SECTION 319 NONPOINT POLLUTION CONTROL PROGRAM

WATERSHED PROJECT FINAL REPORT

CENTRAL BIG SIOUX RIVER WATERSHED IMPLEMENTATION PROJECT, INTERIM

BARRY BERG
SOUTH DAKOTA ASSOCIATION OF CONSERVATION DISTRICTS
PROJECT COORDINATOR

July 2012

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 #9998185-06

EXECUTIVE SUMMARY

PROJECT TITLE: Central Big Sioux River Watershed Project (Interim)

PROJECT START DATE: 8 December, 2010

PROJECT COMPLETION DATE: 30 June, 2011

FUNDING:

Funding Sources	Original Budget	Expended
U.S. EPA Section 319 Grant	$133,785.00	$17,600.00
City of Sioux Falls SRF NPS	$1,170,758.00	$832,435.94
Conservation District	$8,650.00	$2,980.48
EDWDD	$14,260.00	$0.00
Local Cash and In-Kind Match	$10,000.00	$0.00
Totals:	**$1,337,453.00**	**$853,016.42**

The project goal was to restore and protect the beneficial uses of the portion of the Big Sioux River and its tributaries (in South Dakota) between the Brookings/Hamlin County line and Brandon by implementing and promoting best management practices (BMPs) in the watershed that reduce sediment loading and prevent bacterial contamination. Several segments are planned to attain the goal to reduce the total suspended solids (TSS) and/or bacteria (fecal or Ecoli) levels and meet the 25 separate TMDLs developed for the river, tributaries and lakes.

To attain the goal the following actions were taken during this project segment:

- working with local citizens and organizations to develop a TMDL implementation strategy based on the watershed assessment and TMDL to guide future project segments
- initiating a public education and outreach campaign to inform landowners, stakeholders and area residents on water quality issues and BMPs important to the Lower Big Sioux River Basin Watershed and
- installation of BMPs targeted towards identified high priority sub-watersheds

This interim project was a transition between the first and second segment of several planned implementation segments designed to implement BMPs, and therefore, restore and protect the water quality of the Big Sioux River.

The project goal was established based on water quality information gathered during the Big Sioux River Watershed Assessments. Initial water quality data indicated high levels of fecal coliform bacteria and Total Suspended Solids (TSS) in sever segments of the watershed. The first Project Implementation Plan (PIP) was developed during August 2005 to initiate a watershed project and gear up for installing BMPs designed to reduce fecal coliform bacteria and TSS loading into the River.

During the watershed assessment 993 livestock operations were located and analyzed using the Agricultural Non-Point Source (AGNPS) pollution feedlot model. Of the 993 operation assessed, 316 operations were ranked at or above 50. Prioritization of animal feeding operations with AGNPS rankings over 50, within one mile of the Big Sioux and close proximity the city of Sioux Falls, through the use of mapping tools was used as a starting point for Implementation.

A total of 3 feasibility studies were initiated with 2 completed during this segment of the project. Bank stabilization has been installed at 18 locations along the Big Sioux between Baltic and Sioux Falls, totaling 11,275 ft. of stabilization. Thirty-nine water quality samples were collected and analyzed at 10 locations throughout the watershed. Five informational meetings were held in the watershed to inform the public of the project's goals and what the project could do for producers to meet these goals.

TABLE OF CONTENTS

List of Tables

List of Figures

INTRODUCTION

The Central Big Sioux River Watershed Project is a 10-year Total Maximum Daily Load, (TMDL) implementation strategy that is to be completed in multiple segments. The project goal is to restore and/or maintain the water quality of the Big Sioux River and its tributaries to meet the designated beneficial uses.

The Central Big Sioux River Watershed Assessment identified various segments of the Big Sioux River and certain tributaries between Watertown and Brandon as failing to meet designated uses due to impairments from total suspended solids (TSS), dissolved oxygen (DO) and/or fecal coliform bacteria (FCB). Twenty-five separate TMDLs were developed for these segments (See Table 1). Activities to improve and/or maintain current sediment and bacterial loadings targeted sub-watersheds within the project area. East Dakota Water Development District (EDWDD) has continued with water quality sampling through this project segment in efforts to collect several years of data that will be used in future modeling and decision making. An information and education campaign was conducted to keep the public informed of project activities and to provide information on BMPs and water quality issues.

Table 1: Beneficial Use Impairments Identified for the Central Big Sioux River Watershed.

Impaired Water Body	Impaired Beneficial Use	Cause
Big Sioux River		
Brookings to Brookings/Moody Co. Line	WWFLP	TSS
S2-104N-49W to I-90	IR, WWFLP	FCB & EC, TSS
I-90 to Diversion return	IR, LCR, WWFLP	FCB & EC, TSS
Diversion return to SF WWTF	IR, LCR, WWFLP	FCB & EC, TSS
SF WWTF to above Brandon	IR, WWFLP	FCB & EC, TSS
Above Brandon to Nine Mile Creek	IR, WWFLP	FCB & EC, TSS
Beaver Creek	LCR	FCB
Flandreau Creek	LCR	FCB
Jack Moore Creek	LCR	FCB
North Deer Creek	LCR	DO
Pipestone Creek	IR, LCR	FCB & EC
Six Mile Creek	LCR	FCB
Split Rock Creek	IR, LCR	FCB
Spring Creek	LCR	FCB

According to the 2010 Integrated Report, no lakes within the project area are considered to be impaired.

