetings, mailings, landowner survey, website	**$463.80**			**$4,559.98**				**$5,023.78**
Objective 3 - Master Plan Development								
***Task 6. Develop Pilot WQ Trading Program** *								
Consultant costs								
***Task 7. Develop Master Plan for Watershed Restoration** *								
Consultant Costs					**$93,392.20**	**$204,561.56**		**$297,953.76**
Task 8. ARS Design Criteria and Citing of Bank-Toe Protection*								
Consultant Costs						**$145,941.45**		**$145,941.45**
Objective 4 - Monitoring and Evaluation (Section 5.0)								
Task 9. Water Quality Monitoring								
River WQ Monitoring QA/QC - 420 @$35 each (10 sites * 14/yr * 3 yr)	**$3,135.96**						**$1,497.12**	**$4,633.08**
Totals	**$456,336.64**	**$86,000.00**	**$1,577,681.62**	**$1,961,438.47**	**$93,392.20**	**$1,412,851.35**	**$1,497.12**	**$5,589,197.40**

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 EQIP 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 database with producers that own land adjacent to streams in the watershed would be a valuable tool for contacting and mailing information about project opportunities. Mailings 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 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.

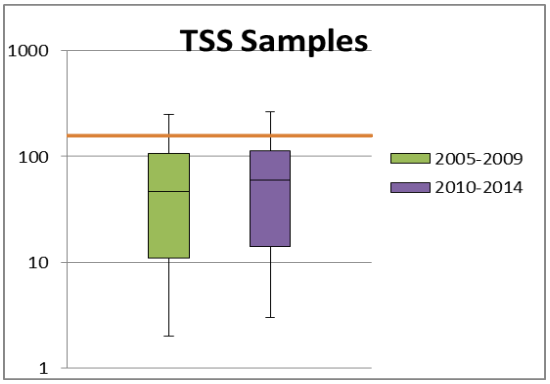
Animal feeding operations should remain a high priority in regard to waste storage, handling and utilization. Nonpoint sources of runoff should be targeted for implementation activities along and near tributaries and the Central Big Sioux River itself. Installation of BMPs in these sensitive areas will 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.

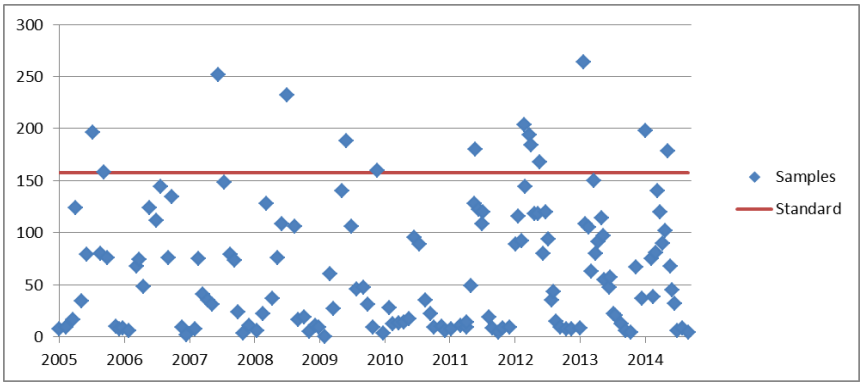
Appendix A

Monitoring Results

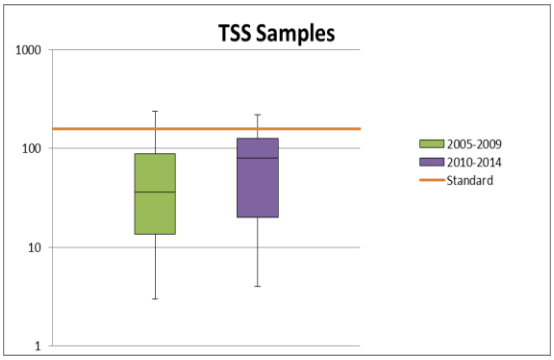
The following figures show the daily standard for each stream segment in comparison to stream samples. Each of these segments are listed in the SD DENR 2014 Integrated Report (IR). To be listed in the IR, 10% of the samples must exceed the Standard. In some causes the chronic standard (not displayed in these figures) is applied to the reach. These samples and exceedance given here are not those used for the 2014 IR.

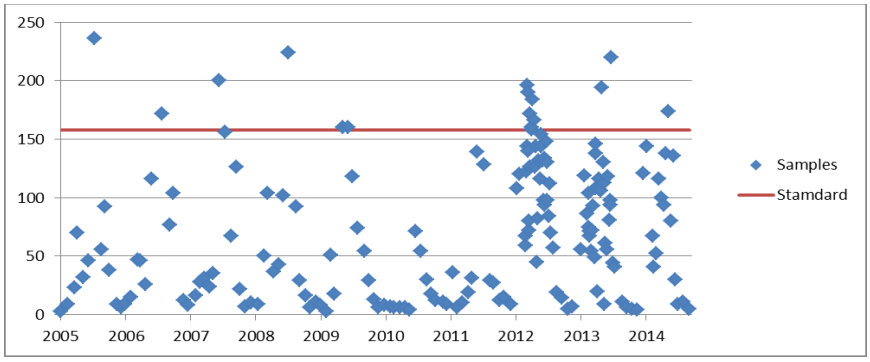
Big Sioux_05-9.88% Exceedance-Newly Listed in 2014



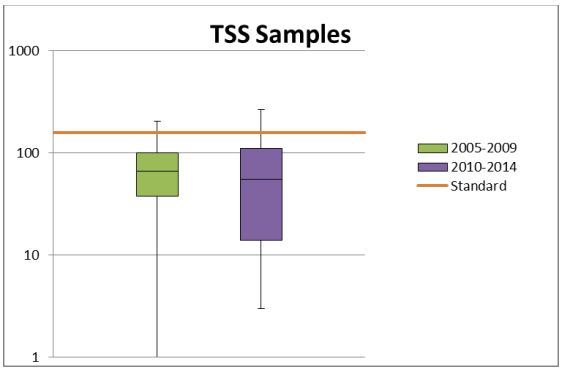


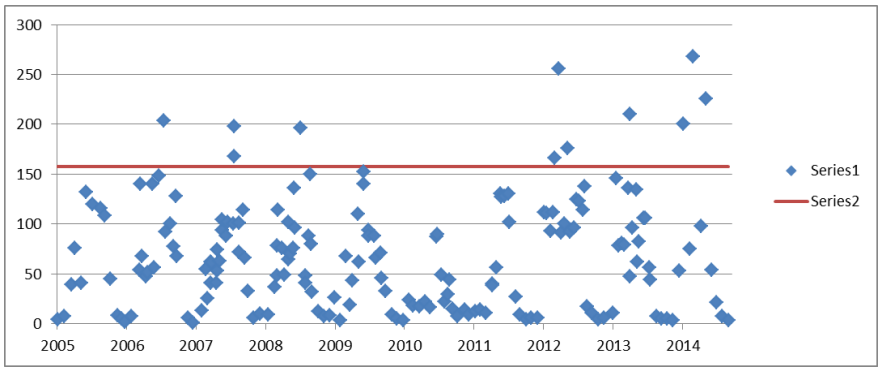
BS_06 -7.7% Exceedance-listed for the chronic standard.



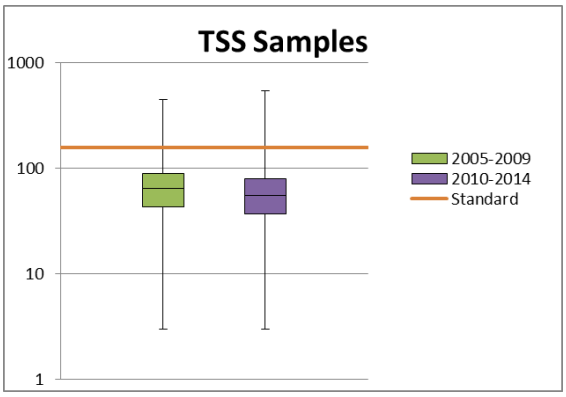


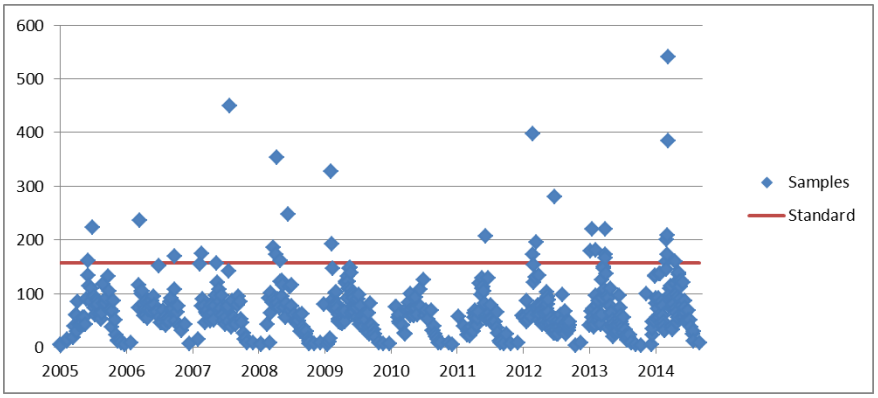
BS_07- 8.5% exceedance.



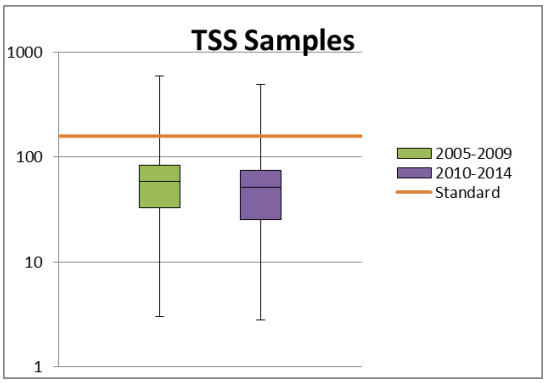


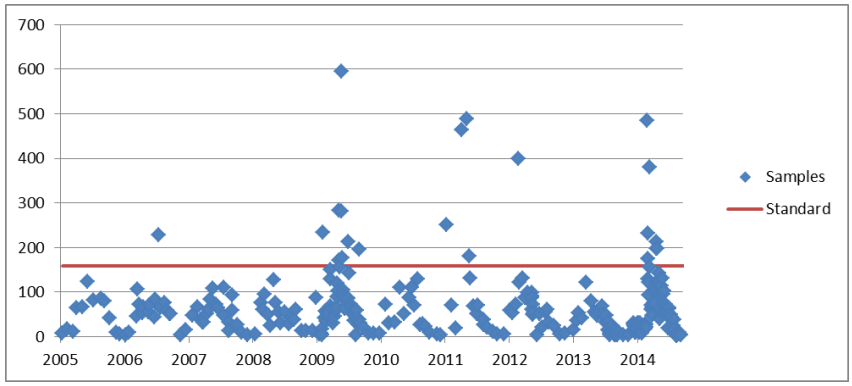
BS_08- 5.6% exceedance, listed for the chronic standard with a 22% exceedance.



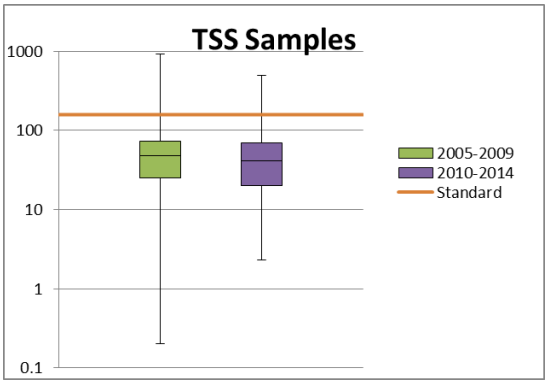


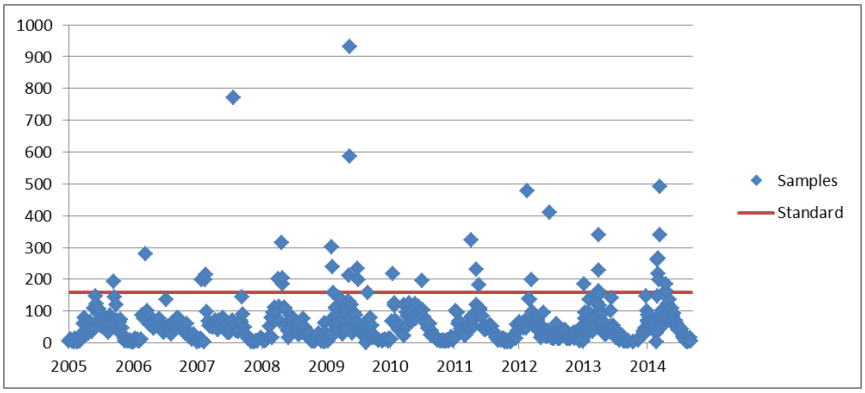
BS_10- 6.8% exceedance, listed for the chronic standard with a 19% exceedance.



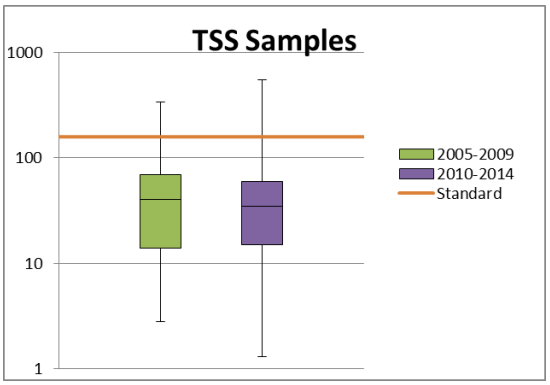


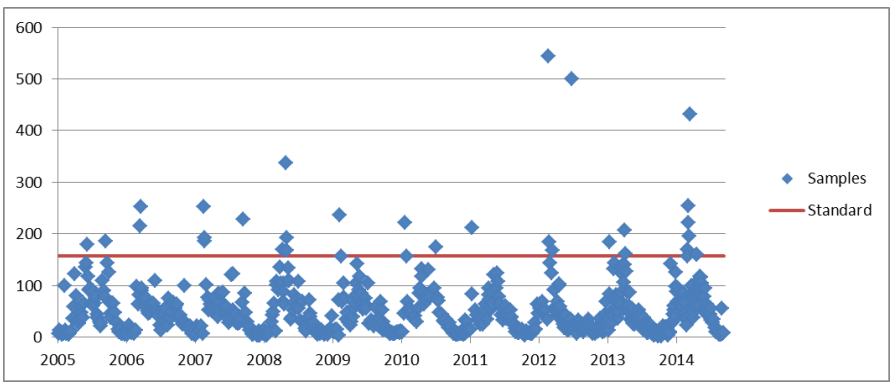
BS_11-5.4% exceedance, listed for the chronic standard with a 16.7% exceedance.



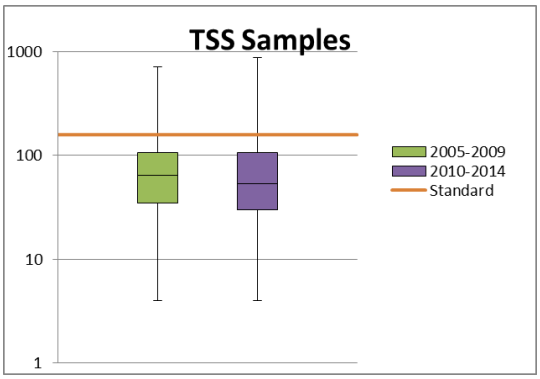


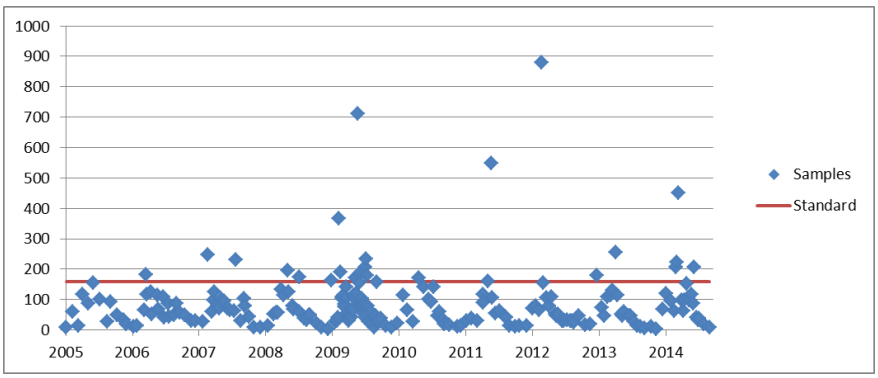
BS_12-4.2% exceedance, listed for the chronic standard with a 13.7% exceedance.



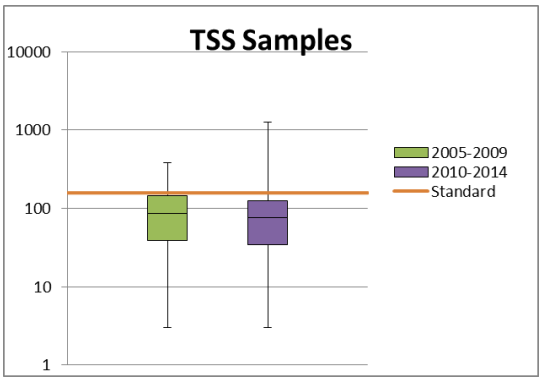


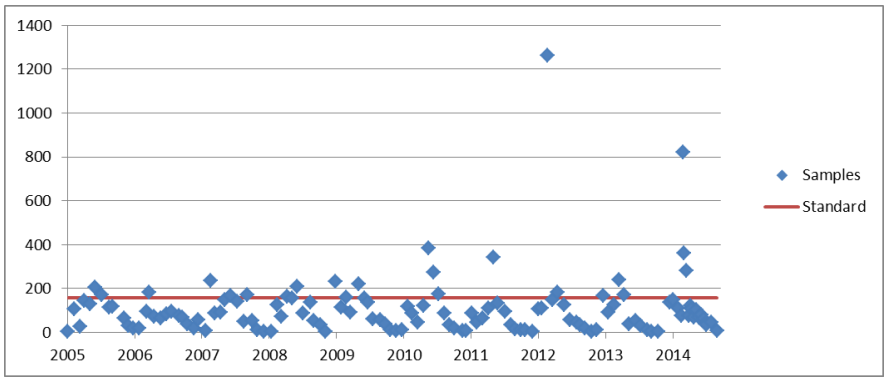
BS_13-11.4% exceedance, listed for the chronic standard with a 32.9% exceedance.



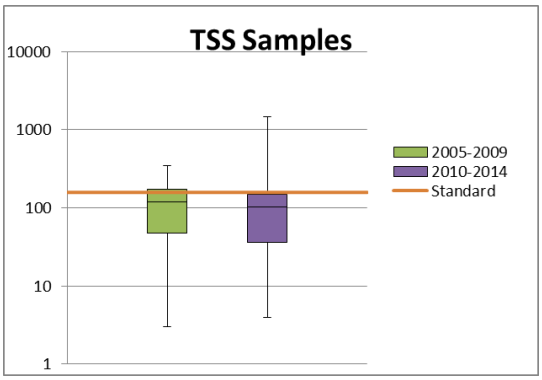


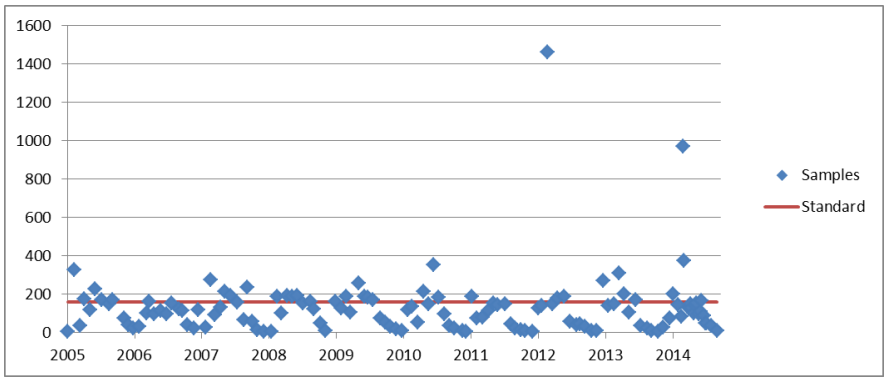
BS_14-15.3% exceedance, listed for the chronic standard with a 42.4% exceedance.



