Lake Poinsett Watershed Project

Segment Two Final Report

EPA Section 319 Nonpoint Source Pollution Control Program

Sponsored by Hamlin County Conservation District

Hayti, South Dakota

July 2014 Report Prepared by

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Project Coordinator

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

Grant Numbers: C9998185-07, C9998185-11

Acknowledgments

The Lake Poinsett Watershed Project wishes to thank each of the partners of this Segment 2, which have supported the distribution of information and contributed to the implementation of best management practices in the Lake Poinsett watershed.

Local Partners

All the individual landowners that voluntarily implemented practices
Lake Poinsett Water Project District
Lake Poinsett Sanitary District
Lake Poinsett Development Association
Hamlin County Conservation District
Kingsbury County Conservation District
Brookings County Conservation District
Codington County Conservation District
Hamlin County Livestock Improvement Association
KWAT radio (Watertown)
East Dakota Water Development District

Statewide Partners

South Dakota Grassland Coalition
South Dakota Association of Conservation Districts
South Dakota Lakes and Streams Association
South Dakota Society of Range Management
South Dakota Game, Fish and Parks
South Dakota Department of Agriculture
South Dakota State University Range Science Department
South Dakota Board of Water and Natural Resources
South Dakota Non-point Pollution Task Force
South Dakota Department of Environment and Natural Resources

National Partners

Ducks Unlimited
United States Fish and Wildlife Service
United States Dept of Agriculture- Farm Service Agency
United States Dept of Agriculture- Natural Resource and Conservation Service
United States Environmental Protection Agency

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Executive Summary

PROJECT TITLE**: Lake Poinsett Watershed Project -Segment 2 Continuation**

GRANT NUMBERS: C9998185-07, C9998185-11

SEGMENT TWO START DATE **: June 5,2007** PROJECT COMPLETION DATE: **7/31/2014**

FUNDING:

EPA 319 Grants	$ 767,000.00
Total Expenditures of EPA 319 Funds	608,446.00
Total Eligible Local Match	$1,659,095.50
Other Federal (USDA)	$ 170,127.80
Total Project Cost	$2,437,616.00

SUMMARY OF GOALS AND IMPLEMENTATION METHODS

The goal of the project was to restore and implement practices that will maintain a long term and full realization of all designated uses of the surface waters identified. This project was the second segment of the local effort to complete BMP installation to reduce phosphorous loading by 40 percent to Lake Poinsett, originating from watershed feeding areas, stream and lake side use areas, and cropland. An amended expansion included additional portions of the Big Sioux River, which during flood conditions can cause significant nutrient and sediment loading problems to Lake Poinsett. The expansion addressed the impaired status of the Big Sioux River, as well as its potential effect on Lake Poinsett. The primary focus for the Big Sioux River portion was fecal coliform reduction to meet TMDL standards.

The following activities were completed during this segment of the restoration effort:

1. Lake shore and stream bank stabilization
2. Nutrient load reduction from livestock feeding operations
3. Soil health quality workshops
4. Establishing permanent vegetative cover
5. Wetland restoration
6. Installing wetland buffers
7. Riparian area livestock exclusions
8. Rotational grazing systems
9. Conducting Rainfall Simulator Demonstrations
10. Media and organizational networking presentations
11. Expansion of centralized sanitary waste system

Introduction

The Lake Poinsett Watershed Project-Segment 2 (**LPWP-2**) was a 2007 continuation and expanded area project to implement practices, which led to sustained beneficial use attainment of the lakes and streams in the Lake Poinsett and adjoining portion of the Big Sioux River watersheds in Hamlin, Codington and Deuel Counties of South Dakota.

1.0 Watershed Function and Quality Evaluation

1.1 Relationship of Watershed's Surface Waters

The Lake Poinsett Watershed Implementation Project has been a Total Maximum Daily Load (TMDL) implementation strategy designed to improve and/or maintain the water quality objectives of Lake Poinsett, Lake St. John, Lake Norden, and Lake Albert. Lake Poinsett is a 7,868 acre glacial lake with a 287,628 acre watershed located in Hamlin, Kingsbury, and Brookings Counties. Lakes Norden, Albert, and St. John are located in the watershed. Additional significant natural lakes in the watershed also upstream of Lake Poinsett include Marsh Lake, Dry Lake, and Thisted Lake. Lake Poinsett is the last lake in this branched chain of lakes and outlets to the Big Sioux River approximately 3 miles to the east. Dry Lake located on the north branch of the Lake Poinsett watershed is also connected to the Big Sioux River by the man-made Boswell Diversion. The diversion was originally built to route river water to Dry Lake and then Lake Poinsett before the issue of nutrient and sediment loading impairments were understood. Diversion channel control gates are now used, to impede water entrance into Dry Lake of Big Sioux River water, but are often overtopped when flood conditions occur on the adjacent reach of Big Sioux River. A set of flood gates span the channel between the Lake Poinsett Outlet and the Big Sioux River, to prevent backflow into Lake Poinsett during flood conditions on the river.