LCR - limited contact recreation standard = 2,000 colonies per 100 milliliters of water;
EC - E. coli bacteria;
FCB - fecal coliform bacteria
WWFLP - warm water 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.

The Central Big Sioux River Watershed Assessment Project began in April of 1999 and lasted through December of 2003 when data collection, analysis and compilation into a final report was completed. The title of the report was: “Phase 1, Watershed Assessment Final Report and TMDL” for the Central Big Sioux River in Brookings, Lake, Moody and Minnehaha Counties of

South Dakota, dated March, 2004. The assessments were conducted as a result of several segments being placed on the 1998 303(d) list for fecal coliform bacteria (FCB), and total suspended solids (TSS) problems. An EPA section 319 grant provided the majority of the funding for this project. The South Dakota Department of Environment and Natural Resources (SD DENR) and EDWDD provided matching funds for the project.

The North-Central Big Sioux River watershed assessment project began in April of 2001 and continued through December of 2005 when data analysis was completed and published in a final report. The title of the report is: "Phase 1, Watershed Assessment Final Report and TMDLs" for the North-Central Big Sioux River in Brookings, Hamlin, Deuel and Codington Counties of South Dakota, dated December, 2005. The assessment was conducted as a result of this area of the Big Sioux River watershed being placed on the 1998 303(d) list for total suspended solids (TSS) problems.

The long term goal for the assessment projects was to locate and document sources of non-point source pollution in the North-Central Big Sioux River watershed and Central Big Sioux River watershed and provide feasible restoration alternatives to improve water quality. Water quality monitoring and watershed modeling resulted in the identification of several sources of impairments. These sources were to be addressed through implementation of BMPs including construction of several waste management systems at animal feeding operations.

PROJECT LOCATION: Latitude North 44° 00' 00" Longitude West 096° 45' 00"
HYDROLOGIC CODE: 10170202 -North Central Big Sioux River
10170203 –Central Big Sioux River North and West of Brandon

The south boundary was located in Minnehaha County along county road 38 southeast of Sioux Falls, SD. The North boundary was located in Codington County at the outlet for Lake Kampeska. The project boundaries are within a seven county area of eastern South Dakota shown in Figure 1. Watertown is located to the north with Brandon as the endpoint. This did not include the following areas that have been included in other watershed projects: Lake Pelican, Lake Kampeska, Clear Lake and Lake Poinsett and the Big Sioux River, including its tributaries, to the confluence with Peg Munky Run.