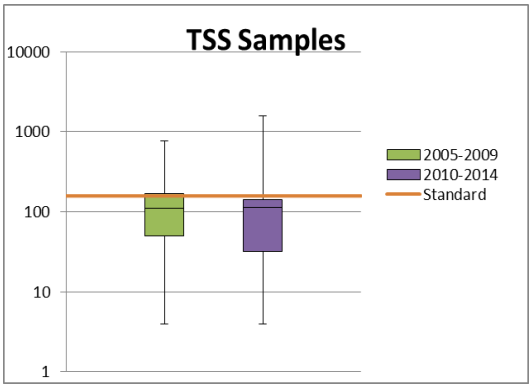


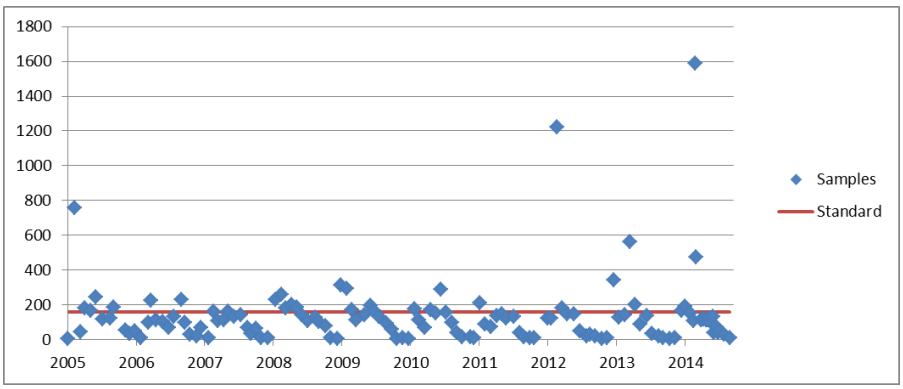
BS_15-20.7% exceedance.



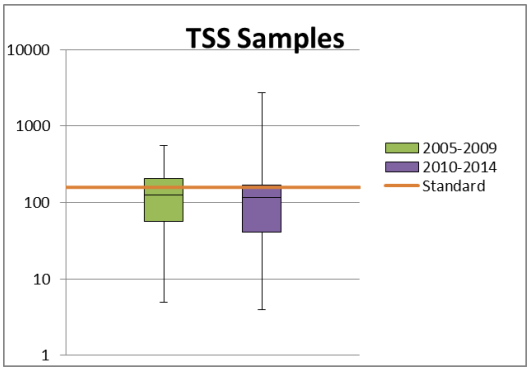


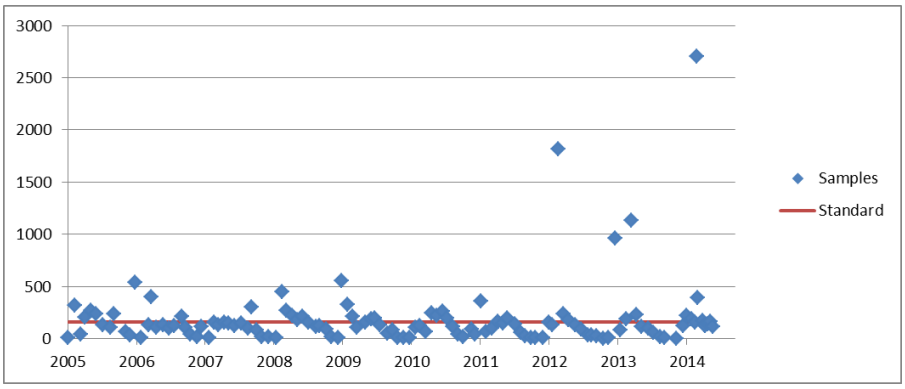
BS_16-17.5% exceedance.



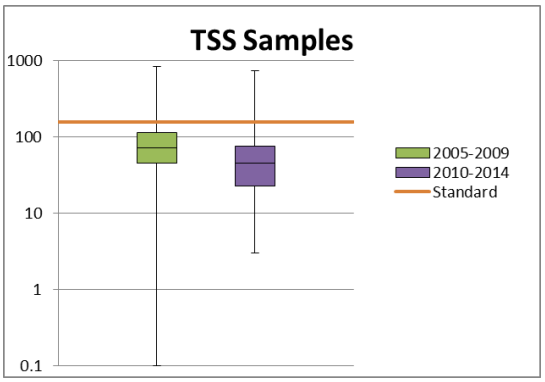


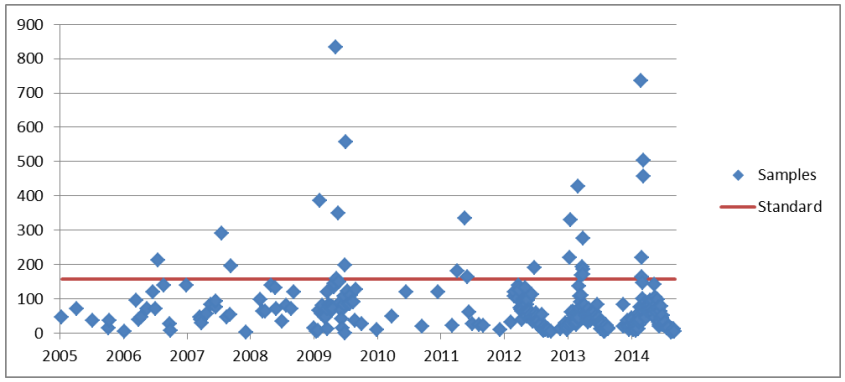
BS_17-27.6% exceedance.



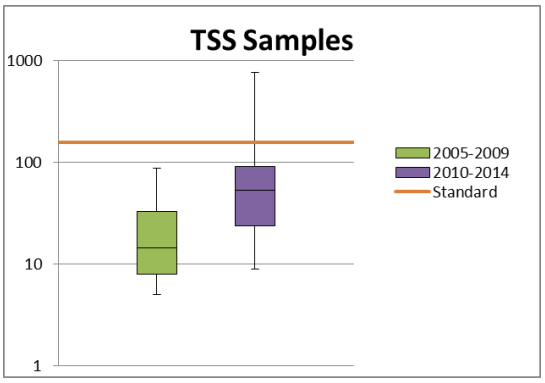


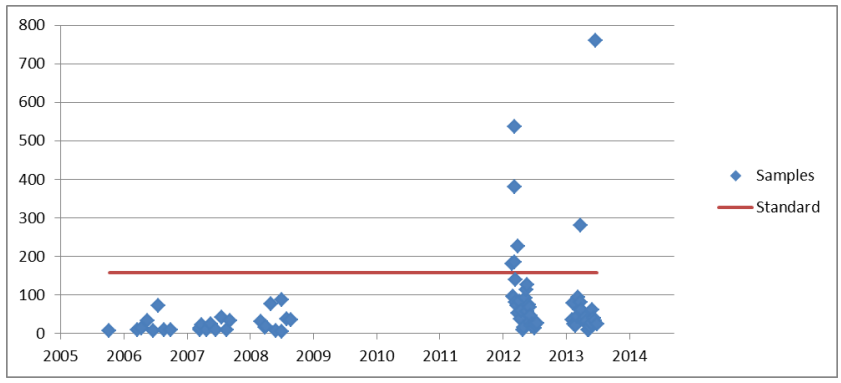
Skunk Creek-7.0% exceedance, listed for the chronic standard with a 19% exceedance.



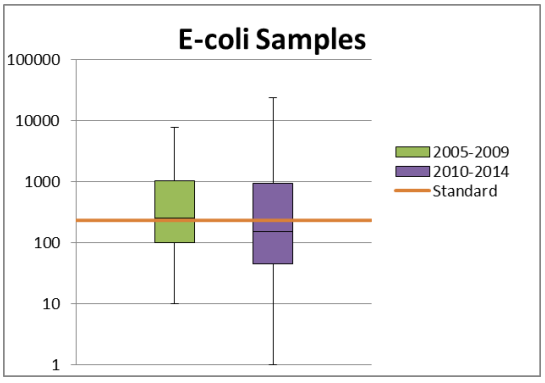


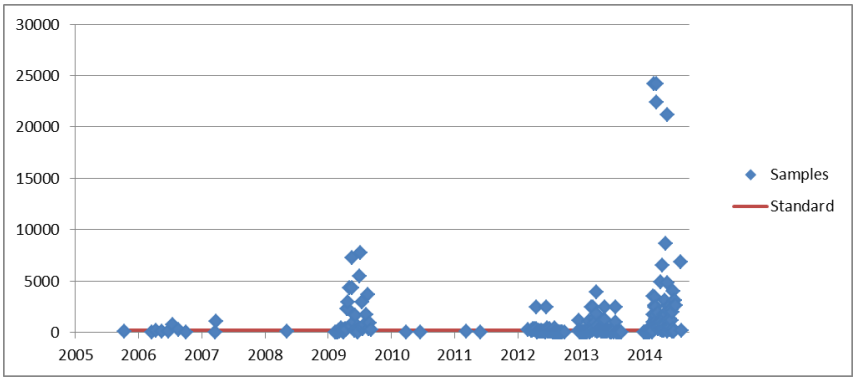
Sixmile- 13.2% exceedance, listed for the chronic standard with a 26% exceedance.





Skunk Creek-41% exceedance.





JOE AHLQUIST / ARGUS LEADER

Barry Berg is watershed coordinator for the Central Big Sioux River Watershed Implementation Project. He spoke Wednesday about an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program on Skunk Creek just south of Brant Lake near Chester. He was part of a tour of the different enrolled pastures in the programs, which are designed to reduce pollution runoff into Skunk Creek and the Big Sioux River. Across the road from the enrolled pasture, and closer to the lake, is a future enrolled pasture in the SRAM program.

POWER OF INCENTIVES

Landowner project pays off for river

By Peter Harriman
pharrima@argusleader.com

Water conservation officials pointed to signs of progress this week in their efforts to reduce agricultural pollution in Skunk Creek, and eventually the Big Sioux River.

Shantel Krebs of Renner, majority whip in the state Senate, and state Agriculture Secretary Lucas Lentsch received a tour Wednesday along the creek, where conservationists with the Central Big Sioux River Watershed project and other agencies noted the effect of a two-year-old pilot program aimed

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GALLERY

Check out more photos from tour
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LOCAL & STATE

Pollution: Incentive program gains converts

Continued from Page 1A

at improving water quality.

The Seasonal Riparian Area Management program pays farmers $60 an acre per year in 10- or 15-year contracts to fence livestock away from the creek's 100-year floodplain from April 1 to Sept. 30, which reduces the amount of manure that winds up in the creek.

While urban pollution sources on the lower creek degrade water quality, livestock grazing and manure runoff along the rest of the creek are a significant source of E. coli, fecal coliform and suspended solids.

Skunk Creek, which flows 58 miles from Brant Lake to its confluence with the Big Sioux River in Sioux Falls, provides the river's greatest flow through the city in summer, because much of the Big Sioux upstream is directed through the flood control diversion channel.

City and state officials have been trying to meet a goal of making the river safe for swimming, and for that to happen, Skunk Creek water quality must improve.

The money is disbursed in a one-time up-front payment. Farmers are allowed to cut hay in the riparian area but must leave a four-inch stubble. The program also pays 75 percent of the cost of providing an alternative water source for farmers who formerly used the creek to water stock.

Krebs remarked that as a legislator, landowners tell her they prefer to be led into new conservation practices and programs by seeing how such practices and programs work for their neighbors rather than being forced into adopting them by laws.

Her observations resonated with Skunk Creek watershed livestock producers whose operations were part of the tour.

"We'd rather learn from each other, not lawmakers," Rodney Vandervliet of Colton said

Eight years ago, Vandervliet built a mono-slope barn and manure storage facility to begin feeding 450 cattle, and he is working with a federal conservation program on a new $350,000 deep pit slatted floor barn. It will replace an open feedlot.

"No manure runs out of that barn — not a scoopful," Vandervliet said proudly of his existing facility.

Lloyd Siemonsma was able to fence 3 acres on the west bank of the Big Sioux River just north of Sioux Falls and 5 acres on the east bank.

He also was able to bring in water from an alternate source, which allowed him to move his cattle away from the river.

The river banks adjacent to his land now are thick with grasses, bushes and young trees.

"It took me a long time to see it," he said of the value of moving cattle away from the river. "I farmed this for 42 years."

Now, he is an enthusiastic supporter of water-quality improvement programs.

"I believe in the concept. I believe it has got to happen," Siemonsma said. He echoes Vandervliet in a desire to be a good land steward.

"I like to make a difference," Siemonsma said. "I'm getting to an age, but I think I can make a difference with something like this."

So far, 589 acres along 11.1 miles of Skunk Creek have been enrolled in the watershed conservation program in the past two years.

Another 128 acres could be enrolled next year, said Barry Berg, the South Dakota Association of Conservation Districts watershed project coordinator.

PHOTOS BY JOE AHLQUIST / ARGUS LEADER

Deron Ruesch, district conservationist with the Natural Resources Conservation Service, talks Wednesday about an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program on Skunk Creek. Farmers are being paid to keep their livestock away from creeks and rivers for a stretch of the year in an effort to reduce pollution runoff.

Lloyd Siemonsma, a farmer near Sioux Falls, likes an incentive program for farmers to fence livestock away from creeks and rivers.

Within five years, Berg anticipates 1,400 acres along Skunk Creek and two of its major tributaries, Colton Creek and West Skunk Creek, will be fenced off from grazing.

Based on the results of a smaller program about 15 years ago on another Big Sioux River tributary, Bachelor Creek, Majeres confidently predicted there will be significant water quality improvements in the Skunk Creek watershed within several years.

"If we don't try to lead, society is going to push us into it," Siemonsma said of improving water quality. "We don't like to be pushed."

Paying landowners to deliver cleaner water downstream is a good investment for society at large, he figures.

"Show them we can do it. Show them we can manage it, and give them the bill."

Big Sioux River gets $4.5M to clean water

Jonathan Ellis

A project to improve water quality on the Big Sioux River was one of 115 nationally to win money under a new, competitive federal program.

The Minnehaha Conservation District — the lead partner in the project — will receive $2 million from the United States Department of Agriculture's Regional Conservation Partnership Program. The city of Sioux Falls, another partner in the project, is matching about $1.5 million from state revolving loan money.

Between federal and local dollars, the project will get about $4.5 million, money that will be used to limit agriculture waste and sediment runoff into the river.

The process of picking award winners started last year with 600 entities submitting pre-proposals. There were two cuts before the winning projects were selected.

"The competition for RCPP money was stiff," said Jeff Zimprich, the state conservationist with USDA's Natural Resources Conservation Service. "We feel blessed we were able to have this project."

The money will fund ongoing efforts to buffer Skunk Creek and the Big Sioux River with strips of vegetation. The vegetation absorbs animal waste and sediments before they can reach the water, which reduces bacteria and enhances water quality.

So far, the groups working on the project have buffered about 14.4 miles along the Big Sioux and Skunk Creek in Minnehaha County, said Barry Berg, watershed coordinator for the Big Sioux River Watershed Project. Water testing stations placed along Skunk Creek last year found significant reductions in the amount of E. coli in the water.

The new funding, which goes to producers along the waterways to create vegetation buffers, could translate to about 28 more miles of protection for the waterways, Berg estimated.

In addition, funding will be used for 13 animal waste management systems — which allow waste to be stored — and 13 comprehensive nutrient management plans.

"We're looking at about $4.5 million of good, hard cash to do watershed management and best practices projects in the watershed," Berg said.

Nationally, the new USDA Regional Conservation Partnership Program funded 115 projects in all 50 states with $370 million. Local partners are spending another $400 million.

Big Sioux Water Quality at risk, board chairman warns

As the Big Sioux River flows from Brookings to Sioux Falls, it winds through a region dotted with dozens of livestock operations too small to require special permits or inspections from the state for waste-handling procedures.

Collectively, though, these 200 or so smaller feedlots have a big effect on water pollution in the Big Sioux, primarily E. coli contamination, according to Brad Johnson, chairman of the South Dakota Board of Water and Natural Resources.

The seven-member board, appointed by the governor, is responsible for establishing a state water plan and overseeing the programs to carry it out.

The board is limited, however, because curbing pollution from these type of operations in South Dakota depends on voluntary participation, usually in exchange for payments, and federal money for such agreements has been declining.

The programs, for example, might pay ranchers to put up buffers to stop livestock from grazing in certain areas where animal waste is most likely to spill directly into a river or stream.

"If we are going to take a voluntary approach to this, we have to come up with additional sources of money to make it an effective program," Johnson said.

From 2001 to 2004, South Dakota received $3.8 million annually in federal Clean Water Act funding to manage "non-point source" pollution, the type that doesn't come from a single discharge pipe but from small trickles across a wide area.

In 2005, that funding fell to $3.2 million a year, and in 2012 it dropped again to $2.5 million, said Jim Feeney, director of the DENR's division of financial and technical assistance.

Meanwhile, Johnson argued, the state's water quality worsened. Of the 6,160 miles of rivers and streams in South Dakota assessed from 2008 to last year, only 30.6 percent were clean enough to support their intended use. That's down from 35 percent in the previous year's report, which looked at waterways assessed between 2007 and 2012.

South Dakota officials have offset some of the federal funding decline by combining it with about $500,000 a year from the state's Clean Water State Revolving Fund Program.

Legislative leaders are wary, though, about creating impediments to a livestock industry that recently has begun to expand thanks to record prices. And state officials say, counterintuitively, that water quality in the state actually might be improving.

"All of us in this business believe we are gaining," said Pete Jahraus, head of the Department of Environment and Natural Resources' nonpoint source pollution program.

"It's not put in something today and see the results tomorrow," he said. "This whole system takes so long to change over time."

Sen. Shantel Krebs, R-Renner, chairman of the state Senate Agriculture and Natural Resources Committee, said livestock producers are taking it upon themselves to learn best management practices for handling waste and implementing them.

"We don't always need a law for everything," she said. "It boils down to education. They're doing that in the water districts, sharing information. Look at how much we're improving in the Big Sioux already. We're making strides."

Sen. Jason Frerichs, D-Wilmot, the committee's ranking member, points out there is limited acreage for raising livestock. Years of robust commodities prices continue to encourage farmers to convert pastures to crop production.

"The good areas for livestock are sloped. They can't be farmed," Frerichs said. Unfortunately, slopes see increased runoff. Runoff, he notes, "flows into a river system."

Krebs and Frerichs also note that nutrients from lawns and golf courses and urban runoff that flows over concrete and asphalt directly into streams have a role in water pollution, in addition to agriculture.

Both legislators said there isn't much appetite in Pierre for tougher regulations for livestock producers to improve water quality.

"We have to be very cautious in terms of limiting producers' abilities," Frerichs agreed. "From my standpoint, I'm not a fan of increasing the hammer or stepping up enforcement."

Such sentiments don't surprise Johnson. But he is blunt about declaring what they mean for South Dakota's water quality.

"At the Board of Water and Natural Resources, we are trying to become creative in using loan and grant programs to maximize the dollars available," he said. But even augmenting federal money with state funds and with farm bill conservation programs isn't making headway.

"We're losing ground," Johnson said, "and we're going to continue to lose ground until we decide as a state and country that we're going to get serious about the issue."

VOICES

Water summit set for Thursday

Big Sioux summit takes message on road to Brookings

JOHN HULT
Have a problem or issue John Hult should look into? Contact him at 605-370-8617

Hundreds of conservationists, farmers and government officials will gather in Brookings on Thursday for the Big Sioux River Water Summit.

Topics include urban runoff control for cities, green infrastructure design for private developers, water quality goals for the Big Sioux watershed and a workshop on rain barrels and other methods homeowners can use to control storm water.

The third annual summit, organized by the city of Sioux Falls, is the first to take place at an upstream location. The move was meant to bring the conversation about the Big Sioux River to partners within the watershed.

Brookings Mayor Tim Reed is glad to see the summit reaching out. The city is home to outreach programs through South Dakota State University's agricultural experts and the East Dakota Water Development District, and city government is working to manage stormwater runoff on its own property and teach homeowners to manage it on theirs.

"It's important to bring more communities into the discussion," Reed said.