The quality of water entering Lake Poinsett was highly dependent on the filtering function of the large chain of lakes. The significant nexus of these individual waters to Lake Poinsett were considered a resource concern to be addressed within the implementation project.

The inter lake connections of the entire Lake Poinsett Watershed are depicted in Figure 1.1-1.

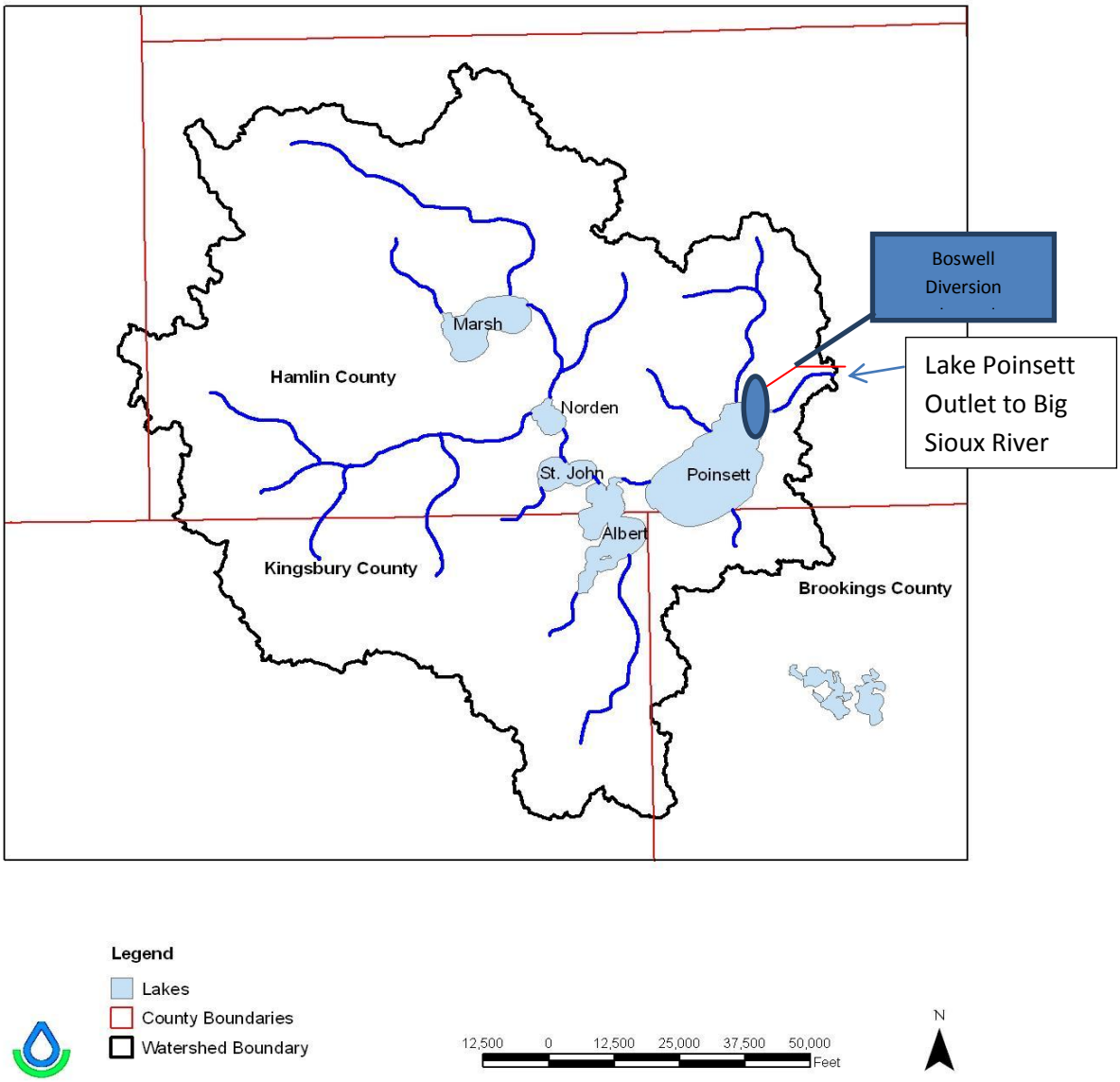

Figure 1.1-1: Lake Poinsett Watershed Boundaries and Primary Connections of Area Lakes

During high flow events on the Big Sioux River, a significant amount of water can overtop structures, fields and roads to enter Lake Poinsett. LPWP-2 was expanded in July 2011 to include the contributing waters of the Big Sioux River as well as the tributaries to the Big Sioux River of Willow Creek entering just below Watertown, South Dakota in Codington County, Stray Horse Creek entering below Castlewood, South Dakota in Hamlin County and Hidewood Creek originating near Clear Lake. The added area was designated the North Central Big Sioux Watershed project area.