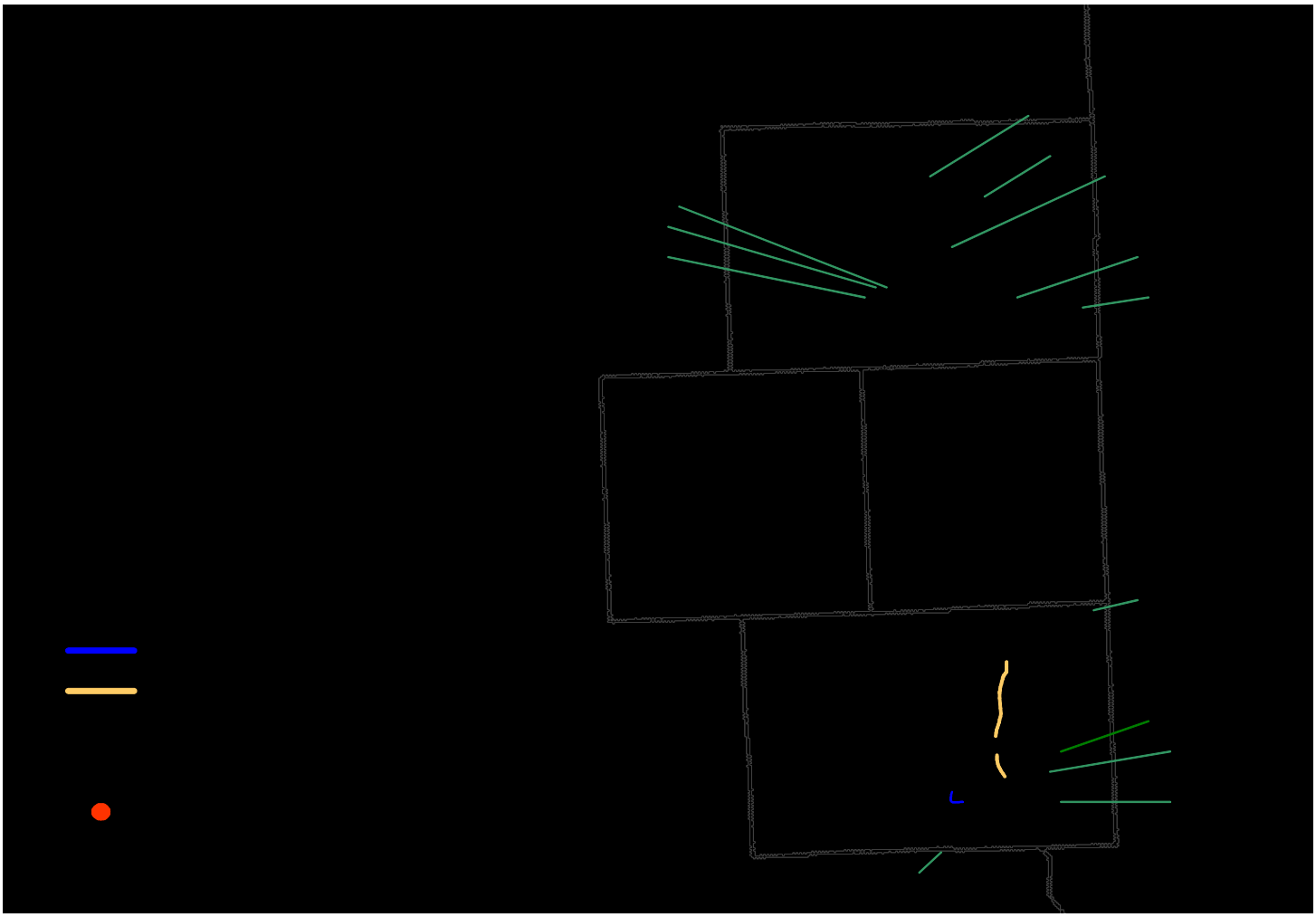

Figure 1: Central Big Sioux River Watershed Project area boundaries.

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 BSR 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 BSR 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.

The watershed project was confined within the counties of Brookings, Codington, Deuel, Hamlin, Lake, Minnehaha and Moody. Total population in the project area is roughly 280,000.

The land use within that area averaged 73.9 % of cropland with the other 26.1% classed as non-cropland. Thirteen point one percent (13.1%) of the cropland not harvested was used for pasture, conservation programs or for other reasons. The non-cropland acres include woodlands, all non-cropland pastures and rangelands, farmsteads, buildings, livestock facilities, ponds, roads, wasteland etc. Corn was the number one crop averaging 31.5% of the cropland planted. Codington County had the lowest percentage of corn with 20% and Moody County was highest with 46.5%. Table 2 provides the crop production figures in 2007 for the major crops.

Table 2: 2007 Cropland Productions by County.

COUNTY	CORN %	WHEAT %	SOYBEANS %	FORAGE %
BROOKINGS	31.6	3.1	22.1	7.1
DEUEL	21.6	5.0	14.3	8.2
HAMLIN	31.8	6.9	26.2	4.9
MINNEHAHA	38.2	0	27.3	7.0
MOODY	46.5	04	21.1	5.4
AVERAGE	**31.5**	**4.3**	**21.5**	**7.0**

Cattle were the primary animal raised within the watershed when comparing animal units (AU's) but second by actual numbers. Pigs and hogs were the highest by actual animal numbers. The breakdown by animal numbers can be found in Table 3.

Table 3: 2007 Livestock Production Numbers by County.

COUNTY	CATTLE FOR INVENTORY	CATTLE for SALE	PIGS & HOGS	SHEEP
BROOKINGS	73,314	63,292	102,875	7,565
DEUEL	50,353	39,012	R*	3,938
HAMLIN	41,650	29,003	61,923	1,203
MINNEHAHA	74,307	52,108	290,027	5,583
MOODY	42,391	39,354	117,517	2,874
AVERAGE	**56,713**	**43,625**	**124,209**	**6,070**

*R indicated that data was not released to the public.

PROJECT GOALS, OBJECTIVES, TASKS AND ACTIVITIES

Objective 1: Reduce bacteria (fecal, Ecoli) 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: Livestock Nutrient Management. Assist livestock producers to complete 3 feasibility studies and one design of Animal Waste Management Systems (AWMS) at critical locations within the project area to reduce bacterial and sediment loading.

Products: Engineering design and plan for one, AWMS prepared by third-party engineering firms/technical service providers or United States Department of Agriculture, Natural Resource Conservation Service engineers (USDA-NRCS) and three feasibility studies for existing high priority feedlots or feeding operations.

Milestones:	**Planned**	**Completed**
Feasibility Studies	3	2
Engineering Design	1	0

Accomplishment: Three feasibility reports were started with the interim project with 2 reports being completed. The third report will be completed in the next segment of the project. One site was not feasible for AWMS construction, and would require relocation. This producer has been considering a new location but has not moved forward at this time.

The other producer with a completed feasibility report is planning to continue with design for a Vegetative Treatment System (VTS) and a mono-slope barn in the next segment. Figures 2 and 3 are pictures of the current operation with runoff leaving the feedlot.

Figure 2: Open Feedlot.

Figure 3: Runoff from open lot.

Task 2: 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: 30 acres of riparian area management (RAM) and 25,000 linear feet of river bank stabilization. BMPs were implemented on critical riparian areas that have been, or have the potential to be significant sources of bacteria (fecal and Ecoli) contamination and sediment loadings due to the degradation of riparian areas. Emphasis was put on pastures that abut or transect the Big Sioux River.