The goal of the summit is pollution control and education, with an emphasis on the efforts and studies already underway and an eye to improvements for the future.

The Big Sioux River's levels of fecal coliform and E. Coli bacteria are consistently higher than state water quality standards for total immersion recreation activities like swimming and often higher than the standard for limited contact recreation like kayaking or canoeing.

The city of Sioux Falls has pumped

See SUMMIT, Page 3C

Summit

Continued from Page 1C

millions into cleanup efforts over the years, with assistance from federal government grants and low-interest loans backing investments from it and from entities outside the city.

A 5-year plan for river improvements throughout the Central Big Sioux watershed includes investments of more than $4.5 million for cover crops, livestock management, buffer zones and more. A program designed to keep cattle out of Skunk Creek has produced promising preliminary results, some of which will be discussed at the summit.

Disease-causing bacteria is only one area of concern for the Big Sioux. One recent study from the East Dakota Development District looked at nitrate levels in the river, spurred in part by a handful of alarming readings from surrounding states.

Nitrates in a water supply can put children at risk for an ailment known as "Blue Baby Syndrome."

The city of Des Moines has spent hundreds of thousands of dollars to clean nitrates from its water supply in recent years, sparking a lawsuit against upstream counties over agricultural drainage.

Nitrates were among the water quality concerns of Minnesota Gov. Mark Dayton, who pushed for a buffer zone law for ag producers in that state.

Nitrate levels along the Big Sioux haven't reached a trouble spot yet, said East Dakota Director Jay Gilbertson, but the summer study on nitrates was an important step to address the issue before it becomes problematic.

The levels edging nearest to the EPA threshold of 10 parts per million are near wastewater treatment plants. Those levels are between 5 and 8.5 parts per million, and they drop soon afterward as the water moves downstream.

"If you wait until you get to 9.9, it's too late," Gilbertson said.

The conference's focus is largely on urban responses, but agriculture has entered the conversation, as well. Al Miron, who farms near Hartford, hosted Sioux Falls city representatives and researchers from South Dakota State University on his no-till farm Tuesday.

The farm tour on soil health was meant to highlight best practices for erosion control and soil health. Visitors were witness to several absorption tests that showed how quickly water absorbed in Miron's untilled soil, heavy with organic matter from two decades of buildup, when compared to traditional tilled ground.

Stopping the loss of productive topsoil is a major issue for producers, Miron told the Tuesday crowd. If the soil can't absorb the rain, the water runs off and carries the soil with it — into rivers and streams and away from the fields where it's needed.

"Soil health is important not only for our livelihoods, but for the livelihoods of our children, grandchildren and their children," Miron said.

The summit runs from 2 p.m. to 6 p.m. at the Days Inn of Brookings.

Central Big Sioux River Watershed Project Tour

August 6, 2014 (3:00 – 6:00pm)

Meet @ Flying J for introductions: Barry Berg, Jack Majeres, Deron Ruesch, Shantel Krebs, Lucas Lentsch and Peter Harriman

Travel east on 60th Street to first stop site #1: just north of diversion and City water intake.

- .5 acre Rip Rap site with exclusion fencing and alternative water source for livestock.

Travel north to site #2: Riparian Area Protection (RAM) on Big Sioux River.

- 3 acres on west side, 5 acres on east side.
- Alternative water grazing system.

Travel north to site #3: Conservation Reserve Program (CRP), RAM and easement on Big Sioux River.

- 23 acres CRP west side, 17 acre easement, 1.9 acres RAM and .8 acres CRP east side.
- Alternative water grazing system

Travel to site #4: Seasonal Riparian Area Protection (SRAM) and EQIP rotational grazing system.

- 82.4 acres of pastureland enrolled into SRAM.

Travel to Site #5: SRAM, CRP and RAM on oil north of Lyons.

- 589 acres SRAM interspersed with CRP and RAM on Skunk Creek.
- 11.1 miles of Skunk Creek in SRAM.
- 3 miles of Skunk Creek in CRP and RAM.
- 1 mile of Skunk Creek in the process to be enrolled into Agricultural Conservation Easement Program (ACEP).

Travel to Site #6 EQIP terrace construction on 71 acres of cropland and no-till farming.

Travel to Site#7: 319, SRF-NPS and EQIP Animal Waste Storage Facility.

- Two mono-slope barns, one manure pack and one deep pit slated floor barn.
- 5 AWMS completed in Segment 2 with 5 AWMS planned construction this fall.

Travel to Site #8: SRAM enrolled pastures and next year site next to Lake Brant.

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

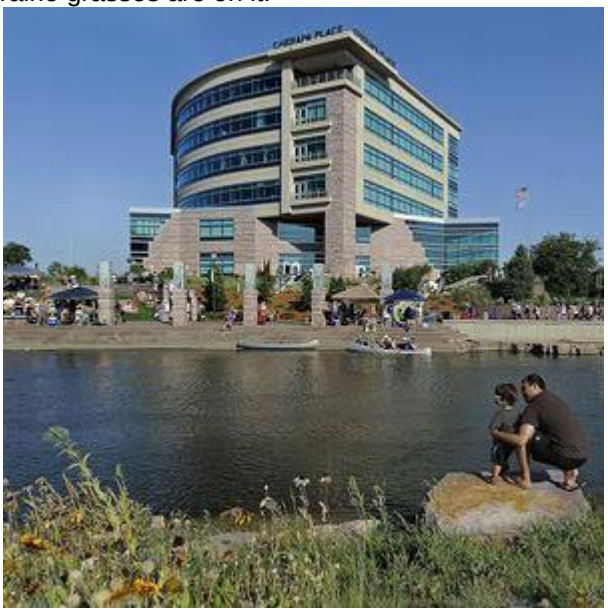
Freshly seeded natives grasses and flowers to help control water along the Big Sioux River on the northeast corner of 57th Street and Western Avenue.(Photo: Elisha Page / Argus Leader)

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.

ARGUS LEADER

Why we love the greenway

"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.

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CONSERVATION PLANNING PROVIDES ECONOMIC AND ENVIRONMENTAL BENEFITS IN SKUNK CREEK WATERSHED

By Laurie Fritsch, Freelance Agricultural Journalist

SIOUX FALLS, SD, August 24, 2015— Tony Gelderman, a young beef producer from Minnehaha County, constantly looks for better ways to manage his livestock operation. This conservationist is blazing the trail to improve the water quality in Skunk Creek near Hartford, SD. “Conservation has always appealed to me. I don’t agree with how pastures have been grazed in the past. That’s why I started to look into better ways of grazing management and conservation practices that are healthier for the soil, the water and my cattle. It eventually equates to benefiting your bottomline.”

He also rents pasture for part of his herd in north-central South Dakota, and in Moody County. The remaining cattle are grazed on pastures near his home place. Even though his herd only grazes near Skunk Creek a few weeks during the year, he stated that he wants to keep his neighbors and those downstream happy.

One of the pastures he rented recently was equipped with rural water hookups and tanks to deliver fresh water to his cows. “I weaned calves as much as 50 pounds heavier. Some of that’s probably genetics. And I don’t know that they drink more water, but what they do drink is cleaner and healthier for them. A healthier calf is always going to be a heavier calf,” he said.

Fresh water is a must

Gelderman and his wife, Ashley, farm in partnership with his parents, Don and Bonnie, also of Hartford. His father oversees the crop farming, while Tony manages the livestock. In 2011, they were faced with what to do because they didn’t have enough grass to feed their beef herd.

Don stopped by the Minnehaha County Conservation District office to see John Parker, the District Manager, to come up with a solution. After Don’s visit, Tony also got involved. As they talked about some of the options to consider, Don liked the idea of rotational grazing and seeding certain grasses for best growth at certain times of the year. And Tony was really interested in planting native grasses.

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In 2012, the Gelderman's changed their management strategy. They decided to plant the first half of the fields that he planned to convert from crop to permanent pasture to native grasses. They purchased their seed and hired the District to plant the first 80 acres with a native grass mix of Little Bluestem, Big Bluestem, Side Oats and Blue Grama, and Intermediate Wheatgrass, using the District's native grass drill.

The following year Gelderman chose to convert another 65 acres of cropland to pasture. But he didn't want to carry such a financial burden on his own this time.

Parker was aware that the Department of Environment and Natural Resources (DENR) and the Natural Resources Conservation Service (NRCS) have conservation programs with financial and technical assistance to help the Gelderman's get grass established. So he looked to Barry Berg, the Watershed Coordinator of the Big Sioux River 319 Water Quality Project, and invited him to visit with Gelderman about these opportunities. Berg explained, "I was surprised that Tony was converting cropland to pasture, but cows are his passion."

It all made sense when Gelderman told Berg why he wanted to convert this crop ground to pasture. He said, "At the time I figured $7 corn wasn't going to last forever. This ground has some highly erodible hills and it's a place where we kept livestock. So I thought it would be a pretty good fit."

Since Gelderman's farm is three-quarters of a mile from Skunk Creek, Berg took time to discuss several conservation programs with Tony, including the Seasonal Riparian Area Management Program (SRAM). Shortly after their visit, Gelderman called Berg to ask more questions about SRAM. This program includes practice incentives with excellent rates for deferred grazing, fencing, and rural water hookups, rock crossings, trees and fabric, and cost share to repair damaged pasture areas and livestock trails.

After Berg's initial contact with Gelderman, he asked him if they'd be willing to meet with Chuck Lebeda, a Certified Conservation Planner for SDACD, to work on a whole-farm plan to identify and address the natural resource concerns on their farm, and they agreed. Lebeda persuaded Gelderman to think beyond seeding just one field, and move to rotational grazing, plus enroll in SRAM.

To incorporate each conservation practice of his choice, Gelderman signed up for the Environmental Quality Incentives Program (EQIP), and Lebeda drew up his whole-farm plan accordingly. Lebeda said, "A combination of the USDA programs and the 319 water quality project programs generally fit in with what you'd like to do."

Since his father had enrolled land in the Conservation Reserve Program (CRP), a cost-share and rental payment program administered by the USDA Farm Service Agency, Gelderman was well aware of the financial commitment involved. He explained, “Before this we didn’t realize there were any cost share programs for establishing grass. We were only familiar with the programs for fencing and water. Once we found out, that’s what gave us the incentive to do more.”

Lebeda began working with area landowners two years ago. To speed up momentum, Berg recently hired Brian Top, through the Regional Conservation Partnership Program (RCPP), to spread the word. Berg explained, “Their work is making an amazing difference. Now farmers are taking the initiative to come in and talk to us; some who I never guessed would work on this project with us.”

Gelderman’s plan

Here’s a summary of the conservation practices included in Gelderman’s whole-farm plan spelled out in his EQIP contract administered by NRCS: **Native grass seeding:** Geldeman hired the Minnehaha County Conservation District again to drill his second 65-acre plot of native grass seedings in 2014, which he uses for haying and grazing. In his SRAM field, a mix of Green Needle Grass, a cool season grass; and three warm season grasses including Side Oats Grama, Indian Grass and Big Blue Stem was planted. Another field that had been corn harvested for silage had a fall cover crop of Rye grain no-till planted into it. Gelderman then followed up the next spring by no-till seeding the native grass mix directly into the Rye stubble to keep the ground covered to control erosion and provide wildlife habitat.

Cross Fencing: To increase forage production and enhance the condition of the pasture through rotational grazing, he’s installing a high tensile electric fence. He plans to evenly divide pasture into multiple paddocks in two different locations on the farm. The pasture on Skunk Creek will be split in half. This eases the grazing pressure on either side until Gelderman moves the herd to another spot. Cattle don’t over graze or damage the creek banks and stream crossings. “We’ve already seen a huge difference in the way we’ve managed it with SRAM because the creek bank is healing up and there’s a lot of new vegetation growing again,” he said.

Rural water hookups, water pipelines and water tanks: Gelderman explains, “Cows prefer fresh water over creek water. That’s the biggest reason for putting it in.” His cattle will have access to fresh water in Moody County near Flandreau and back at home. Construction is underway with a deadline to finish this year. This will force the cows to graze more evenly and enrich the vegetative cover, too.

SRAM Project: Gelderman appreciates the financial incentives of SRAM, administered by the Big Sioux River 319 Water Quality Project. He uses the SRAM incentives as a guide to manage his pasture near Skunk Creek. The deferred grazing option allows him to hay this ground after June 1st, and leave it ungrazed throughout the summer. The cool season grasses get adequate time to replenish and build up an excellent feed source so his cows can come home and graze prior to fall calving.

Stream crossing: Stream crossings will be completed next year. This will give him a safe route to transport equipment and supplies, with easy access to properly manage his conservation practices. Making use of the stream crossings will also reduce sediment load and maintain and improve the water quality of Skunk Creek. It also allows cattle easier access to cross the creek without damaging the banks.

Berg added, "Gelderman's going to be busy because he's doing the majority of this work himself. If everybody did what Tony's doing, we would probably be able to delist Skunk Creek from the impaired watershed list."

No 'I' in teamwork

The work to improve water quality on the Big Sioux River has been ongoing for about three decades. 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. At that time eligible producers in portions of the Skunk Creek watershed; specifically Colton Creek, Buffalo Creek, Jensen Creek, and Willow Creek, voluntarily began to install conservation practices to provide cleaner water for their neighbors and communities.

Pressure is intensifying for farmers to get involved to accelerate the conservation work in Skunk Creek, according to Berg. Recent water quality samples indicate some progress, but not enough progress for Skunk Creek to be removed from a DENR listing of impaired streams.

Jesse Neyens, an Environmental Analyst for the City of Sioux Falls, said, "A portion of the available RCPP 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."

Finances to do this work have a big impact on how producers operate and their cost of operations. Neyens said, "I'm hoping the Big Sioux River Project can assist them with those financial costs."

This is where the financial aid from the City comes in. When the City takes out a state-revolving loan to complete various utility projects, the loans have an established interest rate. Rather than pay the full interest rate, the state allows the City to invest a portion of the interest due into non-point source (i.e. field runoff) water conservation projects.

Other agencies involved in the Skunk Creek effort to assist landowners include: East Dakota Water Development District, and conservation districts in Lake, McCook, Minnehaha and Moody Counties.

Tips to get started

1. If you'd like to put a whole-farm plan together, contact your local conservation district or NRCS office well in advance of when you'd like to implement your plan.

2. Gelderman invites you to visit with him and other farmers already involved in work on Skunk Creek to see what they're doing.

3. Our Sioux Falls Mayor Mike Huether asks people to, "Be a good neighbor," Neyens said. "This isn't just an effort in agricultural areas. There is an urban focus as well.

4. Neyens adds, "Educate yourself. Learn what your conservation options are whether it's for Skunk Creek or the Big Sioux River in general.

5. Gelderman advised, "Go to the NRCS office and ask questions and share your ideas. If some of the stuff I'm doing doesn't fit what you'd like to do, there's probably another program that will work for you. It's not a one-size-fits all. There's a lot of programs to consider; and different programs for different management styles."

Laurie Fritsch, a freelance writer from Vermillion, SD, received her agricultural journalism degree from Iowa State University, and especially enjoys writing about production agriculture.

PHOTO CAPTIONS

Barry Berg, Watershed Coordinator of the Big Sioux River 319 Water Quality Project, and Chuck Lebeda, a Certified Conservation Planner for South Dakota Association of Conservation Districts, provide technical assistance to producers like Tony Gilderman, a beef producer from Hartford, SD. Gelderman has volunteered to participate in conservation programs geared to improve the water quality in Skunk Creek, which flows into the Big Sioux River north of Sioux Falls, SD. *(Photo by Laurie Fritsch, Freelance Ag Journalist).*

Filename: tony gelderman kneeling OR tony gelderman-standing-skunk creek
Tony Gelderman is installing multiple conservation practices this year and next, to do his part to help get Skunk Creek cleaned up. *(Photo by Laurie Fritsch, Freelance Ag Journalist).*

PRELIMINARY COST ESTIMATE - Phase I, Earthen Lot System

Project: Ag Waste Management System (AWMS)

Item	Unit	Quantity	Unit Cost	Total Cost
Earthfill for Clay Liner (Test Controlled, Class A)	yd_3	1,731	$3.50	$6,058.50
Excavation for Pond, Liner, Stripping, and Basin	yd_3	5,236	$2.25	$11,781.00
Earthfill for Dikes, Pond, and Basins (Class S)	yd_3	10,904	$2.25	$24,534.00
Proctor, Moisture, and Density Tests	lump sum	1	$1,500.00	$1,500.00
New Fence around pond (4-barb)	linear foot	1,038	$3.50	$3,633.00
Barbed Wire Fence - creek exclusion fence	linear foot	502	$2.00	$1,004.00
12" PVC Drain Tube	linear foot	227	$25.00	$5,675.00
18" PVC Drain Tube	linear foot	167	$40.00	$6,680.00
Seeding of Embankments and Construction Area	acres	5.4	$350.00	$1,890.00
Warning Signs	each	2	$40.00	$80.00
Permanent Marker	each	1	$250.00	$250.00
Trash Screen - Wooden Picket Type	each	2	$500.00	$1,000.00
Reinforced Concrete - walls	cubic yard	57.2	$300.00	$17,160.00
Reinforced Concrete - flatwork for sediment basins	cubic yard	232.2	$200.00	$46,440.00
Reinforced Concrete - flatwork for new concrete lots	cubic yard	277.8	$200.00	$55,560.00
Gravel or Fine Drainfill - subgrade for concrete	yd_3	288.0	$20.00	$5,760.00
Gravel or Rock - Road Surfacing	yd_3	338.5	$25.00	$8,462.50
Geotextile, 8 oz non-woven - for rock crossing	yd_2	76.6	$3.00	$229.80
Rock Aggregate - riprap for rock crossing	yd_3	13.4	$25.00	$335.00
Obstruction Removal	job	2.0	$2,750.00	$5,500.00
Projected AWMS Construction Cost				**$203,532.80**
Contingency				**$20,353.28**
Total Projected AWMS Construction Cost				**$223,886.08**

PROJECTED INCENTIVE PAYMENT

Practice Code	Practice Description	Units	Unit Type	Unit Payment	Total Payment
313	Waste Storage Facility - Excavated Storage Pond	342,648	Cubic Feet	$ 0.10	$34,264.80
342	Critical Area Planting	5.4	Acres	$ 83.77	$452.36
382	Fence - Protective Fence	1,038	Linear Feet	$ 1.29	$1,339.02
382	Fence - Barbed Wire	502	Linear Feet	$ 0.89	$446.78
500	Obstruction Removal - Removal and Disposal of Steel or Concrete Structures	6,688	Square Feet	$ 5.86	$39,191.68
521D	Pond Sealing or Lining - Compacted Clay Treatment, Use On Site Material	2,596	Cubic Yard	$ 3.28	$8,514.88
561	Heavy Use Area Protection - Reinforced Concrete with Sand or Gravel Foundation	55.6	Cubic Yard	$ 145.17	$8,071.45
561	Heavy Use Area Protection - Rock/Gravel	338.5	Cubic Yard	$ 11.95	$4,045.08
578	Stream Crossing - rock livestock crossing	532.0	Square Feet	$ 2.72	$1,447.04
632	Waste Separation Facility - Earthen settling structure with Concrete Bottom and Pipe Outlet	17,820.0	Cubic Feet	$ 0.46	$8,197.20
634	Waste Transfer - Pressure flow, 12" or greater diameter conduit	394.0	Linear Feet	$ 23.48	$9,251.12
Total Projected EQIP Incentive Payment ($200,000 Max)					**$115,221.41**
Total Projected 319 Payment					**$0.00**
Projected AWMS Cost to Landowner					**$108,664.68**

Notes

1) These prices are only preliminary estimates. Final costs could vary significantly from those shown.

2) The projected incentive payment is based on fiscal year 2014 incentive payment rates. Payment rates for subsquent fiscal years may vary signifcantly. Program rules may also vary and cause changes in the design and/or cost estimate to occur.

3) This estimate assumes all open lots to be abandoned are abandoned and reclaimed in Phase I.

4) This estimate assumes the new concrete lots are built as part of Phase I.