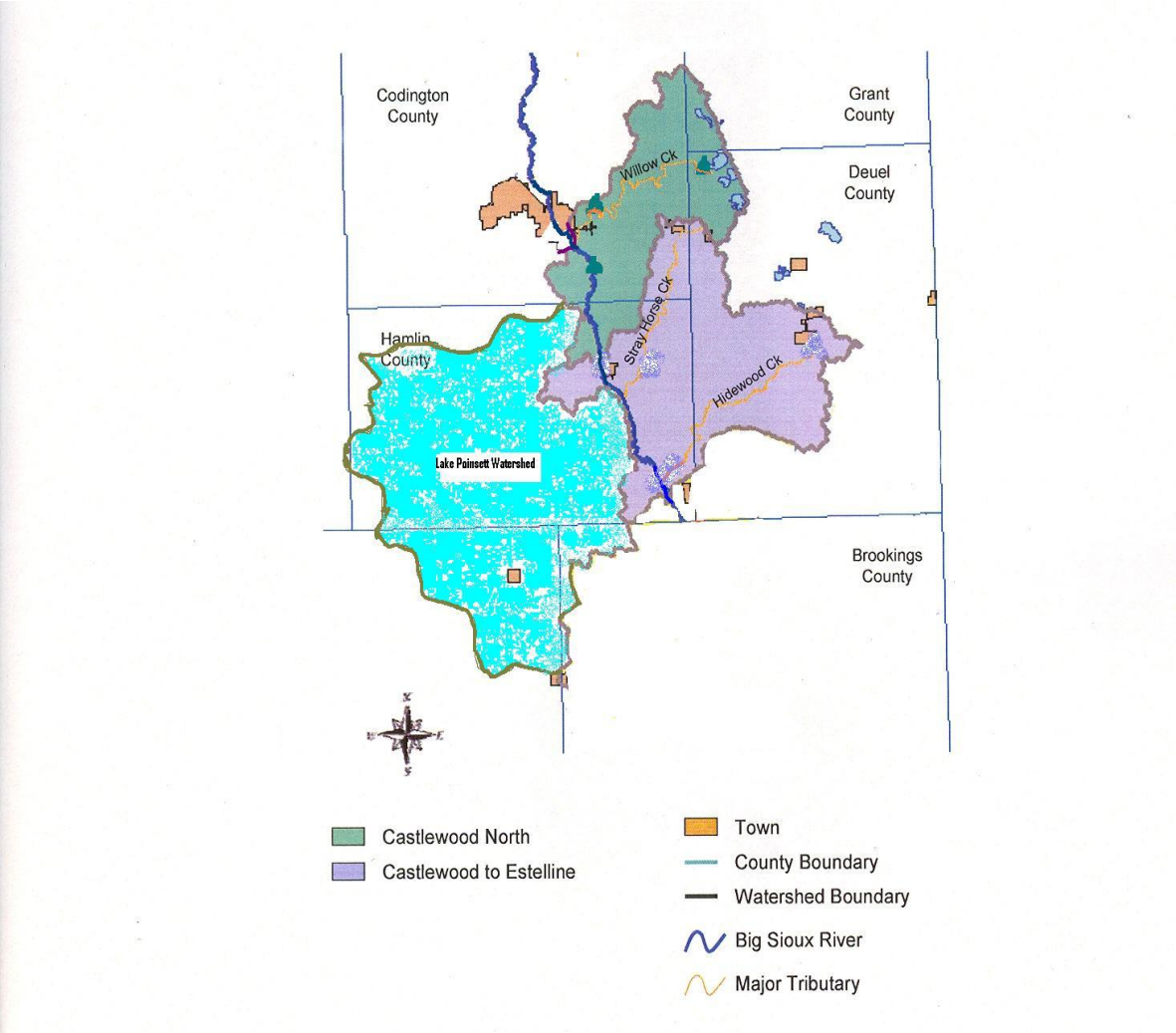

Figure 1.1-2: Combined Lake Poinsett/North Central Big Sioux Watershed 2011 Project Area

1.2 Surface Waters Descriptions

Lake Poinsett, Lake Albert, Lake Norden, and Lake St. John, all have important economic and social values to the region related to recreation, wildlife habitat, and residential living. The watershed is located in the Prairie Pothole region with numerous natural lakes and semi-permanent wetlands. Other significant natural lakes in the watershed include: Marsh Lake, Lake Mary, Dry Lake, Thisted Lake, and Badger Lake.

Table 1.2-1: Drainage and Basin Attributes for Lake Poinsett, Lake Albert, Lake Norden, and Lake St. John.