Milestones:	**Planned**	**Completed**
Riparian Area Management (RAM)	30 ac.	0 ac.
Bank Stabilization	25,000 LF	11,275 LF

Accomplishment: Two producers were contacted and plans started for CCRP buffers, RAM and easements along the Big Sioux main stem. The process has been continued in segment two of this project. A map of these areas can be found in Figure 4.

The Bank stabilization along the Big Sioux began in the first Segment of this project and was continued in this interim project. There was 11,275 linear feet completed at 18 locations between Baltic and Sioux Falls. All of these sites had vertical banks that had shown lateral recession of 6-16 feet in one year. Phase 3 and 4 site locations can be sine in Figure 5 and 6. Lengths and type of stabilization can be seen here in the table to right.

One additional site was added to Phase 3 due to a request from the City of Baltic near their waste treatment lagoons (Figure 7). The river bank and wooded area between the lagoons had heavy erosion putting the lagoons at risk of failure over time.

Site #	Length (ft)	
	Rip Rap	Spurs
18	1050	
104		525
105		600
12	725	300
14	575	
7	550	350
5	550	
Baltic Lagoon	550	
401	900	
403		750
404		625
405	225	
406	725	
408		475
409	475	
410		1000
411	X	
413	450	
414	925	
Total:	**6650**	**4625**
Combined Total:	**11275**	

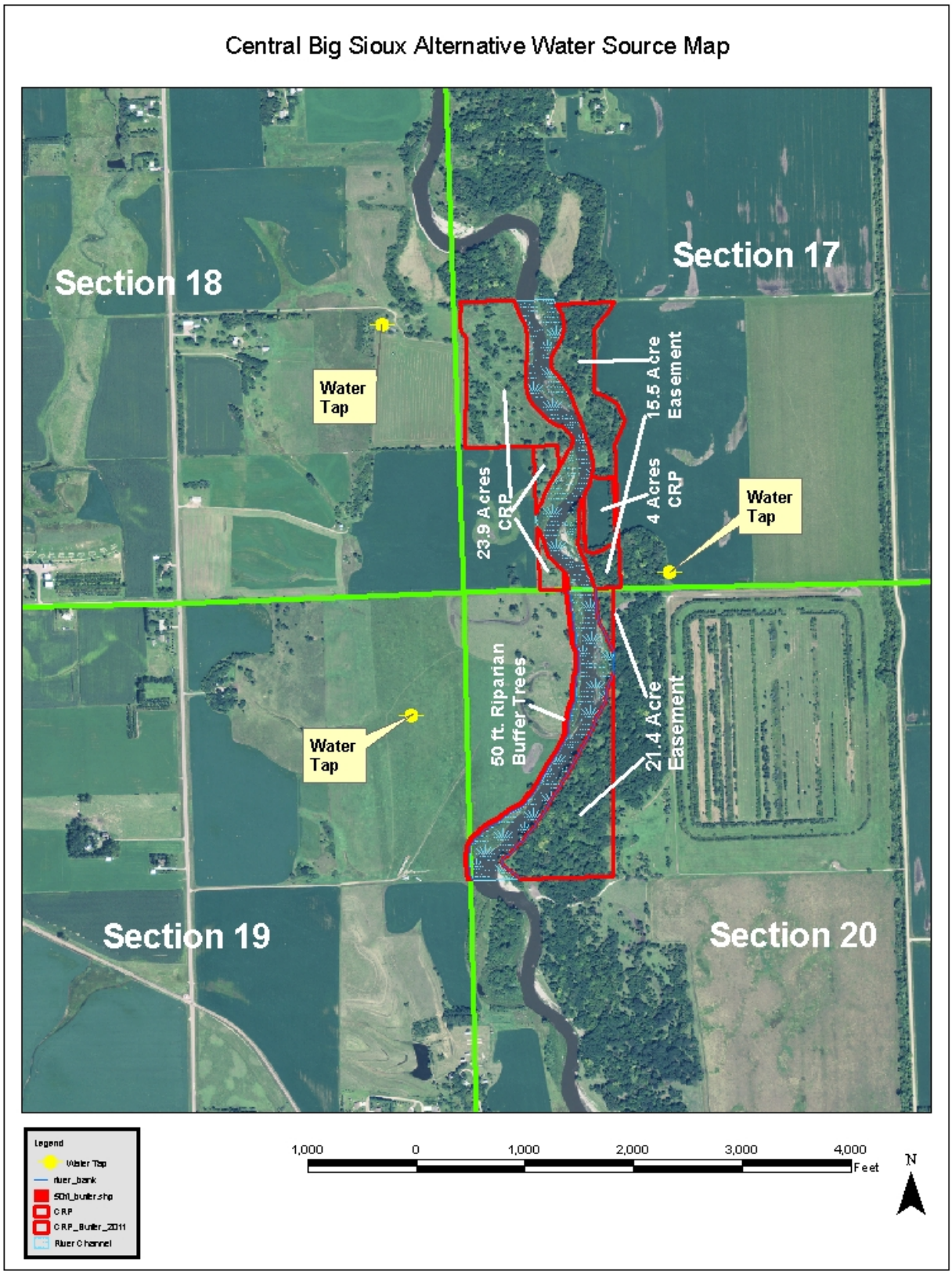

Figure 4: CRP/Easement/RAM Areas.