Communities downstream from Skunk Creek are encouraged to see livestock producers partner in the work to get Skunk Creek cleaned up by voluntarily installing ag waste management systems. This example is based on an actual farming scenario. It shows the components needed for this type of setup, plus the financial commitment expected by the producer and financial assistance received to make it possible. *(Graph courtesy of SDACD).*

Media Contact:
Barry Berg, Big Sioux River 319 Project Coordinator
(605)759-2650

FARMERS MAY RECEIVE CONSERVATION ASSISTANCE TO IMPROVE SKUNK CREEK WATER QUALITY

By Laurie Fritsch, Freelance Agricultural Journalist

SIOUX FALLS, SD, August 27, 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."

That's not all. Mike Kuck, the 303d Water Project Coordinator, explained, "Lebeda follows up with producers after they've installed their conservation practices to see if things are working the way they're intended or to see if they're having any problems. If a farmer encounters problems, Lebeda can get the producer in touch with someone who can provide assistance so he's not left with a practice that's not working. That's why Chuck is working one-on-one with producers. We've always found this to be the best approach. This is a group effort to help everyone do a better job."

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.

Barry Berg, the Big Sioux River 319 Project Coordinator, works with Lebeda, a Certified Conservation Planner, to identify area landowners interested in conservation work. To speed up momentum, Berg recently hired Brian Top, through the Regional Conservation Partnership Program (RCPP), to spread the word. "Their work is making an amazing difference. Now farmers are taking the initiative to come in and talk to us; some who I never guessed would work on this project with us," Berg said.

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Partners involved

The work to improve water quality on the Big Sioux River has been ongoing for about three decades. 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. At that time eligible producers in portions of the Skunk Creek watershed; specifically Colton Creek, Buffalo Creek, Jensen Creek, and Willow Creek, voluntarily began to install conservation practices to provide cleaner water for their neighbors and communities.

Pressure is intensifying for farmers to get involved to accelerate the conservation work in Skunk Creek, according to Berg. 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."

Neyens emphasized, "We want people to realize this is a watershed problem. It's not an agricultural producer problem. It's not a city discharge problem. It's everybody that's contributing and we need everybody to help us get to where we need and want to be. We don't want to point the finger at anybody and say, 'It's your fault.' We're all part of the problem. Hopefully we'll all be a part of the solution."

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.

Checkout all options

Your conservation plan is likely to include assistance from more than one agency, and open the door to several outstanding conservation programs.

If you've got problems with feedlot runoff, find your cows standing in Skunk Creek, or have a gully that runs through a field on your farm, Deron Ruesch, district conservationist for Minnehaha County NRCS, said, "This is a great opportunity to address these issues. We'll help identify any resource concerns on your farm and give you alternatives. Hopefully you'll make that decision that leads to implementation of sound conservation practices."

Financial assistance can be offered to offset the installation costs of conservation practices. For example, through the NRCS Environmental Quality Incentives Program (EQIP) a producer may be eligible for as much as $250,000 for grassed waterways, terraces, rotational grazing, fencing, water tanks, rural water hookups, grass seedings, and stream crossings. If he installs an animal waste facility along with other conservation practices, he may be eligible for as much as $450,000.

If producers don't qualify for EQIP, they may look at the Big Sioux River's 319 Water Quality Project's Seasonal Riparian Area Management Program (SRAM). There's several conservation practices that help to improve water quality, soil health and animal health. A couple grazing options come with financial assistance, as well as monetary perks to establish an alternative water source or install fencing. Other SRAM options offer 75 percent cost share for rural water hookups, wells (i.e. if applicable), pipelines, tanks, and rock crossings.

If a landowner is qualified but their application doesn't rank high enough to be selected, Ruesch said, "They've got three choices: we try to obtain more dollars for the program, they implement the plan themselves without any financial assistance, or they wait until next year and try again."

It's a good investment

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. Kuck explained, "Most farmers will incur a substantial financial investment, but Lebeda and Top can identify where producers can find additional assistance."

Interested producers need to contact their local conservation district manager or NRCS field office located at the USDA Service Center or visit www.nrcs.usda.gov. Berg said, "Talk with the district conservationist and manager of the conservation district. This allows them to find out what your concerns are. They may have ideas about what conservation practices you should consider."

Laurie Fritsch, a freelance writer from Vermillion, SD, received her agricultural journalism degree from Iowa State University, and especially enjoys writing about production agriculture.

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SIDEBAR
5 Steps to Assistance

Courtesy of USDA Natural Resources Conservation Service

Do you farm or ranch and want to make improvements to the land that you own or lease? NRCS offers technical and financial assistance to help farmers and ranchers. Here's how you can get started with NRCS:

1. Planning
To get started with NRCS, we recommend you stop by your local NRCS field office. We'll discuss your vision for your land.

NRCS provides farmers and ranchers, with free technical assistance or advice for their land. Common technical assistance includes: resource assessment, practice design and resource monitoring. Your conservation planner will help you determine if financial assistance is right for you. Technical assistance is also available online through Conservation Client Gateway.

Technical Assistance
2. Application
They will walk you through the application process. To get started on applying for financial assistance, you will need:

- To fill out form AD-1026 which ensures a conservation plan is in place before lands with highly erodible soils are formed. It also ensures that identified wetland areas are protected. This aids you in meeting conservation compliance provisions.

- To meet other eligibility certifications.

- Once complete, they will work with you on the application, or CPA 1200. If you're entity is interested in Agricultural Land Easements then the application will be CPA-41 and CPA-41A.

Applications for most programs are accepted on a continuous basis, but they're considered for funding only during ranking periods. Be sure to ask your local NRCS district conservationist about the deadline for the ranking period to ensure you turn in your application on time. You can also apply for financial assistance and manage applications, contracts and conservation plans online through Conservation Client Gateway.

Financial Assistance

3. Eligibility

As part of the application process, we'll check to see if you are eligible. To do this, you'll need to bring:

- An official tax ID (i.e. Social Security number or an employer ID)
  If you are applying under an employer ID number, then a DUNS number and current CCR registration are required.

- A property deed or lease agreement to show you have control of the property; and

- A land tract number.

If you don't have a land tract number, you can get one from USDA's Farm Service Agency (FSA). Typically, the local FSA office is located in the same building as the local NRCS office. You only need a land tract number if you're interested in financial assistance.

4. Ranking

NRCS will take a look at the applications and rank them according to: A) Local resource concerns, B) The amount of conservation benefits the work will provide, and C) The needs of applicants.

5. Implementing

If you're selected, you can choose whether to sign the contract for the work to be done. Once you sign the contract, you'll be provided standards and specifications for completing the practice or practices, and then you will have a specified amount of time to implement your plan. Once the work is implemented and inspected, you'll be paid the rate of compensation for the work if it meets NRCS standards and specifications.

PHOTO CAPTIONS

Filename: chuck lebeda with tony gelderman
Chuck Lebeda, a Certified Conservation Planner for the South Dakota Association of Conservation Districts, stopped by Tony Gelderman's farm, Hartford, SD, to assess the progress of a native grass seeding planted by the Minnehaha County Conservation District in 2014. The mix includes Green Needle Grass, Sideoats Grama, Indian Grass and Big Blue Stem. Gelderman uses this pasture for haying, as well as a place to graze his beef cattle. This ground cover serves as wildlife habitat, and is helping to improve the water quality of Skunk Creek because it controls erosion. *(Photo by Laurie Fritsch, Freelance Ag Journalist).*

Filename: agwaste system example
Communities downstream from Skunk Creek are encouraged to see livestock producers partner in the work to get Skunk Creek cleaned up by voluntarily installing ag waste management systems. This example is based on an actual farming scenario. It shows the components needed for this type of setup, plus the financial commitment expected by the producer and financial assistance received to make it possible. *(Chart courtesy of SDACD)*

Filename: before after picture
This SRAM pasture in Minnehaha County is once again growing healthy vegetation because it was given est from continual grazing. *(Photo courtesy of SDACD)*

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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);

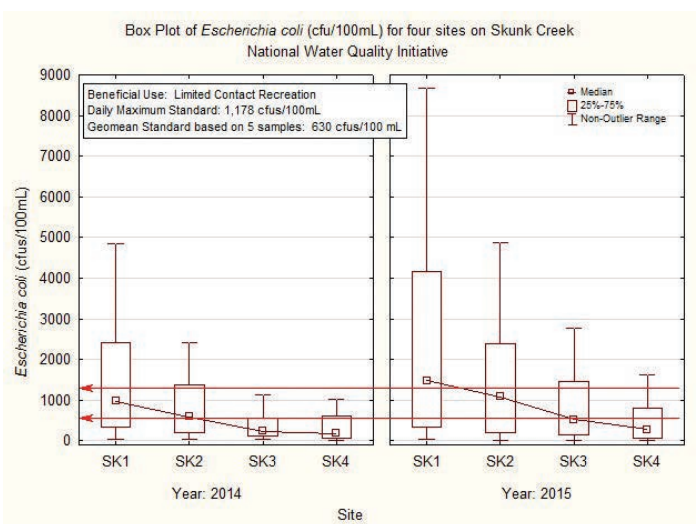
■ No grazing allowed on enrolled acres from April 1st – September 30th, however, those acres can be hayed after June 1st while maintaining a minimum vegetative cover of 4 inches;

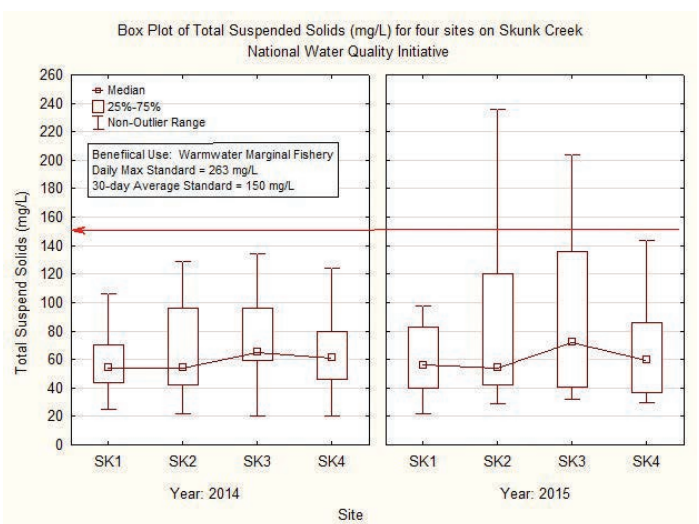
■ Acres under contract can be fall grazed after September 30th if a minimum vegetative cover of 4 to 6 inches is maintained. However, an alternative water source is required to reduce impacts on the riparian area;

■ 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.





Big Sioux River Selected For USDA 'High-Impact' Project

January 15, 2015, 5:56 AM

File Photo

SIOUX FALLS, SD -

The United States Department of Agriculture has selected a project dedicated to improving water quality in the Big Sioux River as one of its "high-impact" projects for 2015.

The USDA says the 115 projects in the Regional Conservation Partnership Program will receive more than $370 million in total. Community partners nationwide will also contribute an estimated $400 million.

The department says the biggest concern of the Central Big Sioux Water Quality Project is the degradation of surface water quality from bacteria, nutrients and sediment. The project will assist land owners and producers with improving water quality by avoiding, controlling and trapping nutrient and sediment runoff.

The funding will also go toward installing 13 Animal Waste Management Systems.


USDA
United States Department of Agriculture
CITY OF SIOUX FALLS

New group focuses on Big Sioux water quality

 Joe Sneve, jsneve@argusleader.com 1:01 a.m. CDT May 14, 2015

John Crazy Horse sits Wednesday at Fawick Park near the Big Sioux River, which is scheduled for a cleanup.(Photo: Emily Spartz Weerheim / Argus Leader)

A new group wants to encourage Sioux Falls and other watershed communities to do more to clean up the Big Sioux River.

Friends of the Big Sioux River (FBSR), a collective of local environmentalists, conservationists and business leaders, will formally launch at a press conference Thursday morning. The group wants to convince communities along the Big Sioux that South Dakota's dirtiest river is worth caring about.

Matt McLarty, a policy advocate with the Environmental Law and Policy Center, said despite millions of dollars' worth of investment along the river from Sioux Falls and the ag industry, there's been little progress to improve the quality of the water that flows between the banks of the Big Sioux.

"The city has invested quite a bit in the shores of the Big Sioux. But it's really time to pull the focus back to the waterway itself," he said.

The Big Sioux River is thirteenth on the U.S. Environmental Protection Agency's list of most polluted rivers. The first step toward improving its status is making people aware just how polluted it is, McLarty said.

The group will have an arm for citizen outreach to provide pointers about what homeowners can do to keep contaminants out of the river water. It also hopes business leaders will be receptive to sustainability recommendations without having to be compelled by new rules and regulations, said Greg Veerman, a marketing professional and member of the group.

"In the environmental movement, historically you've had regulation as the solution to perceived ills when it comes to the environmental management," he said. "And maybe that needs to happen, but what we really want first is for people to recognize we've got an opportunity here to create something special in the health of this water way."

Making more strides to clean up the Big Sioux in urban areas will also give local environmentalist more leverage when engaging the agricultural community, Veerman said.

"Let's … earn the right to go reach out to farmers so we can say, 'Look, we're trying to do our part. Let's work together,'" he said.

Friends of the Big Sioux River will coordinate with the city of Sioux Falls to build on ongoing efforts to improve water quality. Sioux Falls Environmental Analyst Jesse Neyens said city staff has attended some of the group's meetings and looks forward to partnering with them.

"They're looking at what we're doing and hopefully, maybe, they can do things that we can't," he said. "I'm happy to see them, both as a city employee and personally, … lead the way on a community-wide basis."

The city already has a hand in efforts to better Big Sioux water quality. As a part of a regional Big Sioux River watershed group, Sioux Falls has supported successful efforts to identify non-point pollution sources along the river and Skunk Creek and to get farmers to build animal confinement systems that keep livestock out of the river.

"We also do the annual Mayor's Big Sioux River Summit, a conference to bring together local and regional people to come in and educate everyone on water quality and tell everybody about what's going on with our watershed," Neyens said.

Where Friends of the Big Sioux River can further aid those efforts, he said, is in public engagement.

"I consider them a community information and outreach group," Neyens said.

IF YOU GO

No till, cover crops help producers minimize erosion, surface runoff

Tuesday, May 19, 2015

These pastures show the difference between rotational grazing on the left and continuous grazing on the right. *(Photo courtesy of Barry Berg, South Dakota Association of Conservation Districts)*

Keeping soil and fertilizers where they belong—in the field—benefits producers and the environment.

No-till farming, cover crops and rotational grazing will help producers reduce surface runoff to improve soil and water quality, according to assistant professor Sandeep Kumar of the plant science department.

Through a $60,000 subcontract from a U.S. Department of Agriculture National Institute of Food and Agriculture grant, Kumar and graduate student Sagar Gautam used computer modeling to determine which farm management methods will produce the best reduction in surface runoff.

Their work is part of a three-year, $482,000 research project led by Distinguished Professor Rattan Lal of the Ohio State School of Environment and Natural Resources. The goal is to determine which farm-management practices will improve soil and water quality on sloped land.

Adjusting model for South Dakota

Kumar and Gautam used the Agricultural Policy/Environmental eXtender (APEX) computational model developed using 40 years of data from the North Appalachian Experimental Watershed near Coshocton, Ohio.

The rolling Ohio landscape provides an ideal platform to study the long-term impact of crops and farm management techniques on the water quality of streams and rivers, according to Kumar, who contributed to the USDA proposal as a postdoctoral researcher at Ohio State.

In 1935, the USDA established the 1,050-acre watershed to determine which farming methods are appropriate for sloped lands. USDA Agricultural Research Service scientists have conducted soil water conservation studies on the watersheds since 1937.

Kumar and Gautam customized the

This filter strip helps keep soil and fertilizer from running off into Union Creek in southeastern South Dakota. *(Photo courtesy of Barry Berg, South Dakota Association of Conservation Districts)*

model for South Dakota with soil conditions, management information and weather data from the last 10 years. South Dakota gets half the amount of precipitation that Ohio does, according to Kumar. However, he noted, "this model is universal—it works everywhere."

Gautam said, "Once the model is ready, you can use different crops and then compare which one gives you more reduction in runoff." The researchers looked at small plots of approximately 2.5 acres, a nearly 20-acre field and even a large-scale model of approximately 27 sections of land to determine the impact of management practices up to 50 years from now.

Recommending management techniques

The computational model confirmed the value of using no-till in the Midwest to retain water and limit nutrient run-off, explained Kumar. "It improves water infiltration."

In a soybean-corn rotation, the use of cover crops, such as winter wheat or oats that can be harvested early, will reduce erosion, Kumar noted. "If there is more cover on the ground, this will minimize water losses."

The researchers also looked at management of orchard grass pastures on a 10 percent slope.

Rotational grazing is beneficial, Kumar explained, pointing out the soil must be properly managed. “When there is a lot of compaction, we are getting more runoff,” Gautam noted.

Kumar recommended using perennial grasses, such as switch grass and big blue stem, to reduce runoff. In particular, strips of perennial grasses left ungrazed on the borders between pastureland and waterways provide a buffer to help control runoff and subsequently improve the water quality of streams and rivers.

These findings agree with other studies, Kumar pointed out. However, the next step will be to determine the size and number of strips that are needed based on the slope and size of the grazing lands.

Considering climate change, Kumar and Gautam found that increased precipitation has a direct influence on runoff at a field scale, while increasing or decreasing temperatures have no significant impact.

When considering climate change impacts on a larger watershed scale, Kumar said, “It will take longer to get a better answer, and research is still on-going.

SD0121

NEWZ GROUP

Brookings Register

Publication Date: 12/14/2015 Page Number: 1

Title: Survey probes past, future grassland conversions

Author:

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Survey probes past, future grassland conversions

BROOKINGS – Prairie Pothole Region farmers who added converted North and South Dakota grasslands into their cropland base in the past decade report that the new acreage represented a sizable share of their total acreage in 2014.

That was one of the major findings from a survey mailed to producers in spring 2015.

South Dakota State University, North Dakota State University and Iowa State University researchers created the survey to study the impact of farmland-use decisions in the Dakotas. It was completed by 1,026 producers in 57 counties (37 South Dakota, 20 North Dakota).

Among those producers, 40 percent converted at least some grassland to crop-

See **GRASSLAND**, page 2

GRASSLAND: Decreases reported

Continued from page 1

land. Within that 40 percent group, they reported that 14 percent of their 2014 cropland acreage was grassland in the past 10 years.

The USDA reports that during the six-year period of 2006-11 cropland enrolled in the Conservation Reserve Program in North and South Dakota decreased from 5.0 million to 3.8 million acres with most of the tracts returned to cropland. This includes all producers, not just those participating in the survey.

In North Dakota, most of the new cropland came from acres leaving the CRP program. South Dakota farmers were more likely to put grasslands into production that had never been enrolled in CRP.

Overall, 14.4 percent of responding farmers that had converted acres into cropland did so with native grasslands; another 16.2 percent said they put tame grasslands into cultivation.

Land-use decisions haven't strictly been in the direction of more tillable land. Among respondents, 14 percent reported converting grassland to cropland as well as cropland to grassland in the past decade. Another 14 percent converted only cropland to grassland.

However, the acreages were much smaller than grassland to cropland (28,000 to 85,000 according to data provided by participants).

Land going back to grass was primarily due to new CRP or Wetland Reserve Program sign-ups (a combined 23.3 percent). Only 7 percent of respondents turned CRP land into grass or hay acres.

Corn, bean acreages increases

As would be expected, 75 percent of responding farmers who converted grass to cropland used the new ground to plant corn or soybeans. There were 30 percent that planted wheat on the new cropland.

Larry Janssen, an ag economics professor at SDSU and one of the survey authors, said that mirrors current producer output.

"Nearly 90 percent of respondent producers raised corn and/or soybeans in the past 10 years. Nearly half of North Dakota respondents raised wheat each year compared to 28 percent of South Dakota respondents. Very few respondents in either state increased their wheat acreage in comparison to other crops," Janssen said.

"Even among those who didn't convert grassland, the majority reported grassland decreases and increased soybean and corn acres within five miles of their farm headquarters," Janssen said.

Change driven by crop prices

Not surprisingly, improving commodity prices was the No. 1 reason for taking land out of grassland. It was listed as the most important factor by 50.3 percent of respondents. Other choices for "most important factor" were changing input prices for seed, fertilizer, chemicals, etc., 15.2 percent; and improved crop yields (10.8 percent).

Highest among a tier of seven lower choices was changing weather/climate (6.9 percent).

The survey, which had a 36 percent response rate, also found that those most likely to have converted grassland were those who:

- expanded their land operation in the past 10 years;
- operate more than 2,000 acres with annual gross farm sales of $500,000 or more; and
- are currently under 50 years of age.

Future to be more stable

As to the future, the study finds in the coming decade that:

- More producers plan to convert cropland to pasture or grassland (12.6 percentage) than those who plan to convert native grassland (2.6 percent) or tame grassland (6.5 percent) to cropland.
- More than two-thirds (68 percent) expect no major changes in grassland acres. A major change was defined as greater than 5 percent. Meanwhile, 26 percent predicted continued decline in grasslands. Six percent predicted increased grassland acreage.
- Most producers (61 percent) also predicted stable acreage for corn and soybeans. An increase of 5 to 10 percent was foreseen by 22 percent of respondents while 5 percent expected increases to be more than 10 percent. Soybean and corn acreage reduction of more

SD0121

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than 5 percent was predicted by 12 percent.

"Overall, producers project more land use stability in the next 10 years than in the past 10 years," Janssen said.

"This result is partly due to uncertainty about future crop and livestock prices, farm program provisions, renewable energy policies, agricultural technology changes and other factors that affect land-use decision making," Janssen said.

A more detailed summary of the study is available at www.sdstate.edu/econ/commentator/index.cfm.

– From SDSU Marketing & Communications

SDSU photo

A rise in commodity prices and the restructuring of the Conservation Reserve Program turned more than a million acres of grassland into cropland in the Dakota in the past decade. Prices have since fallen and a survey of ag producers finds that most expect stable land-use decisions in the coming decade.

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, 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. Joe Ahlquist / Argus Leader

Barry Berg, watershed coordinator for the Central Big Sioux River Watershed Implementation Project, talks about an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program on Skunk Creek near Chester, 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. Joe Ahlquist / Argus Leader

South Dakota State Senator Shantel Krebs, left, talks with Barry Berg, second from left, watershed coordinator for the Central Big Sioux River Watershed Implementation Project, as Lucas Lentsch, second from right, secretary of agriculture with the South Dakota Department of Agriculture, and Jack Majeres, district chairman with the Moody County Conservation District and a farmer, stand by at an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program on Skunk Creek just south of Brant Lake, the Skunk Creek headwaters, near Chester, 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. Joe Ahlquist / Argus Leader

Barry Berg, watershed coordinator for the Central Big Sioux River Watershed Implementation Project, talks about an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program on Skunk Creek just south of Brant Lake, the Skunk Creek headwaters, near Chester, 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. Across the road from the enrolled pasture, and closer to the lake, is a future enrolled pasture in the SRAM program. Joe Ahlquist / Argus Leader

Barry Berg, center, watershed coordinator for the Central Big Sioux River Watershed Implementation Project, talks with Lucas Lentsch, left, secretary of agriculture with the South Dakota Department of Agriculture, and South Dakota State Senator Shantel Krebs, in front of a future enrolled pasture in the Seasonal Riparian Area Management (SRAM) program on Skunk Creek just south of Brant Lake, the Skunk Creek headwaters, near Chester, 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. Just across the road from the future enrolled pasture is an enrolled pasture in the SRAM program. Joe Ahlquist / Argus Leader

Lloyd Siemonsma, a farmer near Sioux Falls, talks about his experience with the the Riparian Area Management (RAM) program on the Big Sioux River with Barry Berg, right, watershed coordinator for the Central Big Sioux River Watershed Implementation Project, as Lucas Lentsch, secretary of agriculture with the South Dakota Department of Agriculture, on his farm near Sioux Falls, S.D., on Wednesday, Aug. 6, 2014, during a tour of the different enrolled pastures in the Seasonal Riparian Area Management (SRAM) and RAM programs on Skunk Creek and the Big Sioux River. Joe Ahlquist / Argus Leader

Barry Berg, left, watershed coordinator for the Central Big Sioux River Watershed Implementation Project, talks with Lucas Lentsch, secretary of agriculture with the South Dakota Department of Agriculture, in an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program on the 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 (RAM) programs on Skunk Creek and the Big Sioux River. Joe Ahlquist / Argus Leader

Rod VanDerVliet, right, a farmer near Colton, S.D., who is building a deep pit barn, which helps with contaminated water runoff, talks as Barry Berg, watershed coordinator for the Central Big Sioux River Watershed Implementation Project, on his farm near Colton, S.D., on Wednesday, Aug. 6, 2014, during a tour of the different enrolled pastures in the Seasonal Riparian Area Management (SRAM) and Riparian Area Management programs on Skunk Creek and the Big Sioux River. Joe Ahlquist / Argus Leader

Deron Ruesch, district conservationist with the Natural Resources Conservation Service, talks about an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program on Skunk Creek near Sioux Falls, 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. Joe Ahlquist / Argus Leader

Rod VanDerVliet, a farmer near Colton, S.D., who is building a deep pit barn, which helps with contaminated water runoff, talks with Lucas Lentsch, left, secretary of agriculture with the South Dakota Department of Agriculture, and South Dakota State Senator Shantel Krebs on his farm near Colton, S.D., on Wednesday, Aug. 6, 2014, during a tour of the different enrolled pastures in the Seasonal Riparian Area Management (SRAM) and Riparian Area Management programs on Skunk Creek and the Big Sioux River. Joe Ahlquist / Argus Leader

South Dakota State Senator Shantel Krebs talks with Rod VanDerVliet, a farmer near Colton, S.D., who is building a deep pit barn, which helps with contaminated water runoff, on VanDerVliet's farm near Colton, S.D., on Wednesday, Aug. 6, 2014, during a tour of the different enrolled pastures in the Seasonal Riparian Area Management (SRAM) and Riparian Area Management programs on Skunk Creek and the Big Sioux River. Joe Ahlquist / Argus Leader

South Dakota State Senator Shantel Krebs looks out over an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program 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. Joe Ahlquist / Argus Leader

Lloyd Siemonsma, a farmer near Sioux Falls, talks about his experience with the Riparian Area Management (RAM) program on the Big Sioux River on his farm near Sioux Falls, S.D., on Wednesday, Aug. 6, 2014, during a tour of the different enrolled pastures in the Seasonal Riparian Area Management (SRAM) and RAM programs on Skunk Creek and the Big Sioux River. Joe Ahlquist / Argus Leader

South Dakota State Senator Shantel Krebs, left, talks as Jack Majeres, center, district chairman with the Moody County Conservation District and a farmer, and Barry Berg, watershed coordinator for the Central Big Sioux River Watershed Implementation Project, stand by in an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program 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. Joe Ahlquist / Argus Leader

South Dakota State Senator Shantel Krebs, left, and Lucas Lentsch, center, secretary of agriculture with the South Dakota Department of Agriculture, look on as Barry Berg, watershed coordinator for the Central Big Sioux River Watershed Implementation Project, talks in an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program 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. Joe Ahlquist / Argus Leader

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, secretary of agriculture with the South Dakota Department of Agriculture, looks on in an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program 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. Joe Ahlquist / Argus Leader

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South Dakota State Senator Shantel Krebs, left, talks as Jack Majeres, district chairman with the Moody County Conservation District and a farmer, while looking at an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program on Skunk Creek near Sioux Falls, 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. Joe Ahlquist / Argus Leader

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Lloyd Siemonsma, right, a farmer near Sioux Falls, talks about his experience with the the Riparian Area Management (RAM) program on the Big Sioux River with Barry Berg, left, watershed coordinator for the Central Big Sioux River Watershed Implementation Project, and Lucas Lentsch, back, secretary of agriculture with the South Dakota Department of Agriculture, on his farm near Sioux Falls, S.D., on Wednesday, Aug. 6, 2014, during a tour of the different enrolled pastures in the Seasonal Riparian Area Management (SRAM) and RAM programs on Skunk Creek and the Big Sioux River. Joe Ahlquist / Argus Leader

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Jack Majeres, district chairman with the Moody County Conservation District and a farmer, walks through an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program on Skunk Creek near Colton, S.D., on Wednesday, Aug. 6, 2014, during a tour of the different enrolled pastures in the Seasonal Riparian Area Management (SRAM) and Riparian Area Management programs on Skunk Creek and the Big Sioux River. Joe Ahlquist / Argus Leader

Lucas Lentsch, center, secretary of agriculture with the South Dakota Department of Agriculture, looks on as Barry Berg, left, watershed coordinator for the Central Big Sioux River Watershed Implementation Project, talks about an enrolled pasture in the Seasonal Riparian Area Management (SRAM) program on Skunk Creek near Sioux Falls, 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. Joe Ahlquist / Argus Leader

South Dakota State Senator Shantel Krebs talks with Rod VanDerVliet, a farmer near Colton, S.D., who is building a deep pit barn, which helps with contaminated water runoff, on VanDerVliet's farm near Colton, S.D., on Wednesday, Aug. 6, 2014, during a tour of the different enrolled pastures in the Seasonal Riparian Area Management (SRAM) and Riparian Area Management programs on Skunk Creek and the Big Sioux River. Joe Ahlquist / Argus Leader

Lawmaker Reaction to Skunk Creek Pollution Stinks-June29, 2014

The Skunk Creek winds its way from the lake country northwest of Sioux Falls through the pastures and cropland upon which our ancestors invested the very measure of their being.

It is blessedly fertile ground that continues to support our health, wealth and posterity.

The Skunk snakes into Minnehaha County, past Colton and Hartford, before entering Sioux Falls proper somewhere around Ellis. Along the way, it consumes whatever man can mix into it until it's slurry of natural and manmade compounds well beyond the two parts hydrogen, one part oxygen that forms its base.

Once in the city, the creek is lined with scrub oak and ash trees and underbrush, creating a green corridor meandering through neighborhoods and parks before hooking up with its brother Big Sioux in the midst of the country clubs and commercial development, contributing to a massive bend of river that shapes the core of our city.

Here's your chance to clean up the Big Sioux River

Big Sioux River: Improved, but more can be done

The modest Skunk Creek feeds a miles-long corridor, a green magnet of recreation on the west side.

Every day that weather allows, the fishermen come with their poles and buckets.

There are bikers and runners, dog walkers and romantic strolls in the coming dusk.

There are softball games and football practice, sand volleyball and makeshift cricket.

And on the warm days of summer, when the current slows and the waters of the Skunk form calmer pools, the children living along its banks, from the working class collection of manufactured and modest housing, come to the water to play.

I see them often in my ventures along the recreational trail through Legacy and Dunham parks.

They scramble through the tangle of bush and trees, down the slippery shores of Skunk Creek to enjoy a simple pleasure shared by their parents and grandparents, often in different corners of the globe but with a common sense of purpose, the splashing, frolicking freedom of a summer dip in a cool river.

I watch them and shudder, and wonder into what chemically imbalanced slush they are so innocently leaping.

I would not swim in the Skunk or the Big Sioux.

I would not eat the fish caught there.

When I paddle along in my kayak, I limit my contact with the actual water.

That's not how it should be.

We should not have to fear the river that shapes our city. Yet that's where we're stuck.

We have known for generations that the activity in which we engage to feed ourselves, raising livestock and treating cropland, comes with a price.

We know the byproducts of animal waste and chemicals are potentially harmful.

And we know how best to handle them. We have the technology.

Yet in South Dakota, we continue to pretend that we're doing the best we can while all the while the evidence suggests otherwise.

Two Argus Leader Media stories in recent weeks highlighted this reality. The first pointed out that attaining the goal of allowing actual recreation on the Big Sioux River isn't possible without also cleaning up Skunk Creek, which because of our flood control system is the major feeder of our urban waterway.

The second relayed a fundamental flaw in our efforts to clean up our lakes and rivers in eastern South Dakota. There are about 200 feedlots along the Big Sioux River between Brookings and Sioux Falls that are too small to require special permits but contribute to the overall contamination of the water.

There is very little the state can do under its current laws and budget restraints to fix the problem, according to Brad Johnson, chairman of the South Dakota Board of Water and Natural Resources.

Johnson of Watertown has been involved in water quality issues for several years. In his spare time, he chairs the water and natural resources board, which is responsible for developing and enforcing the state water plan.

Those are two very separate missions, however. It's one thing to set up a plan; it's quite another to enforce it.

In a story reported by the Argus Leader's Peter Harriman, and a subsequent appearance on "100 Eyes," the daily Internet talk show I host at argusleader.com, Johnson's frustration with accomplishing the latter of the two missions came through.

To be sure, there are efforts underway to reduce the pollution. But it's not enough.

"We're losing ground," Johnson said, "and we're going to continue to lose ground until we decide as a state and country that we're going to get serious about the issue."

Perhaps it's not surprising that the citizen head of a state board with a passion for conservation of natural resources would be concerned about the responsiveness of an agriculture sector and state bureaucracy seemingly bent on maintaining the status quo.

That is not the disturbing part of this tale.

The rather difficult bit to stomach is the reaction from the lawmakers whose job it is to guard our natural resources, in this case Sens. Shantel Krebs of Renner and Jason Frerichs of Wilmot. They represent their parties as the top managers of the Senate Agriculture and Natural Resources Committee.

And their message, as relayed by Harriman's reporting, was clear: "Everything is fine."

Both said they see no need for further regulation.

Both also pointed to urban run-off and lawn chemicals as a contributor to pollution. It's true, that's a point of discussion, but it ignores the larger issue.

One might suggest that lawmakers have their head in the sand when it comes to continued degradation of our key waterways.

An antidote to this blissful ignorance might be to take stroll through Dunham Park on the west side of the Best Little City in America, slip through the brambles down to the bank, where the eddies collect and the fireflies dance in a quickening twilight. Grab hold of an outcropping of long grass to steady yourself.

Dip that same head into the welcoming embrace of the Skunk Creek and all she has collected, from the pastures and feedlots upstream.

Hold your breath.

Close your eyes.

Everything is fine.

Patrick Lalley is managing editor of Argus Leader Media. Reach him at plalley@argusleader.com or 605-331-2291.

kansascity.com

THE KANSAS CITY STAR.

Health & Science News

Effort fences off ag areas along Sioux Falls creek

By PETER HARRIMAN

Updated: 2014-05-25T21:21:02Z

May 26

By PETER HARRIMAN

Argus Leader

SIOUX FALLS, S.D. — The stretch of the Big Sioux River that flows through Sioux Falls should be safe for swimming, without fear that diving below the surface would require a visit to a hospital emergency room and a course of antibiotics.

This is called immersion recreation, and it is the South Dakota Department of Environment and Natural Resources' goal for the river, based on standards established in the federal Clean Water Act.

The DENR also has set a lesser goal for Skunk Creek to become a stream suitable for fishing and limited contact, such as wading.

Skunk Creek, though, provides most of the river's flow through the city in summer, because much of the Big Sioux upstream is directed to the flood-control diversion channel.

Sioux Falls recently completed extensive recreational and public entertainment improvements to the River Greenway through downtown, and planning has begun for the third phase of that project, Mayor Mike Huether said. It is an effort to enhance the Big Sioux as a valued amenity, and if the river ever does reach the immersion recreation standard, its value to the community will skyrocket, said Teri Schmidt, executive director of the Sioux Falls Convention and Visitors Bureau.

"That would be just another plus about Sioux Falls and the river and the Falls Park area," she said. "People love water, and a lot of people that travel are looking for areas with water that they can enjoy for recreational activities. One of those is being able to put your foot in it.

"If it ever became the case where it was completely safe for people to swim and we started marketing that, I have a feeling there would be people excited about it."

While the city's major use of the river is for drinking water, Huether said, its recreational potential is inviting.

"The goal is to make it look good, second, to be able to float on top of it in canoes and kayaks. But wouldn't it be wonderful if we could actually tube down that river and swim in that river?" he asked.

But for that to happen, Skunk Creek needs to change.

The levels of E. coli and fecal coliform bacteria and total suspended solids in Skunk Creek don't magically drop to immersion recreation standards — a maximum 235 E. coli colonies per 100 milliliters of water on any specific day and no more than an average 126 colonies per 100 ml in a 30-day period. So when the water passes beneath the Interstate 29 bridge on its short transit to the confluence with the river, for the Big Sioux to meet its target, Skunk Creek must exceed its own.

At this point, though, the DENR goals for both the Big Sioux and its tributary, Skunk Creek, are theoretical. DENR monitoring from May and August last year showed Skunk Creek actually had lower E. coli and fecal coliform levels than did the Big Sioux. However, the river and creek both are considered impaired streams, too polluted for their suggested use.

Now, a consortium of city, area and state agencies are trying to reduce the influence of a major source of E. coli — livestock — on Skunk Creek and significantly improve its water quality. The Seasonal Riparian Area Management (SRAM) program is a pilot program in the Central Big Sioux River Watershed project.

In the past, agencies have spent hundreds of thousands of dollars to design and build manure-handling facilities for feedlots near Skunk Creek in an effort to lower E. coli levels in the stream.

This time, though, the answer to cleaner water during the recreation season might be as simple as a fence.

SRAM will pay farmers to fence livestock away from Skunk Creek's 100-year floodplain from April 1 to Sept. 30.

Payments are $60 an acre, per year, for 10- or 15-year contracts. The money is disbursed in a one-time, up-front payment. Farmers will be allowed to cut hay in the riparian area as long as they leave at least four inches of stubble, and SRAM also will pay for 75 percent of the cost of alternative water sources for farmers who relied on the creek to water livestock.

Barry Berg, South Dakota Association of Conservation Districts watershed project coordinator, pulled together the funding sources to develop SRAM. He said the program might be more attractive to farmers than another federal set-aside program, the Conservation Reserve Program, because SRAM is more generous in setbacks from the stream than is CRP.

The maximum riparian buffer CRP will allow is 120 feet, Berg said.

"That doesn't get a lot of producers interested. The floodplain can be a quarter-mile. At 120 feet, they would constantly be replacing fences," he said. Fences at the floodplain borders won't be swept away.

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It's a narrow pasture, and because of that Alverson keeps stocking rates on it low.

"It generates very little income." SRAM "is a nice way to get some income off it and protect the water that goes through it."

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Overall, the Central Big Sioux River Watershed project has $2 million for water-quality improvement projects, including SRAM. The money comes directly from the Environmental Protection Agency and U.S. Department of Agriculture's Natural Resource Conservation Service, and from EPA money passed through the DENR and city of Sioux Falls.

"Several years ago, the EPA and NRCS got together and came up with a national water-quality initiative. They asked all the states to select at least one 12-digit Hydrologic Unit," of 10,000 to 40,000 acres, says Pete Jahraus, DENR Environmental Scientist Manager II for Watershed Protection.

The Central Big Sioux project area of the river and its tributaries contains more than 1.2 million acres and includes 65 of the 12-digit Hydrologic Unit Codes.

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Season-long monitoring will help determine the effect on water quality of fencing livestock away from Skunk Creek. The East Dakota Water Development District has a contract to do water-quality monitoring from April through September this year and next. Development district personnel took water samples the first week in May for baseline data. Those samples still are being processed. The staff will monitor a

four-mile stretch of the creek south of Colton twice a week and a longer stretch that extends as far south as Marion Road, just above the confluence, biweekly through the end of September.

Jahraus, though, said monitoring should continue beyond two years. Jay Gilbertson, water development district manager, agreed that multiple years of data from high and low flow summers would provide a representive view of SRAM effects.

Two years of data, however, will show a notable improvement in water quality, Jack Majeres predicts. He is chairman of the Moody County Conservation District board of supervisors. The organization is the SRAM Skunk Creek project lead.

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The specifics of the Bachelor Creek project were different. A key distinction was excluding livestock from the creek for three months each year instead of six. But for the three years of the program, the result was the same, establishing a riparian buffer along the creek.

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Skunk Creek, however, flows for 58 miles from its source at Brant Lake north of Chester to the Big Sioux in Sioux Falls. There isn't enough money in SRAM to control all the livestock grazing along the creek, and any grazing that occurs can add to the creek's bacteria and total suspended solids burden and blur the effect of SRAM.

But you've got to start somewhere, Jahraus maintains. "We've got to work where we've got problems and willing landowners."

Even if unmanaged grazing dilutes SRAM's benefits somewhat, Sioux Falls environmental analyst Jesse Neyens contends the program will have a positive effect on water quality in the Big Sioux in Sioux Falls.