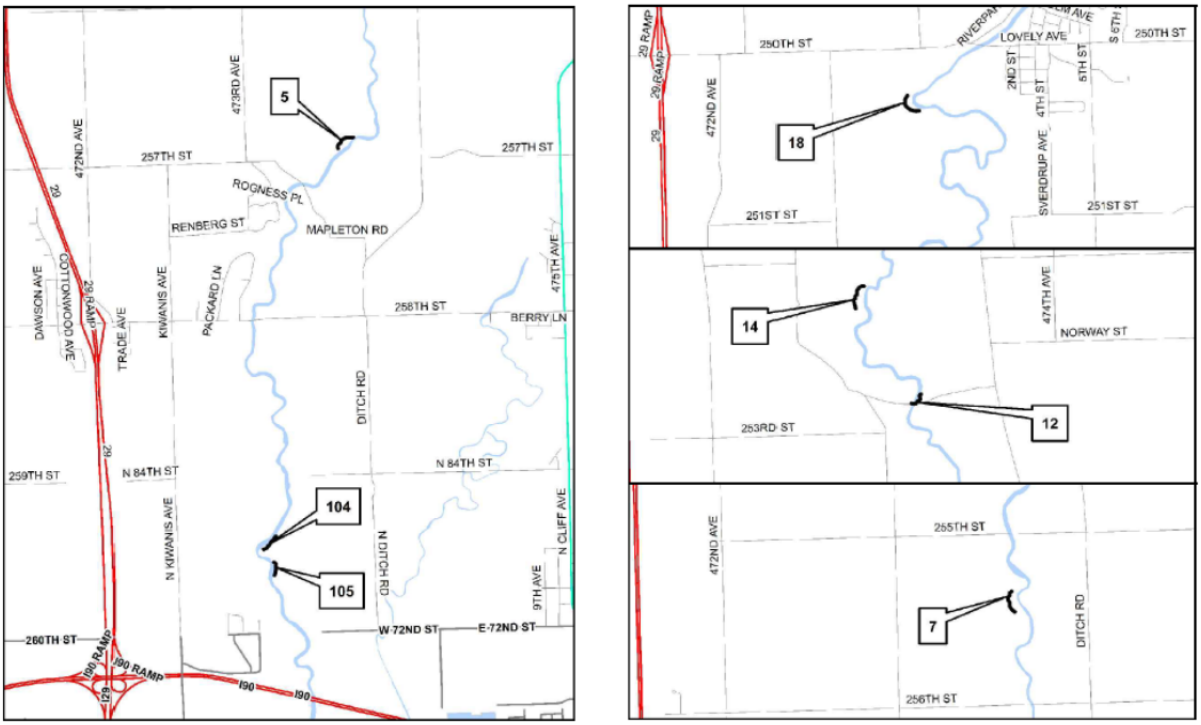

Figure 5: Phase 3 Site Locations.

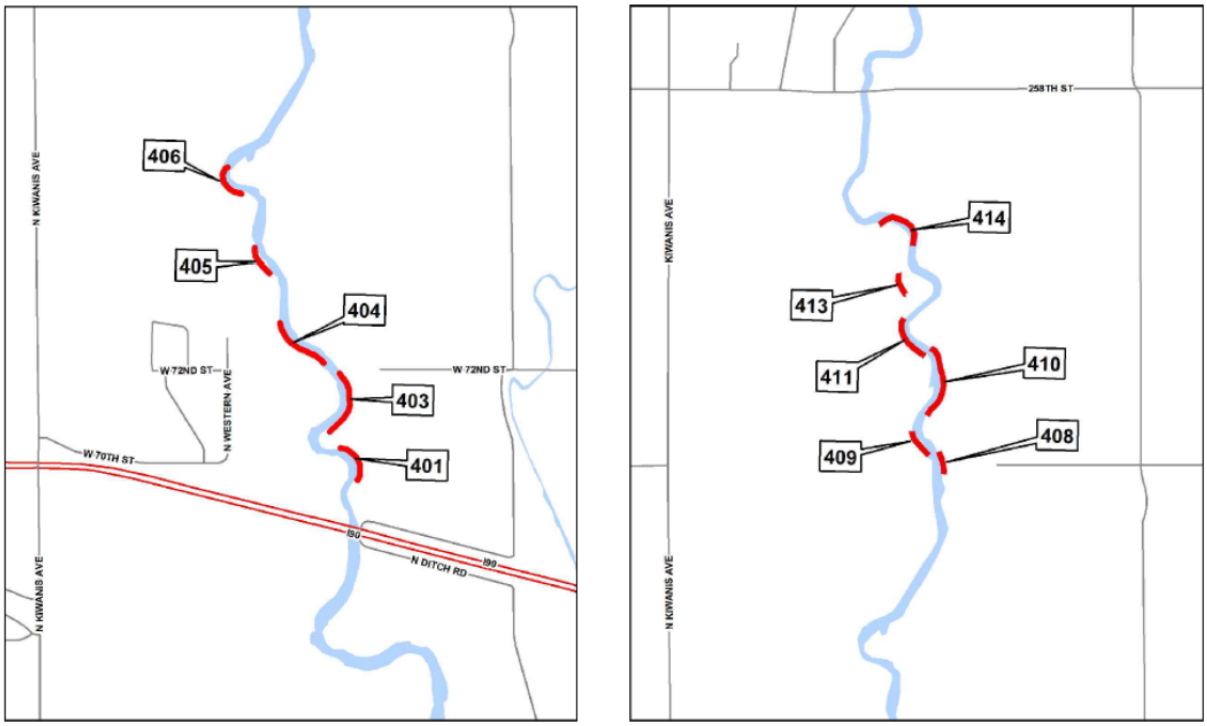

Figure 6: Phase 4 Site Locations.