"It will certainly help what goes over the falls," he said. "We don't have control of everything. But the more we can put in the program, the more water quality should improve."

The signal success of a pilot program, after all, is to demonstrate that it should be continued on a grander scale.

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He insisted the Big Sioux can be made suitable for immersion recreation.

"It's doable, but there's a lot of work to do yet. We're in the initial stages of the water quality initiative in the city."

Gilbertson remembers the years when agencies spent money to improve feedlot manure-handling facilities in an effort to improve Skunk Creek's water quality.

"It's ferociously expensive," he said, "and unless the creek runs through your feedlot, short of a catastrophic failure or a 500-year rain, very little of what left your place was going to end up in the creek.

"Dollar for dollar, this is the most effective way to reduce loading in decades," Gilbertson said of offering farmers SRAM payments to fence livestock away from the creek.

"I'm looking forward to it. This is the kind of thing we should have started doing a long time ago."

Information from: Argus Leader, http://www.argusleader.com

Effort fences off ag areas along creek for river's sake

Peter Harriman | pharrima@argusleader.com, | pharrima@argusleader.com; *11:29 p.m. CDT May 17, 2014*

(Photo: Elisha Page / Argus Leader)

The stretch of the Big Sioux River that flows through Sioux Falls should be safe for swimming, without fear that diving below the surface would require a visit to a hospital emergency room and a course of antibiotics.

This is called immersion recreation, and it is the South Dakota Department of Environment and Natural Resources' goal for the river, based on standards established in the federal Clean Water Act.

The DENR also has set a lesser goal for Skunk Creek to become a stream suitable for fishing and limited contact, such as wading.
Skunk Creek, though, provides most of the river's flow through the city in summer, because much of the Big Sioux upstream is directed to the flood-control diversion channel.

Sioux Falls recently completed extensive recreational and public entertainment improvements to the River Greenway through downtown, and planning has begun for the third phase of that project, Mayor Mike Huether said. It is an effort to enhance the Big Sioux as a valued amenity, and if the river ever does reach the immersion recreation standard, its value to the community will skyrocket, said Teri Schmidt, executive director of the Sioux Falls Convention and Visitors Bureau.

“That would be just another plus about Sioux Falls and the river and the Falls Park area,” she said. “People love water, and a lot of people that travel are looking for areas with water that they can enjoy for recreational activities. One of those is being able to put your foot in it.

“If it ever became the case where it was completely safe for people to swim and we started marketing that, I have a feeling there would be people excited about it.”

While the city’s major use of the river is for drinking water, Huether said, its recreational potential is inviting.

“The goal is to make it look good, second, to be able to float on top of it in canoes and kayaks. But wouldn’t it be wonderful if we could actually tube down that river and swim in that river?” he asks.

But for that to happen, Skunk Creek needs to change.

The levels of E. coli and fecal coliform bacteria and total suspended solids in Skunk Creek don’t magically drop to immersion recreation standards — a maximum 235 E. coli colonies per 100 milliliters of water on any specific day and no more than an average 126 colonies per 100 ml in a 30-day period. So when the water passes beneath the Interstate 29 bridge on its short transit to the confluence with the river, for the Big Sioux to meet its target, Skunk Creek must exceed its own.

At this point, though, the DENR goals for both the Big Sioux and its tributary, Skunk Creek, are theoretical. DENR monitoring from May and August last year showed Skunk Creek actually had lower E. coli and fecal coliform levels than did the Big Sioux. However, the river and creek both are considered impaired streams, too polluted for their suggested use.

Paying farmersto fence livestock

Now, a consortium of city, area and state agencies are trying to reduce the influence of a major source of E. coli — livestock — on Skunk Creek and significantly improve its water quality. The Seasonal Riparian Area Management (SRAM) program is a pilot program in the Central Big Sioux River Watershed project.

In the past, agencies have spent hundreds of thousands of dollars to design and build manure-handling facilities for feedlots near Skunk Creek in an effort to lower E. coli levels in the stream.

This time, though, the answer to cleaner water during the recreation season might be as simple as a fence.

SRAM will pay farmers to fence livestock away from Skunk Creek's 100-year floodplain from April 1 to Sept. 30.

Payments are $60 an acre, per year, for 10- or 15-year contracts. The money is disbursed in a one-time, up-front payment. Farmers will be allowed to cut hay in the riparian area as long as they leave at least four inches of stubble, and SRAM also will pay for 75 percent of the cost of alternative water sources for farmers who relied on the creek to water livestock.

More inviting to farmers than CRP

Barry Berg, South Dakota Association of Conservation Districts watershed project coordinator, pulled together the funding sources to develop SRAM. He said the program might be more attractive to farmers than another federal set-aside program, the Conservation Reserve Program, because SRAM is more generous in setbacks from the stream than is CRP.

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Using EPA moneyfor water quality

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Encouraging results from Bachelor Creek

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Bacterial Levels

E.Coli
(per 100 mililiters of water)

	SKUNK CREEK	BIG SIOUX RIVER
MAY 2013	6.3 organisms	31.8 organisms
AUGUST 2013	33.6 organisms	533 organisms*

Fecal Coliform
(per 100 mililiters of water)

	SKUNK CREEK	BIG SIOUX RIVER
MAY 2013	no detectable coliforms	20 organisms
AUGUST 2013	no detectable coliforms	440 organisms*

* These sample results are higher than the water quality standards established for the Big Sioux River.

Volunteers needed for Big Sioux River cleanup Saturday

Argus Leader staff 1:22 p.m. CDT May 14, 2015

 Buy Photo

Trash at Lien Park on the north side of the Big Sioux River. Join the Argus Leader cleanup May 16 from 8 a.m. to 11 a.m. Other parks along the river will also be hosting cleanups.(Photo: Argus Leader)Buy Photo

6 CONNECT 2 TWEETLINKEDINCOMMENTEMAILMORE

Argus Leader Media is partnering up with other companies and the city of Sioux Falls to clean up the Big Sioux River on Saturday morning, and you can help.

Argus Leader Media and reporters Joe Sneve and Jill Callison will be at Lien Park on the north side of the Big Sioux on Cliff Avenue.

When: Stop by any park from 8 a.m. to 11 a.m. Saturday. Gloves are provided, but volunteers should wear appropriate clothing. Volunteer scan show up at any time.

Where: In addition to Lien Park, other companies will be hosting cleanups at: Sanford Sports Complex, Elmwood Park, Elmen Park Trailhead on W. 12th Street; Legacy Park; Dunham Park,

Park Maintenance Shop at 2401 W. 49th Street; Yankton Trail; Pasley Park; Spencer Park; Riverdale Park; Fawick Park; Falls Park and at Feeding South Dakota at 3511 N. 1st Avenue. Those attending at Feeding South Dakota are asked to bring canned food items to donate.

In 2014, 180 volunteers picked up 4,000 pounds of trash. If parks have too many volunteers Saturday morning, people will be asked to go to different parks.

The Argus Leader will provide a light breakfast at Lien Park for the first volunteers who arrive in the morning.

Photos: Trash at Lien park

Argus Leader reporter Joe Sneve will be cleaning up Lien Park from 8 a.m. to 11 a.m. May 16. Join him there or join other teams at parks along the river to clean up the river greenway. (Photo: Argus Leader)
Buy Photo Fullscreen

Written by
J.L. Atyeo

- Filed Under
- News
- Mike Huether

Sep. 9, 2013

Water summit targets a cleaner Big Sioux

Mayor's initiative shines spotlight on river quality

The Big Sioux River is one of the nation's dirtiest water bodies by one measure, and while cleanup efforts are getting more attention, the Big Sioux has a ways to go.

"I certainly wouldn't let my grandson swim in it," said Jay Gilbertson, manager of the East Dakota Water Development District based in Brookings.

When it comes to swimming, water in the Big Sioux exceeds the standard level for E. coli bacteria, which comes from feces. Watershed groups are monitoring those levels monthly. Levels have been fairly consistent in recent years, barring any big rain events that can throw off results as they tend to wash manure from livestock and droppings from wildlife into the river.

"That's the nature of life in the Big Sioux basin," Gilbertson said. "Short of fencing off huge chunks of the river and excluding livestock, swimming in the Big Sioux might be a bit problematic."

Calling attention to what has been accomplished in the watershed, Sioux Falls Mayor Mike Huether is host to the city's first Big Sioux River Water Summit, from 3 to 7 p.m. today at the Orpheum Theater. Twelve speakers will discuss work in conservation, flood control and recreation, among other topics.

There's another water quality event scheduled next month in Brookings.

Moving from talk to defined improvements is a complex task, however.

The river as it runs through Sioux Falls heading toward the Iowa border is held to a different water quality standard than it is upstream. As it runs through the city, the river is supposed to be swimmable and open for recreation. On its journey from its headwaters north of Watertown, though, the river runs through farmland and has to meet a lower standard for water quality.

“That little block of water moves downstream, and suddenly (bacteria) is three times the allowable limit,” Gilbertson said. “The water hasn’t changed; it’s just we use a different criteria.”

One tributary in particular, Skunk Creek, has been the major focus for improving upstream water quality. It contributes about half of the bacteria contamination in the river as it flows through Sioux Falls. The other half comes mostly from the city’s storm water system, and a small percentage comes from further upstream.

Skunk Creek, which flows south from Madison, is surrounded by agricultural land. It is also on the list of impaired water bodies, in part for the amount of sedimentation and partly for E. coli.

The Natural Resources Conservation Service, through a national water quality initiative program, began focusing last year on Skunk Creek cleanup. Conservationists are working with producers on handling manure and keeping cattle away from the creek. To improve sediment levels, they are encouraging farmers to plant cover crops and keep from tilling their land before planting season.

Producers have been receptive to the ideas, state conservationist Jeff Zimprich said. Starting with a $750,000 budget in the first year of the program, there was so much interest that the conservation service added federal dollars and ended up spending $1.1 million.

Zimprich said it will be a few years before their efforts start to show any noticeable improvements in the river.

The Central Big Sioux Watershed Implementation Project, led by the Moody County Conservation District, implemented a pilot program called seasonal riparian area

management or S-RAM. It allows producers to hay along Skunk Creek throughout the summer and use that grass for livestock.

This fall, if there are four to six inches of vegetation there, producers may put cattle there through the winter. Leaving the grass buffer helps filter out bacteria and reduces sediment.

The pilot program also works with farmers to put in alternative water sources so cattle don't have to use the stream.

Watershed coordinator Barry Berg also said it's too early to see any improvements in water quality from the monitoring end of it, but he's noticed good signs.

"When I'm out on the land and traveling around in the watershed," he said, "I've actually noticed a lot of the stream has healed up."

Berg is optimistic about where the river is headed with so many partners working toward a better Big Sioux. He said this week's Water Summit is an opportunity to bring urban and rural interests together and he's hoping it will bring up some good discussions.

"Everybody has an impact on water quality," he said. "It's not just the rural. There's impact from the urban population."

While Gilbertson doesn't hold out hope for being able to swim in the river anytime soon, he said they're already making great strides in improving the water quality.

"It doesn't mean we don't try," he said.

If you go

WHAT: Mayor's Big Sioux River Water Summit; includes presentations on water quality, water resources and conservation, urban, rural and government watershed partnerships, flood control, fisheries and recreation. Open to the public.
WHEN: 3 to 7 p.m. today
WHERE: Orpheum Theater, 315 N. Phillips Ave.
NEXT: Eastern South Dakota Water Conference; 8 a.m. to 5 p.m. Oct. 30 at the University Student Union at South Dakota State University, Brookings

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T: 605-367-8162 F: 367-8167

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T: 605-373-6979 F: 373-6974

Street
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T: 605-367-8255 F: 367-8200

Utility Billing
1201 North Western Avenue
P.O. Box 7401
Sioux Falls, SD 57117-7401
T: 605-367-8131 F: 367-7341

Water Maintenance
668 West Algonquin Street
P.O. Box 7402
Sioux Falls, SD 57117-7402
T: 605-367-8810 F: 367-7883

Water Purification
2100 North Minnesota Avenue
P.O. Box 7402
Sioux Falls, SD 57117-7402
T: 605-373-6940 F: 373-6941

Water Reclamation
4500 North Sycamore Avenue
Sioux Falls, SD 57104-9612
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NEWS RELEASE

For Immediate Release

Release Date: August 13, 2013

Contact: Bob Kappel, Environmental Manager

Phone: 605-367-8276

Mayor's Big Sioux River Water Summit: "We Need the River and the River Needs Us!"

Sioux Falls, South Dakota: Sioux Falls Mayor Mike Huether will host the first "Mayor's Big Sioux River Water Summit" on Monday, September 9, 2013. The summit is an opportunity for the public to become more knowledgeable and engaged in a critical natural resource, the Big Sioux River.

"The Big Sioux River is one of the many things that make our city so beautiful and vibrant," says Mayor Huether. "However, it needs our help, and it needs it now! Improvements can be made to water quality, drainage, resource management and recreational opportunities."

The summit will include multiple presentations in the following general areas:

- Water quality
- Water resource and conservation
- Urban, rural and government watershed partnerships
- Flood control—FEMA
- Fisheries and recreation

The Mayor also will facilitate a question-and-answer session with other watershed professionals and stakeholders to listen to and understand the public's concerns.

Save the Date
Mayor's Big Sioux River Water Summit
Monday, September 9, 2013
3 to 7 p.m.
Orpheum Theater
315 North Phillips Avenue, Sioux Falls

The summit is open to the public. Residents are encouraged to participate and help the City and water professionals maintain and improve this important water resource. Look for more information about the event in the coming weeks.

# # #

Programs created to further improve Big Sioux River

Mar. 21, 2014 |

Mark Cotter, director of Public Works, speaks during a Water Quality News Conference on Thursday, March 20, 2014, at the City of Sioux Falls Public Works Environmental Center in Sioux Falls. The city of Sioux Falls has announced it is intensifying its efforts to improve water quality of the Big Sioux River.

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PURCHASE IMAGE
1 of 7

Joe Ahlquist - Argus Leader

Written by
Nick Lowrey

- Filed Under
- News

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Mary Wright and Justin Grass Rope, both of Lower Brule, take in the sights and sounds of the Big Sioux River on Thursday at Falls Park in Sioux Falls. The city of Sioux Falls has announced it is intensifying its efforts to improve water quality of the Big Sioux River. / Joe Ahlquist / Argus Leader

The Big Sioux River has gotten cleaner in recent years, but Sioux Falls city officials are not satisfied.

The city announced a series of programs Thursday to improve the river's water quality, from educating pet owners about animal waste to paying farmers to stop polluting Skunk Creek.

"We as the city of Sioux Falls know that we have not been perfect," Environmental Manager Bob Kappel said at a news conference. "We have not lived up to our responsibilities fully over the years."

The new strategies include educating pet owners about cleaning up pet waste, monitoring storm sewer outflows, adding water quality efforts to the city's flood management plan, restarting an annual river greenway cleanup event, expanding waterway adoption programs and growing the mayor's Big Sioux Water Summit.

"We really need to make sure that the quality of the Big Sioux River and Skunk Creek continue to improve," Public Works Director Mark Cotter said. "It's so essential to the environment, ecology and quality of life of Sioux Falls."

Kappel said the city has succeeded in reducing the levels of ammonia, dissolved oxygen and iron in the river. The state Department of Environment and Natural Resources no longer lists those pollutants as impairments on the Sioux Falls section of the river.

“Sometimes, people get the idea that the Sioux River is a polluted river,” Kappel said. “That’s not really a true picture of the river. It is impaired, but it has improved dramatically.”

The river as it flows through the city still struggles with sediment and bacteria, however. The amount of E. coli bacteria in the river has been especially difficult to control and has led to restrictions on the river’s uses, most notably swimming.

“That’s what we’re trying to do — bring the river into compliance for those designated uses,” Kappel said.

To that end, the city is working with the Central Big Sioux River Coalition and several other conservation organizations on a set of aggressive programs to take the fight against E. coli to the next level.

Programs created to further improve Big Sioux River

Besides educating its citizens, the city will help pay livestock producers and farmers to keep animal waste out of Skunk Creek, which a recent study backed by the city found was the source of 48 percent of the Big Sioux River’s E. coli. Producers would get up to $60 per acre to create a riparian buffer zone around Skunk Creek to reduce bacteria runoff. Farmers also will be encouraged to stop using the creek to water their livestock and will be connected with programs to help them pay for alternative sources.

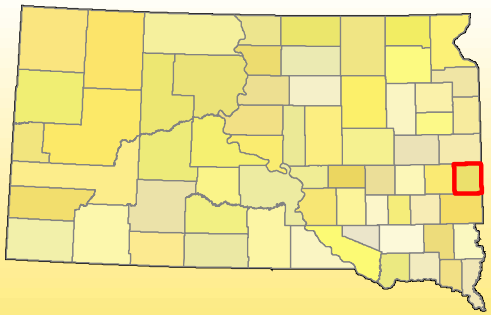
“Their main concern is it’s a change in their land management, it’s a change in how they’ve managed their operations successfully for years,” said Barry Berg of the South Dakota Association of Conservation Districts, who already has begun working with farmers on water quality issues.

Sioux Falls’ efforts to curb the sediment in the river also have seen success. So far, $6 million has been spent to create stilling ponds for storm runoff that allow brake dust and sand to settle out before the water hits the river. Another $1.2 million has been spent to upgrade the city’s flood control ponds.

Improving water quality has been a major priority for the East River Group of the South Dakota Sierra Club, and the city's efforts to make the river cleaner all have been positive, said the group's president, Dana Loeske

"You've got to be optimistic," Loeske said. "When you look at other cities in the Midwest, we are head and shoulders above any other city in investing in water quality."

Moody County



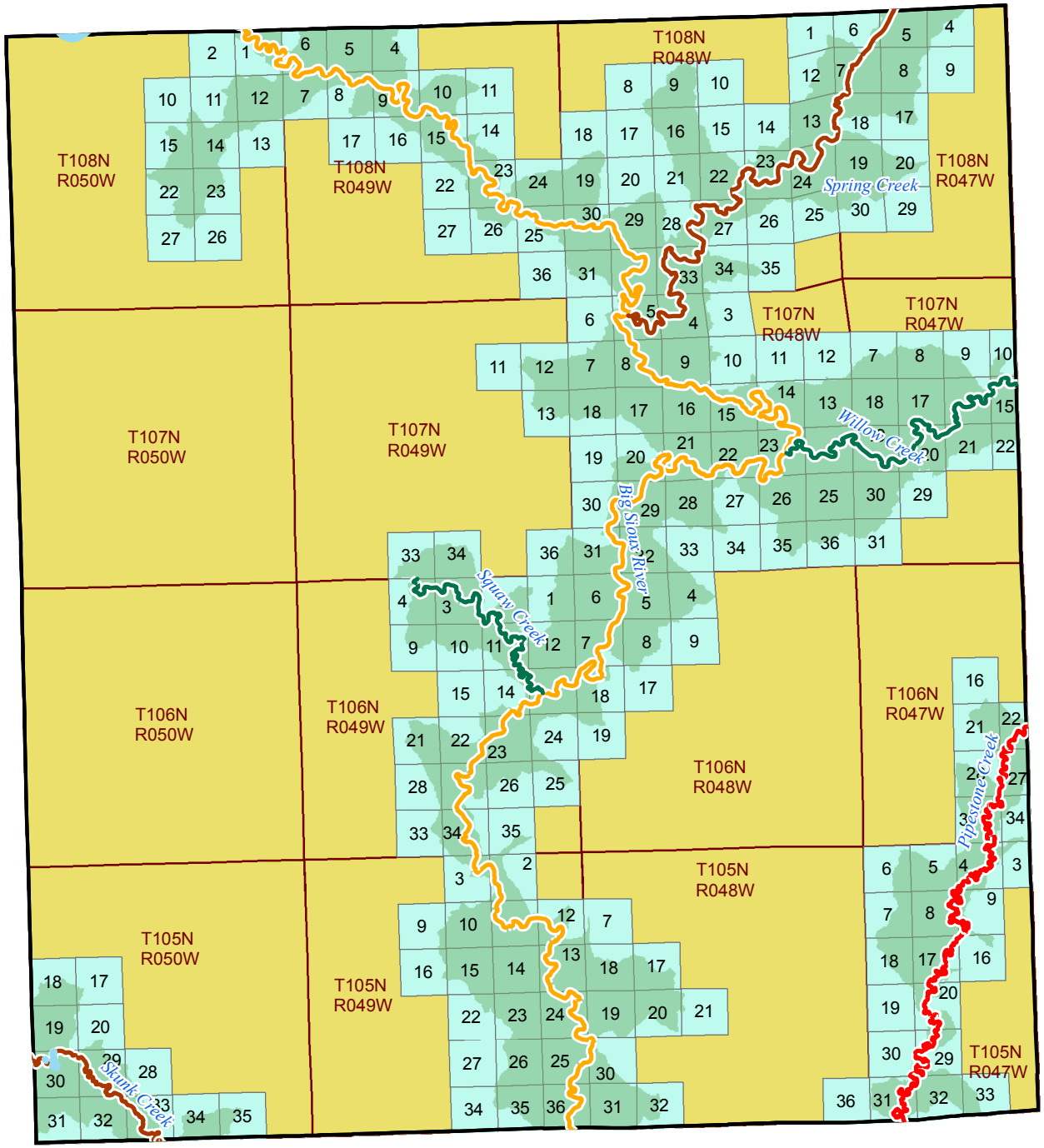
Priority Riparian Areas were based on beneficial uses for streams as defined in the South Dakota Administrative Rule 74:51:03:02. Zone A includes waters designated for the uses of domestic water supply, warm water semi-permanent fish life propagation, and immersion recreation. Zone B includes waters designated for the uses of warm-water marginal fish life propagation and limited-contact recreation. Zone C uses include fish and wildlife propagation, recreation, stock watering, and irrigation. The buffer widths are related to Water Quality Standard Criteria as defined in Chapter 74:51:01 of the South Dakota Administrative rules. Pollutants of concern are sediment, nitrates, and bacteria. Waters with higher standards for pollutants have been assigned wider riparian buffers. The Zone A buffer is 120-feet, the Zone B Buffer is 60-feet, and the Zone C buffer is 30-feet.

- Zone A: 120 Foot Buffer
- Zone A:Impared Stream
- Zone B: 60 Foot Buffer
- Zone B:Impared Stream
- Zone C: 30 Foot Buffer
- High Priority Drainage Area
- High Priority Sections
- Lakes

N W E S

1:219,170

01/02/2013

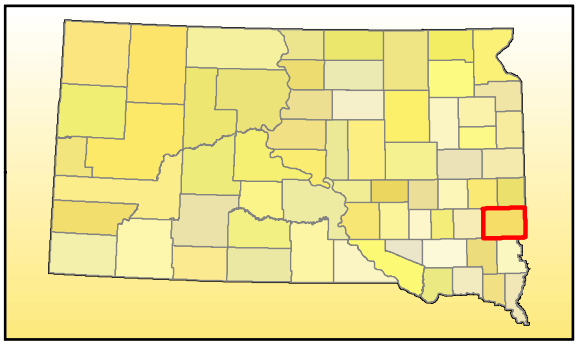


Department of Environment & Natural Resources

Protecting SD's Tomorrow... Today

Minnehaha County

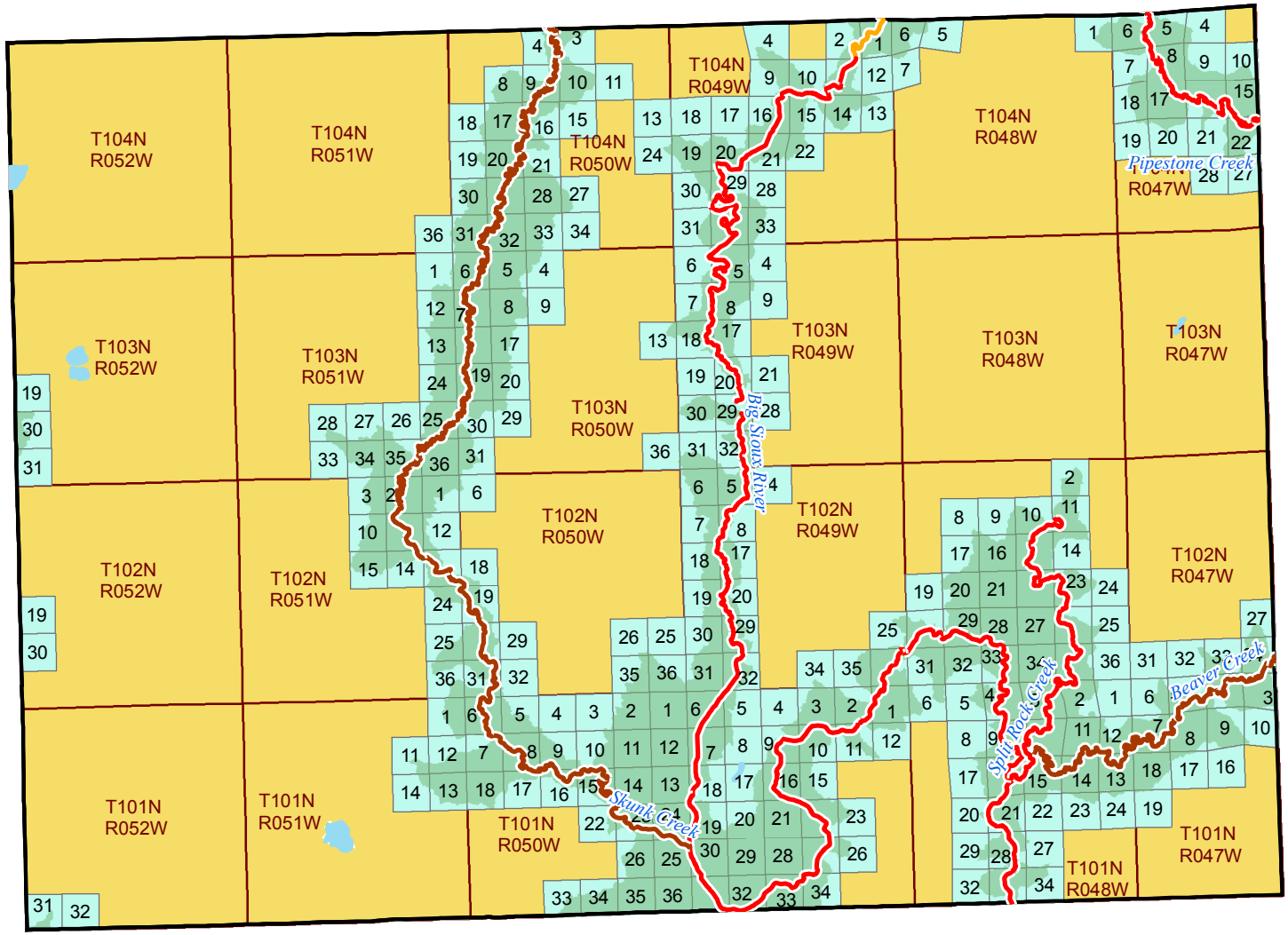
South Dakota Department of Environment & Natural Resources
Protecting SD's Tomorrow... Today



Priority Riparian Areas were based on beneficial uses for streams as defined in the South Dakota Administrative Rule 74:51:03:02. Zone A includes waters designated for the uses of domestic water supply, warm water semi-permanent fish life propagation, and immersion recreation. Zone B includes waters designated for the uses of warm-water marginal fish life propagation and limited-contact recreation. Zone C uses include fish and wildlife propagation, recreation, stock watering, and irrigation. The buffer widths are related to Water Quality Standard Criteria as defined in Chapter 74:51:01 of the South Dakota Administrative rules. Pollutants of concern are sediment, nitrates, and bacteria. Waters with higher standards for pollutants have been assigned wider riparian buffers. The Zone A buffer is 120-feet, the Zone B Buffer is 60-feet, and the Zone C buffer is 30-feet.

- Zone A: 120 Foot Buffer
- Zone A:Impared Stream
- Zone B: 60 Foot Buffer
- Zone B:Impared Stream
- Zone C: 30 Foot Buffer
- High Priority Drainage Area
- High Priority Sections
- Lakes

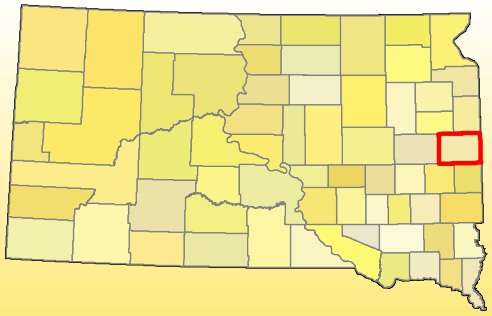
N W E S



1:291,680

01/02/2013

Brookings County



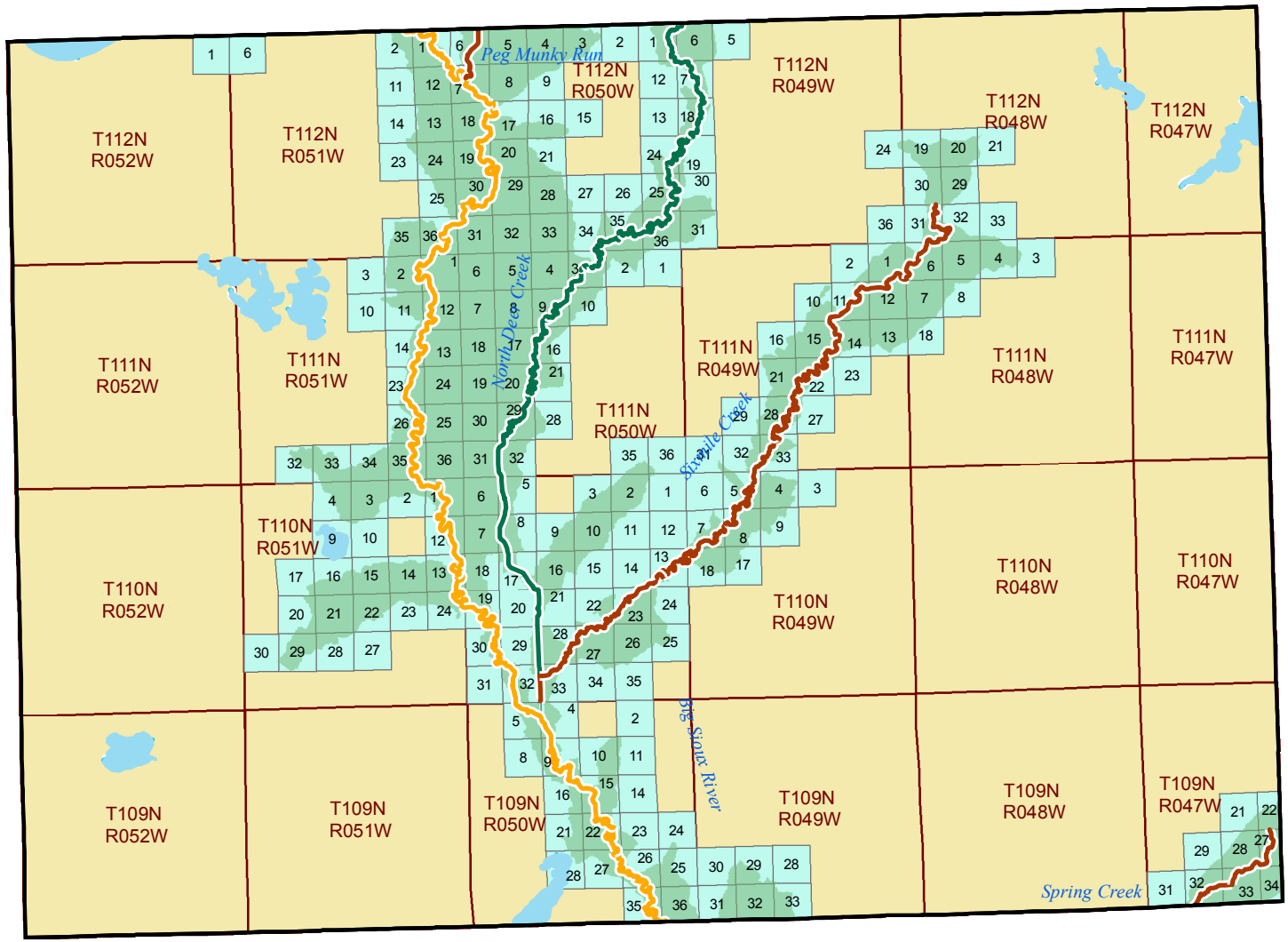
Priority Riparian Areas were based on beneficial uses for streams as defined in the South Dakota Administrative Rule 74:51:03:02. Zone A includes waters designated for the uses of domestic water supply, warm water semi-permanent fish life propagation, and immersion recreation. Zone B includes waters designated for the uses of warm-water marginal fish life propagation and limited-contact recreation. Zone C uses include fish and wildlife propagation, recreation, stock watering, and irrigation. The buffer widths are related to Water Quality Standard Criteria as defined in Chapter 74:51:01 of the South Dakota Administrative rules. Pollutants of concern are sediment, nitrates, and bacteria. Waters with higher standards for pollutants have been assigned wider riparian buffers. The Zone A buffer is 120-feet, the Zone B Buffer is 60-feet, and the Zone C buffer is 30-feet.

- Zone A: 120 Foot Buffer
- Zone A:Impared Stream
- Zone B: 60 Foot Buffer
- Zone B:Impared Stream
- Zone C: 30 Foot Buffer
- High Priority Drainage Area
- High Priority Sections
- Lakes

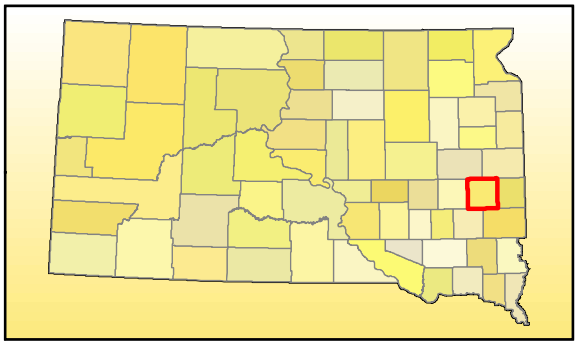
N W E S

1:288,124

12/31/2012



Lake County



Priority Riparian Areas were based on beneficial uses for streams as defined in the South Dakota Administrative Rule 74:51:03:02. Zone A includes waters designated for the uses of domestic water supply, warm water semi-permanent fish life propagation, and immersion recreation. Zone B includes waters designated for the uses of warm-water marginal fish life propagation and limited-contact recreation. Zone C uses include fish and wildlife propagation, recreation, stock watering, and irrigation. The buffer widths are related to Water Quality Standard Criteria as defined in Chapter 74:51:01 of the South Dakota Administrative rules. Pollutants of concern are sediment, nitrates, and bacteria. Waters with higher standards for pollutants have been assigned wider riparian buffers. The Zone A buffer is 120-feet, the Zone B Buffer is 60-feet, and the Zone C buffer is 30-feet.

- Zone A: 120 Foot Buffer
- Zone A:Impared Stream
- Zone B: 60 Foot Buffer
- Zone B:Impared Stream
- Zone C: 30 Foot Buffer
- High Priority Drainage Area
- High Priority Sections
- Lakes

N W E S

1:217,850

12/31/2012

South Dakota Department of Environment & Natural Resources
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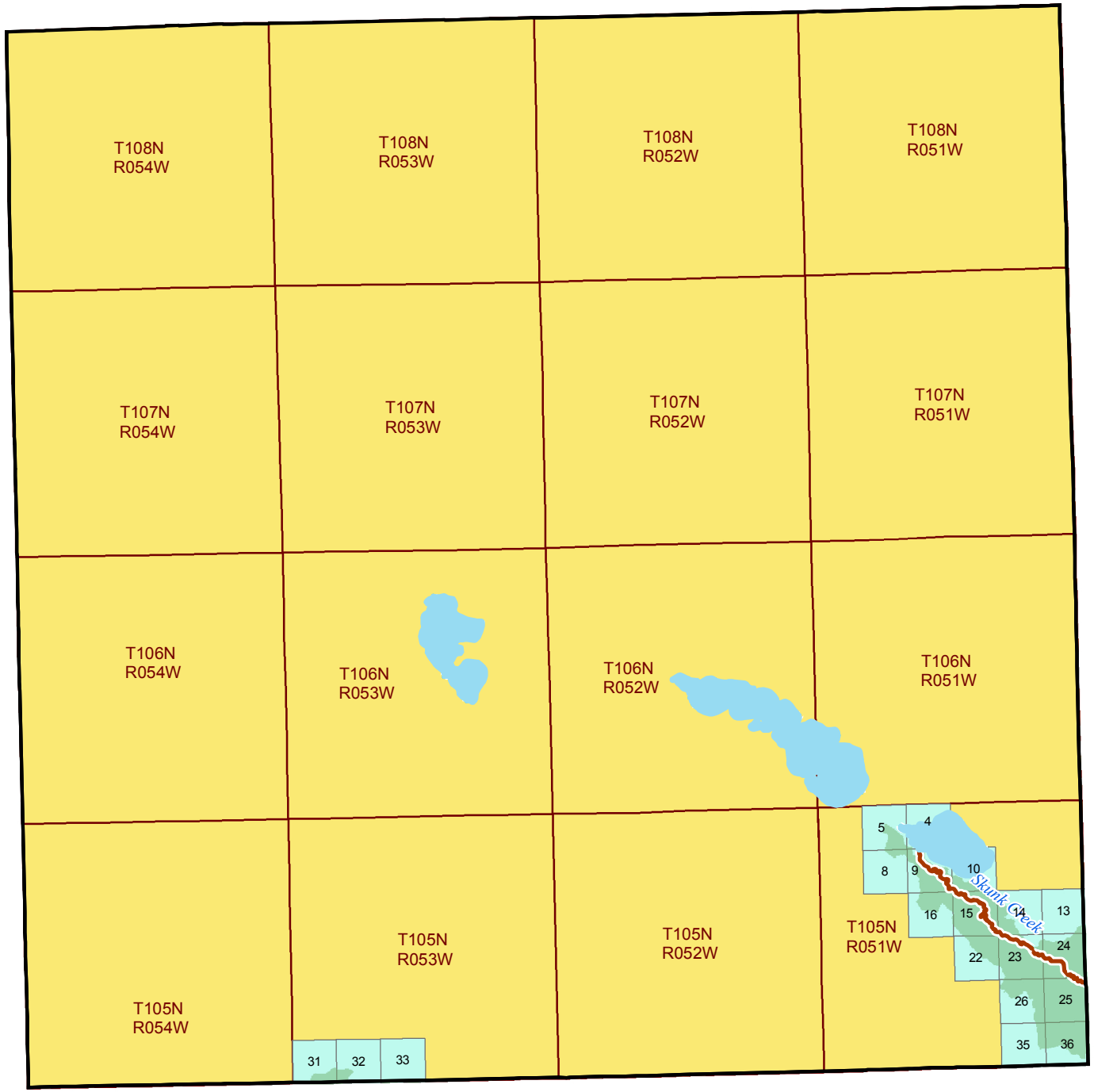
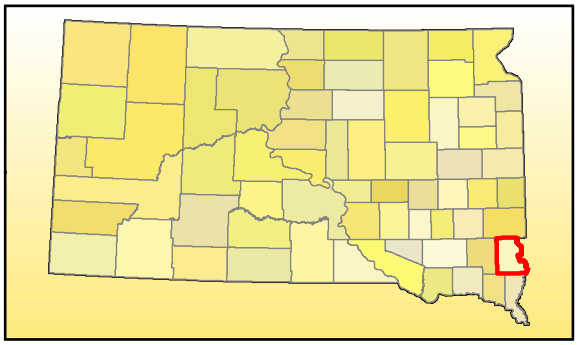


Lincoln County



Priority Riparian Areas were based on beneficial uses for streams as defined in the South Dakota Administrative Rule 74:51:03:02. Zone A includes waters designated for the uses of domestic water supply, warm water semi-permanent fish life propagation, and immersion recreation. Zone B includes waters designated for the uses of warm-water marginal fish life propagation and limited-contact recreation. Zone C uses include fish and wildlife propagation, recreation, stock watering, and irrigation. The buffer widths are related to Water Quality Standard Criteria as defined in Chapter 74:51:01 of the South Dakota Administrative rules. Pollutants of concern are sediment, nitrates, and bacteria. Waters with higher standards for pollutants have been assigned wider riparian buffers. The Zone A buffer is 120-feet, the Zone B Buffer is 60-feet, and the Zone C buffer is 30-feet.