Two sites in Phase 4 were not completed in the winter of early 2011 (sites 411 & 413). These sites were not completed since the ground was starting to warm up and the sites were not accessible when the contractor was to start construction. Site 413 was completed in the fall of 2011, and site 411 was planned for completion in Segment 2 of this project.

Figure 7: Baltic Lagoon Site before Construction.

Similar to Phase 1 and 2, two typical designs were used: spurs (Figure 8) and conventional Rip Rap (Figure 9). The top of the rock in either of these cases was only to reach the 1.5 year flow. Trees were planted on the exposed part of the bank between the rocks and top of the bank. This was to give the site extra protection years down the line. The land owner was also required to leave at least a 15ft buffer for cropland, but if the area was part of a pasture it was fenced off as well.

Figure 8: Site 104 Spurs.

Figure 9: Site 14 Rip Rap.

Some sites had shown failures after the water receded in late 2011 (Figure 10). Water levels stayed 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. Since waters levels were high for so long most of the trees couldn't be planted. These trees have been planned for Segment two of this project.

Phase 1 and 2 from the previous Segment handled the extra water without any major failures. These sites had higher top rock elevations and adequate time for vegetation to establish.

Figure 10. Failure at Site 406.

Task 3: Alternative Water Quality Treatments. Provide riparian easements to protect priority areas of the Big Sioux River and its tributaries.

Implemented easements were to provide protection for priority agricultural land. Emphasis was on land that discharges directly into the Big Sioux River or tributary streams.

Milestones:	**Planned**	**Completed**
Easement	1	0

Two easements were started during this project (see Figure 4), and are to be completed in segment two. The northern easement was planned for 15.5 acres and the southern for 21.4 acres of grazed riparian wood lands protecting approximately 6,000 linear feet of the Big Sioux River.

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 4: Public outreach. Conduct informational meetings and provide mailings and new releases to the public for information on the project.

Milestones:	**Planned**	**Completed**
Informational Meetings	4	4
News Releases	2	1

Accomplishment: An advertisement was run in the local newspapers for informational meeting held at various locations throughout the watershed. The public was informed of the project's goals and opportunities for participation at these meetings.

Objective 3: Master Plan development for the Central big Sioux Watershed.

Task 5: Develop a Water Quality Master Plan 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.
- Product 4: Twenty-five (25) acres of filter strips and 27,226 linear feet of grassed waterways on cropland.

Milestones:	**Planned**	**Completed**
Hire Consultant	1	1
Draft Plan Developed	1	0
Plan Published	1	0
Tour Completed	1	0

Accomplishment: RESEC has been hired as the consultant for completion of the master plan. Since the project's end date has been moved forward, the goals set for this task have not been completed in this segment, but are planned for completion in segment two.

Objective 4: Reporting

Task 6 & 7: GRTS and Final Report. Prepare and submit semi-annual and annual reports to fulfill GRTS reporting requirements and a final project report summarizing the results of the project and the impact of the BMPs on the water quality within the project area.

All required reports have been completed.

Objective 5: Conduct water quality monitoring to assess project impacts on impaired water bodies

Task 8: Water quality sampling to monitor project impacts. Continue to monitor water quality at the 10 river and tributary locations.

Milestones:	**Planned**	**Completed**
Water Samples/Testing by EDWDD	36	39

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

Site	Local
R20	Big Sioux River (BSR) @ Bruce
R1	BSR @ Brookings (8th Street South)
R4	BSR @ below Brookings USGS gage
R5	BSR @ Flandreau
R6	BSR @ Egan
R7	BSR @ Trent
R8	BSR @ below Dell Rapids
R9	BSR @ I-90
T23	Skunk Creek @ Marion Road
R10	BSR @ Western Avenue (SF)
R11	BSR @ North Cliff (SF)
R12	BSR @ Brandon
R13	BSR @ SD Highway 38 (Rowena)

Task 9: Develop a comprehensive monitoring plan.

Milestones:	**Planned**	**Completed**
Comprehensive Monitoring Plan	1	1
Baseline Monitoring	1	0
Monitoring Report	1	0

Accomplishment: RESPEC delivered a comprehensive monitoring plan to monitor several additional sites in the watershed. A meeting was held with the City of Sioux Falls and SD DENR to discuss funding for the plan. It was determined that Clean Water State Revolving Nonpoint Source (CWSRF NPS) funds were not eligible for this task, thus this task was terminated since no other funding was available.

Summary of Project Goals and Objectives

Table 4: Planned Versus Completed Project Milestones.

Objectives/Tasks/Products	Milestones	
	Planned	Completed
Objective 1. BMP Installation		
Task 1: Livestock Nutrient Management		
Engineering Feasibilities	3	2
Task 2: Riparian Area Protection		
RAM Plans completed (acres)	30	0
Bank Stabilization Installed (linear feet)	25,000	11,275
Task 3: Alternative Water Quality Treatments		
Riparian Easement	1	0
Objective 2. Information & Education /Public Participation		
Task 4. Public Outreach		
Informational Meetings	4	4
News Releases	2	1
Objective 3: Master Plan Development		
Task 5. Develop Master Plan		
Consultant Hired	1	1
Draft Plan Developed	1	0
Plan Published	1	0
Tour completed	1	0
Objective 4: Reporting		
Task 6&7: GRTS & Final Reports		
Semi-annual Reports	2	0
Annual Reports	1	1
Final Report	1	1
Objective 5: Monitoring and Evaluation		
Task 8: Water Quality Monitoring		
Product : Water Samples/Testing by EDWDD*	36	39
Task 9: Comprehensive monitoring plan for the master plan		
Comprehensive plan	1	1
Baseline monitoring	1	0
Monitoring report	1	0

MONITORING RESULTS

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

STEPL was used to evaluate the reduction of TSS and other nutrients from implementation of bank stabilization. These load reductions can be found in Table 5. Calculations were based on 11,275 linear feet of bank stabilized with an average bank height of 8 feet and a lateral recession of 5 foot per year. Locations of bank stabilization sites can be seen in Figures 5 and 6 of this report.

Table 5: Central Big Sioux Implementation (Interim) Load Reductions by River Segment.

Central Big Sioux River Segment	N (Pounds)	P (Pounds)	Sediment (Tons)
Big Sioux 8-Near Del Rapids to Sioux Falls	27,601	10,627	20,295

COORDINATION EFFORTS

The Moody Conservation District was the lead sponsor of the Central Big Sioux River Watershed Interim Project. The district manager and board of directors provided input and direction for the project through monthly meetings and serving on the steering committee and stakeholder group. Federal, state, local agencies and organizations contributed funds, technical services, cash and in kind match to accomplish goals of the project (Table 6). The agencies and their roles are summarized below.

Conservation Districts

The Moody Conservation District agreed to be the lead project sponsor and will enter into a joint agreement with the other Conservation Districts involved with the project. All counties that support the project will appoint members to serve on the steering committee and allow the project coordinator access to landowner information through their offices. The Moody Conservation District set aside time during each board meeting to approve project implementation activities and funds being spent. The office manager assisted the project coordinator with cost-share reimbursement, file maintenance and other financial transactions.

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 rented from the NRCS and software licenses were paid for through the project. 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), and Conservation Reserve Program (CRP) administered through the Farm Service Agency (FSA).

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.

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.

City of Sioux Falls

The City of Sioux Falls has been working to finalize a joint powers agreement with Moody Conservation District. They appoint members to serve on the steering committee and stakeholder group and have held several meetings to discuss the project and its goals. The city has provided technical and financial assistance through SRF NPS funds for bank stabilization.

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.

ASPECTS OF THE PROJECT THAT DID NOT WORK WELL

Several bank stabilization sites failed due to prolonged high waters from spring into summer 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.

PROJECT BUDGET

Table 6: Central Big Sioux River Implementation Project Original Budget.