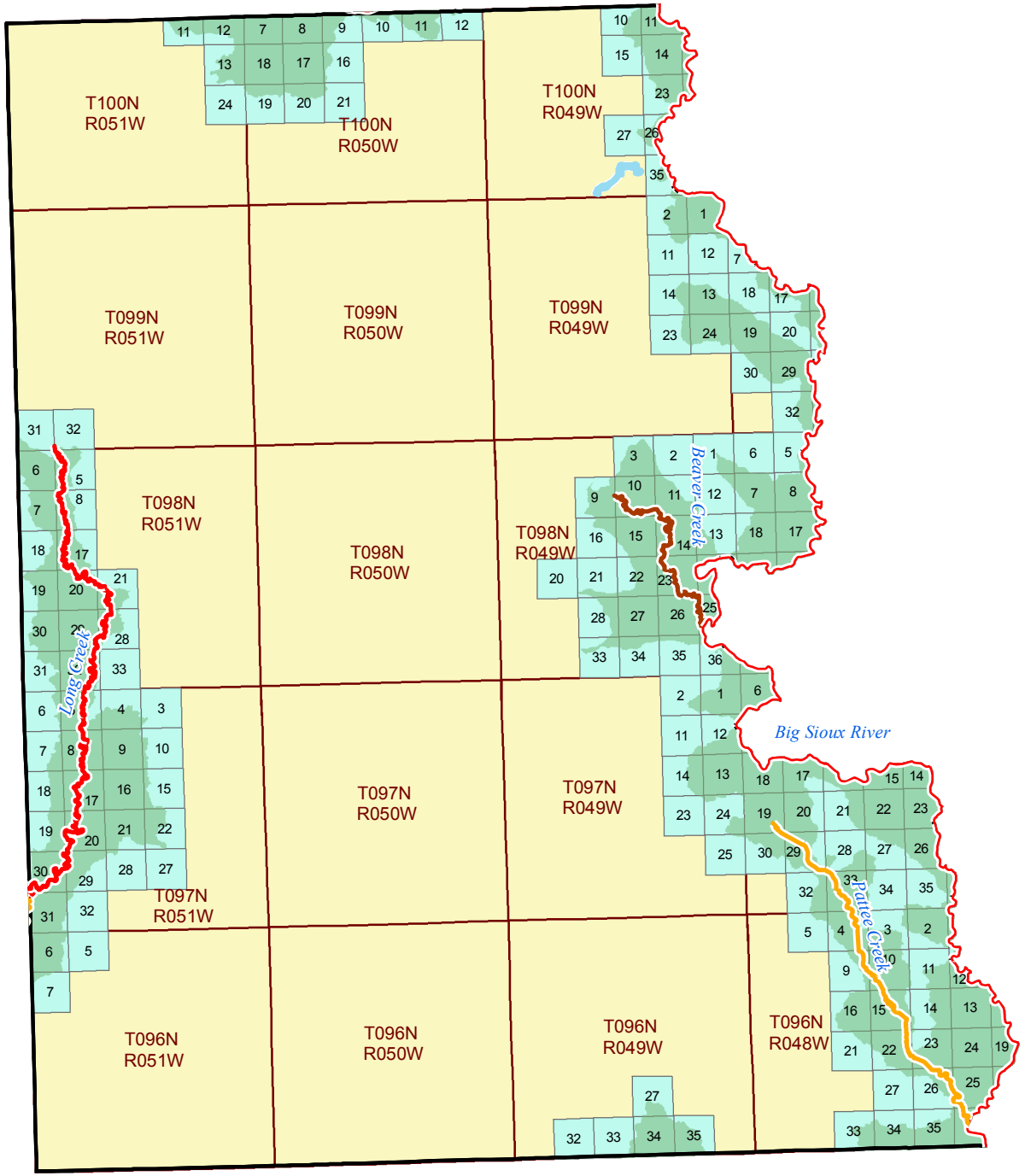
- Zone A: 120 Foot Buffer
- Zone A:Impared Stream
- Zone B: 60 Foot Buffer
- Zone B:Impared Stream
- Zone C: 30 Foot Buffer
- High Priority Drainage Area
- High Priority Sections
- Lakes

N W E S

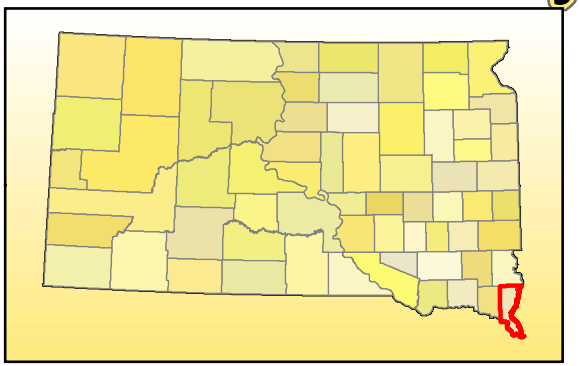
1:259,390

01/02/2013

South Dakota Department of Environment & Natural Resources
Protecting SD's Tomorrow... Today



Union County



Priority Riparian Areas were based on beneficial uses for streams as defined in the South Dakota Administrative Rule 74:51:03:02. Zone A includes waters designated for the uses of domestic water supply, warm water semi-permanent fish life propagation, and immersion recreation. Zone B includes waters designated for the uses of warm-water marginal fish life propagation and limited-contact recreation. Zone C uses include fish and wildlife propagation, recreation, stock watering, and irrigation. The buffer widths are related to Water Quality Standard Criteria as defined in Chapter 74:51:01 of the South Dakota Administrative rules. Pollutants of concern are sediment, nitrates, and bacteria. Waters with higher standards for pollutants have been assigned wider riparian buffers. The Zone A buffer is 120-feet, the Zone B Buffer is 60-feet, and the Zone C buffer is 30-feet.

- Zone A: 120 Foot Buffer
- Zone A:Impared Stream
- Zone B: 60 Foot Buffer
- Zone B:Impared Stream
- Zone C: 30 Foot Buffer
- High Priority Drainage Area
- High Priority Sections
- Lakes

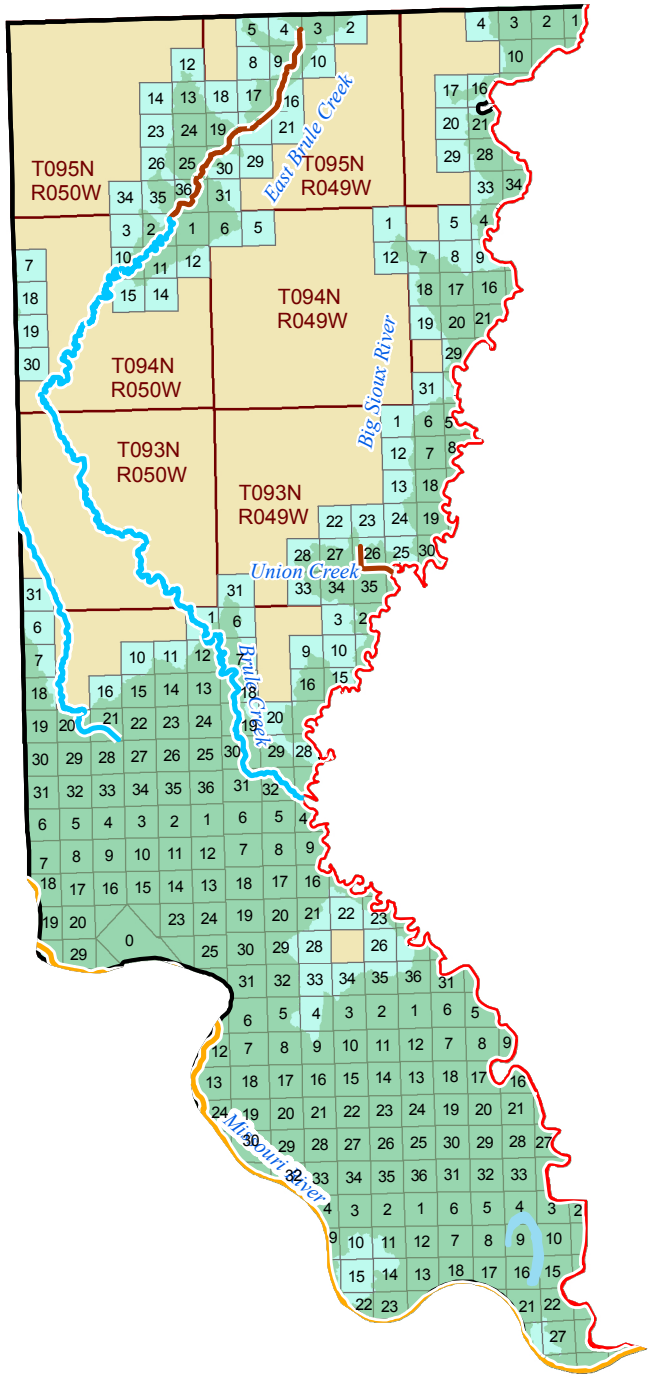
N W E S

1:370,760

01/02/2013

South Dakota Department of Environment & Natural Resources

Protecting SD's Tomorrow... Today



CENTRAL BIG SIOUX RIVER WATER QUALITY
STATE OF SOUTH DAKOTA
JOINT POWER AGREEMENT

AGREEMENT made and entered into by and between Moody County Conservation District, 202 East 3rd Ave, Flandreau, SD 57028, (hereinafter "Moody"), and the City of Sioux Falls, 224 W. Ninth St, Sioux Falls, SD 57117-7402, (hereinafter "Sioux Falls"), to implement the Central Big Sioux River Watershed Project Implementation Plan (hereinafter "CBSRW PIP").

I
GENERAL PROVISIONS

Moody hereby enters into this Agreement for services with Sioux Falls in consideration of and pursuant to the terms and conditions set forth herein.

1. Moody and Sioux Falls will perform those services described in the CBSRW PIP, attachment A and by this reference incorporated herein. The Brookings County Conservation District, Lake County Conservation District, Minnehaha County Conservation District and East Dakota Water Development District have tasks that are referenced in the CBSRW PIP. Moody and Sioux Falls will work toward having the other entities enter into Joint Powers Agreements for the benefit of Moody, Sioux Falls and the other Conservation Districts and the East Dakota Water Development District but this agreement is being entered into by Moody and Sioux Falls to allow both entities to proceed on their joint goal of improving the water quality in the Central Big Sioux Watershed "CBSRW".

2. Moody and Sioux Falls services under this Agreement shall commence upon signing and end on October 2, 2016, unless sooner terminated pursuant to the terms hereof.

3. In order to improve water quality in the CBSRW Moody, and Sioux Falls agree to collectively work together to promote and provide assistance to landowners and operators in planning and installing recommended soil and water conservation Best Management Practices "BMP". These BMPs will assist in addressing the water quality concerns in the watershed and attempt to achieve the established total maximum daily load quantities that have been adopted to protect and enhance the beneficial uses of that portion of the Big Sioux River between the Hamlin County and Brookings County line to North Sioux City, SD.

4. Moody will be responsible for their own equipment, human resources, insurance, billing, accounting and other administrative costs when doing work in other counties. Sioux Falls will be responsible for their own equipment, human resources, insurance, billing, accounting and other administrative costs when carrying out the duties in this agreement.

5. It is agreed that the two parties will support a BMP implementation project “Project” to improve the water quality of the Big Sioux River, located in eastern South Dakota. The primary purpose of the BMP implementation measures is to reduce bacteria and sediment loading to the Big Sioux River and its named tributaries between Brookings/Hamlin County boundary and North Sioux City, South Dakota, by offering incentives to producers (hereinafter referred to as the “Producer”).

6. The activities, budget, and milestones involved in the Project are described in the attached CBSRW PIP (Attachment A). The CBSRW PIP, budget and projected timeline may be modified with written approval of the South Dakota Department of Environment and Natural Resources (SDDENR).

7. It is understood that the two parties will provide funds and/or support for the implementation and completion of the CBSRW PIP in accordance with the schedule presented in the Attachment to this agreement. It is understood that Moody will provide funding to the landowners involved with the BMP installation identified in Attachment A and that Moody will submit proper paperwork to Sioux Falls for reimbursement of these BMPs through State Revolving Fund (SRF) Non-Point Source (NPS) funding. It is understood that the agents or representatives of the parties to this agreement cannot commit to an increase of the funding levels established in the attached CBSRW PIP without first obtaining an amendment to the CBSRW PIP.

8. Moody will be responsible for any liability or claims that may arise resultant to its activities undertaken in the completion of its Project responsibilities (Attachment A) and will maintain adequate liability, workers’ compensation, professional liability, and other necessary insurance during the period which this Agreement is in effect.

9. Sioux Falls will be responsible for any liability or claims that arise resultant to its activities undertaken in the completion of its Project responsibilities (Attachment A) and will maintain adequate liability, workers’ compensation, professional liability, and other necessary insurance during the period which this Agreement is in effect.

10. Moody and Sioux Falls agree to report any event encountered in the course of performance of this Agreement which results in injury to the person or property of third parties, or which may otherwise subject either party to liability. The above shall report any such event to the other parties in this agreement immediately upon discovery. The above cooperators’ obligation under this section shall only be to report the occurrence of any event to the other party and to make any other report provided for by their duties or applicable law. The obligation to

report shall not require disclosure of any information subject to privilege or confidentiality under law (e.g., attorney-client communications). Reporting to the other party under this section shall not excuse or satisfy an obligation of either party to report any event to law enforcement or other entities under the requirements of any applicable law.

11. This Agreement may be terminated by the above parties hereto upon thirty (30) days written notice. In the event that either party breaches any of the terms or conditions hereof, this Agreement may be terminated by the other at any time with or without notice. If termination for such a default is effected by either party, any payments due to the other party at the time of termination may be adjusted to cover any additional costs to a party because of the other party's default.

12. This Agreement depends upon the continued availability of funds. If funds become unavailable by operation of law or federal, state or local funds reductions, this Agreement is considered automatically terminated without further required notice. Termination for lack of funds is not a default by any party nor does it give rise to a claim against any party.

13. This Agreement may not be assigned without the express prior written consent of Moody and Sioux Falls. This Agreement may not be amended except in writing, which writing shall be expressly identified as a part hereof, and be signed by an authorized representative of each of the parties hereto.

14. This Agreement shall be governed by and construed in accordance with the laws of South Dakota. Any lawsuit pertaining to or affecting this Agreement shall be venued in Circuit Court, Second Judicial Circuit, Minnehaha County, South Dakota.

15. The parties to this agreement will comply with all federal, state and local laws, regulations, ordinances, guidelines, permits and requirements applicable to providing services pursuant to this Agreement, and will be solely responsible for obtaining current information on such requirements.

16. The parties to this agreement will include provisions in any subcontracts requiring its subcontractors to comply with the applicable provisions of this Agreement, to indemnify the other party in this agreement, and to provide insurance coverage for the benefit of the other party in this agreement in a manner consistent with this Agreement. The parties to this agreement will cause any subcontractors, agents, and employees to comply, with applicable federal, state and local laws, regulations, ordinances, guidelines, permits and requirements and will adopt such review and inspection procedures as are necessary to assure such compliance.

17. Any notice or other communication required under this Agreement shall be in writing and sent to the address set forth above. Notices shall be given by and to Jack Majeres on behalf of Moody, and Robert J. Kappel or Andy Berg on behalf of

Sioux Falls, or such authorized designees as either party may from time to time designate in writing. Notices or communications to or between the parties shall be deemed to have been delivered when mailed by first class mail, provided that notice of default or termination shall be sent by registered or certified mail, or, if personally delivered, when received by such party.

18. In the event that any court of competent jurisdiction shall hold any provision of this Agreement unenforceable or invalid, such holding shall not invalidate or render unenforceable any other provision hereof.

19. All other prior discussions, communications and representations concerning the subject matter of this Agreement are superseded by the terms of this Agreement, and except as specifically provided herein, this Agreement constitutes the entire Agreement with respect to the subject matter hereof.

II.
JOINT POWERS

Moody and Sioux Falls agree to the following provisions pursuant to the Joint Powers Act (SDCL 1-24):

1. This Agreement does not establish a separate legal entity as contemplated by SDCL 1-24-5. The cooperative undertaking described herein will be financed and conducted under the provisions of this agreement by Moody and Sioux Falls. Each party has responsibilities under the terms of this Agreement as specified in the CBSRW PIP. Purchase and maintenance of equipment used to fulfill the agreement will be undertaken by the respective agencies as described herein. No real property will be purchased and retained by Moody and Sioux Falls to use for this Agreement. However structures may be purchased for landowners as part of the BMPs that are developed in this process. Easements may also be obtained from landowners as a part of this agreement. The easements shall be retained by Northern Prairies Land Trust, Moody and/or Sioux Falls after the complete or partial termination of this agreement.

2. The parties to the Agreement hereby commit themselves to work cooperatively to implement and successfully complete the Project.

3. Moody will be the lead cooperating agency responsible for overall Project management and completing the CBSRW PIP elements and activities involved in the Project as described in Attachment A, except those activities designated for Sioux Falls in the CBSRW PIP and Section 7 of this Part of the Agreement. Responsibilities include an accounting of the use and disbursement of all Project funds, and both parties will keep records of all financial matters using generally accepted accounting practices.

4. Moody will keep complete records of all funds (cash and in-kind assistance) to be credited to this Project and will make available such records to Sioux Falls so that all such services may be credited to the Project.

5. Moody agrees to fund a portion of the Water Quality Master Plan for the CBSRW. Sioux Falls will contract with a consultant for the entire project and will invoice Moody for $50,000 for the master plan and $25,000 for developing a pilot water quality trading program. Moody will use State 319 funds for these projects.

6. Moody will be responsible for promoting the programs offered through the Project. Moody will be responsible for making decisions to fund individual projects (BMP installations) and will use best judgment to determine where Project funds are to be spent. Moody will request from SDDENR pre-approval on all projects before actual funds are expended. Moody will disburse payments to the Producer for installed BMP's and will submit reimbursement requests to Sioux Falls in a timely manner. Moody will ensure all projects and expenditures using SRF NPS resources will meet appropriate federal and state conditions, requirements and limitations on this funding source.

7. Sioux Falls will directly contract the following specific item and tasks of the CBSRW PIP. Funds for these items will be SRF NPS funds, City funds, and State 319 funds.

a. Bank stabilization item of the Riparian Area Protection Task.

b. Develop Master Plan & Pilot Water Quality Trading Program Task.

c. Agricultural Research Services Design Criteria & Citing Bank Toe Protection Task.

8. Sioux Falls will be responsible for approving pay requests submitted by Moody in a timely manner. Sioux Falls agrees to submit pay requests to SDDENR for approval and reimbursement to Moody for Project funds (through the SRF NPS Program) expended on BMPs identified in Attachment A within the Project Area provided that Sioux Falls shall have the right as its election to require consultation and pre-approval before any funds are committed on its behalf.

9. A copy of this Agreement will be filed by Moody, with the Attorney General and the Legislative Research Council not more than 14 days after execution as required by SDCL 1-24-6.1.

10. Financing required by this agreement will come from budgets as identified in the CBSRW PIP.

11. This agreement may be terminated by any party upon thirty (30) days written notice without cause.

12. All parties must comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352, 42 U.S.C. 2000d) and, in accordance with Title VI of that act, no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the applicant receives Federal financial assistance and will immediately take any measures necessary to effectuate this agreement.

13. Nothing in this Agreement shall be construed as an indemnification by one party of the other for liabilities of a party or third person for property loss, or damage, or death, or personal injury arising out of the performance of this Agreement. Any liabilities or claims for property loss, or death, or personal injury by a party or its agents, employees, contractors or assigns or by third persons, arising out of and during this agreement shall be determined according to applicable law.

By their signatures affixed below, each participating entity acknowledges their acceptance and approval of this agreement.

_____

MAYOR, City of Sioux Falls

_____

Chairman, Board of Supervisors
Moody County Conservation District
Federal ID Tax No. _____

ATTEST:

_____

City Clerk