Central Big Sioux River Watershed Implementation Interim Project	Project Expenses		Project Funding				
	9 to 21 Months	*Total*	319-EPA Grant	Conservation Districts	Land Owners	City of Sioux Falls	East Dakota WDD
Project Personnel and Administration							
Project Coordinator	$ 21,875	***$ 21,875***	$ 21,875				
Lodging/Meals/Expenses	$ 260	***$ 260***	$ 260				
Travel	$ 4,425	***$ 4,425***	$ 4,425				
Computer Support	$ 2,500	***$ 2,500***	$ 2,500				
Office Supplies/Postage/Telephone	$ 350	***$ 350***	$ 350				
Office Space	$ 1,125	***$ 1,125***	$ 1,125				
Contract Management (Moody CD)	$ 650	***$ 650***	$ 650				
Contract Management (SDACD)	$ 3,500	***$ 3,500***	$ 3,500				
Project Management (Sponsor & Advisory Board)	$ 1,000	***$ 1,000***		$ 1,000			
Clerical Assistance - (CDs 80 hrs @ $30))	$ 2,400	***$ 2,400***		$ 2,400			
Technical Assistance (CDs 150 hrs @ $35)	$ 5,250	***$ 5,250***		$ 5,250			
Sub-Total	$ 43,335	***$ 43,335***	$ 34,685	$ 8,650	$ 0	$ 0	$ 0
Objective 1 - Best Management Practices							
Task 1. Livestock Nutrient Management							
Ag. Waste Systems & Nutrient Mgt. Plans							
Feasibility study of 3 Animal Waste Facilities @$1,200 each	$ 3,600	***$ 3,600***	$ 3,600				
Design of 1 Animal Waste Facilities @$16,000 per	$ 16,000	***$ 16,000***	$ 12,000		$ 4,000		
Sub-Total	$ 19,600	***$ 19,600***	$ 15,600		$ 4,000		
Task 2. Riparian Area Protection							
Bank Stabilization	$ 1,955,310	***$ 1,955,310***	$ 0			$ 1,955,310	
Riparian Area Management Program, 30 acres @ $800/acre	$ 24,000	***$ 24,000***	$ 18,000		$ 6,000		
Sub-Total	$ 1,979,310	**$ 1,979,310**	$ 18,000		$ 6,000	$ 1,955,310	
Task 3. Alternative Water Quality Treatments							
Riparian easements	$ 26,000	***$ 26,000***	$ 13,000				$ 13,000
Sub-Total	$ 26,000	**$ 26,000**	$ 13,000				$ 13,000
Objective 2 - Information & Education/Public Participation							
Task 4. Public Outreach							
News releases, Informational meetings, mailings	$ 2,500	***$ 2,500***	$ 2,500				
Sub-Total	*$ 2,500*	***$ 2,500***	*$ 2,500*				
Objective 3 - Master Plan Development							
Task 5. Develop Master Plan for Watershed Restoration							
Consultant costs	$ 300,000	***$ 300,000***	$ 50,000			$ 250,000	
Sub-Total	$ 300,000	***$ 300,000***	$ 50,000			$ 250,000	
Objective 4 - Reporting							
Task 6. GRTS							
Task 7. Final Report							
Sub-Total							
Monitoring and Evaluation (Section 5.0)							
Task 8. River Water Quality Monitoring - 30 @$35 each (10 sites*3 mo*$35) by EDWDD	$ 1,050	***$ 1,050***	$ 0				$ 1,050
QA/QC - 6 @ $35 each by EDWDD	$ 210	***$ 210***	$ 0				$ 210
Task 9. Develop comprehensive monitoring plan for the CBSRW Master Plan	$ 193,050	***$ 193,050***	$ 0			$ 193,050	$ 0
Sub-Total	$ 194,310	***$ 194,310***	$ 0			$ 193,050	$ 1,260
Totals	$ 2,565,055	***$ 2,565,055***	$ 133,785	$ 8,650	$ 10,000	$ 2,398,360	$ 14,260

Table 7: Central Big Sioux River Interim Project Actual Budget.

Central Big Sioux River Watershed Implementation Interim Project	Project Funding					
	319-EPA	Conservation	Land	City of	East Dakota	Total
Project Personnel and Administration	Grant	Districts	Owners	Sioux Falls	WDD	
Project Coordinator	$10,732.60					**$10,732.60**
Lodging/Meals/Travel	$2,146.19					**$2,146.19**
Computer Support	$0.00					**$0.00**
Office Supplies/Postage/Telephone	$60.00					**$60.00**
Office Space	$0.00					**$0.00**
Contract Management (Moody CD)	$18.20					**$18.20**
Contract Management (SDACD)	$0.00					**$0.00**
Project Management (Sponsor & Advisory Board)		$200.00				**$200.00**
Clerical Assistance		$2,591.60				**$2,591.60**
Technical Assistance		$0.00				**$0.00**
Sub-Total	$12,956.99	$2,791.60	$0.00	$0.00	$0.00	**$15,748.59**
Objective 1 - Best Management Practices						
Task 1. Livestock Nutrient Management						
Ag. Waste Systems & Nutrient Mgt. Plans						
Feasibility studies	$3,371.88					**$3,371.88**
Design of Animal Waste Facilities	$0.00		$0.00			**$0.00**
Sub-Total	$3,371.88		$0.00			**$3,371.88**
Task 2. Riparian Area Protection						
Bank Stabilization	$0.00			$832,435.94		**$832,435.94**
Riparian Area Management Program	$0.00		$0.00			**$0.00**
Sub-Total	$0.00		$0.00	$832,435.94		**$832,435.94**
Task 3. Alternative Water Quality Treatments						
Riparian easements	$0.00					**$0.00**
Sub-Total	$0.00					**$0.00**
Objective 2 - Information & Education/Public Participation						
Task 4. Public Outreach						
News releases, Informational meetings, mailings	$1,271.13	$188.88				**$1,460.01**
Sub-Total	*$1,271.13*					**$1,271.13**
Objective 3 - Master Plan Development						
Task 5. Develop Master Plan for Watershed Restoration						
Consultant costs	$0.00			$0.00		**$0.00**
Sub-Total	$0.00			$0.00		**$0.00**
Objective 4 - Reporting						
Task 6. GRTS						**$0.00**
Task 7. Final Report						**$0.00**
Sub-Total						
Monitoring and Evaluation (Section 5.0)						
Task 8. River Water Quality Monitoring	$0.00					**$0.00**
QA/QC	$0.00					**$0.00**
Task 9. Develop comprehensive monitoring plan (CBSRW Master Plan)	$0.00			$0.00		**$0.00**
Sub-Total	$0.00			$0.00		**$0.00**
Totals	**$17,600.00**	**$2,791.60**	**$0.00**	**$832,435.94**		**$1,460.01**

FUTURE ACTIVITY RECOMMENDATIONS

Future segments of the Central Big Sioux River Implementation Project should continue to work closely with the project sponsor and 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. Work should be continued with the Agricultural Research Service to determine the practicality of log jam spur use in the Big Sioux Watershed, and costs that would be associated with them.

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.