Attribute	Lake Poinsett	Lake Albert	Lake Norden	Lake St. John
Surface Acres	7,868	3,500	746	1,200
Average Depth (Ft.)	9.5	8.8	7.0	5.0
Drainage (acres)	287,628 (44,628 acres from its watershed only)	244,000 (43,000 acres w/o Marsh, Norden, St. John, included)	188,724 (89,993 acres w/o Marsh Lake Included).	201,500 (12,500 acres w/o Norden and Marsh included)
County Located	Hamlin and Brookings	Hamlin and Kingsbury	Hamlin	Hamlin
TMDL Status	Established	Needed		
Outlets to :	Big Sioux River	Lake Poinsett	Lake St. John	Lake Albert

Lake Poinsett:

Lake Poinsett is located on the east side of SD Highway 81, 20 miles south of Watertown, SD (population 21,500) and 25 miles northwest of Brookings, SD (population 23,000). The closest communities to Lake Poinsett are the rural communities of Estelline,SD, 7 miles east (population 760) and Lake Norden,SD, 7 miles west (population 470). Populations based on 2010 census.

Lake Poinsett is a 7,868 acre lake originating from glacial activity. It is one of the largest natural lakes in South Dakota and its natural outlet is three miles long to its entrance into the Big Sioux River. The lake receives most water inflows directly from the Dry Lake sub watershed to the north or from Lake Albert. The Lake Poinsett watershed is 287,626 acres, however an additional 470,000 acres of drainage was added through construction of the Boswell Diversion in 1929. This diversion was built to use Lake Poinsett and Dry Lake for floodwater storage when the Big Sioux River reached flood stage. Both the

Lake Poinsett outlet and the Boswell Diversion have control gates and are now kept closed to prevent Big Sioux River water from backing up into the lake as this water is very low quality.

Lake Poinsett is highly developed for recreation and commercial purposes with approximately 625 residences and 10 businesses located around the lake. The SD Game, Fish, and Parks maintain four developed public access areas on the Lake. Lake Poinsett State Park located on the Southeast side in Brookings County maintains 116 full utility camping pads and cabins for public use.

Lake Albert:

Lake Albert is natural lake with a surface area of 3,500 acres. It is located in Hamlin and Kingsbury Counties with its outlet to Lake Poinsett approximately 1 mile in length. Lake Albert receives overflow waters from Lake Marsh, Lake Norden. Lake Mary, and Lake St. John which outlets (over less than 1 mile) into Lake Albert from the northwest and from the Lake Badger, Thisted Lake watershed to the south. . Lake Albert receives runoff waters from 244,000 acres of the total 287,828 acre Lake Poinsett Watershed. Lake Albert located to the southwest of Lake Poinsett is closest to the rural communities of Badger (5 miles south) and Lake Norden (pop. = 425 and 7 miles northwest). Public access facilities at Lake Albert include a SD Game Fish and Parks dock, boat ramp, and restrooms.

Lake St. John:

Lake St. John is a 1,200 acre natural lake with a drainage area of 201,500 acres. Lake St. John is located below Lake Norden and Lake Marsh in the watershed and receives outflow water from these lakes. Lake St. John without Lakes Norden and Marsh has a drainage area of 12,500 acres. Public facilities at Lake St. John include a boat ramp. Lake St. John connects to Lake Albert through a 500 ft channel on the Southeast corner of lake.

Lake Norden:

Lake Norden is a 746 acre natural lake located near the City of Lake Norden. Lake Norden's drainage is 188,724 acres and it outlets into Lake St. John (2.5 miles to the southeast). Public facilities include a boat ramp and restrooms. Marsh Lake, 1,595 surface acres is located northwest of and outlets into Lake Norden. The drainage area for Marsh Lake is 98,731 acres of the 188,724 acre Lake Norden watershed.

Table 1.2-2: Attributes of North Central Big Sioux and Tributaries.

Attribute	Willow Creek	Stray Horse Creek	Hidewood Creek	Big Sioux River Willow Creek to Stray Horse Creek
Drainage (acres)	79,931	57,548	85,815	144,371
Approximate length (miles)	25.2	23.2	25.7	22.4 segment
County Located	Codington, Deuel and Grant	Codington, Deuel and Hamlin	Deuel and Hamlin	Codington and Hamlin
TMDL Status	Established	Established	Established	Established
Outlets to	Big Sioux River	Big Sioux River	Big Sioux River	Continuation

Willow Creek:

The watersheds of School Lake, Bullhead Lake, Round Lake, and Wigdale Lake, in northwestern Deuel County and part of Grant County, are also located in this region. A separate watershed assessment was completed on these four lakes in 2005. Willow Creek drains this chain of lakes and enters the Big Sioux River south of the City of Watertown. Land use in this area is predominantly agricultural. The main stem of Willow Creek is approximately 25.2 miles in length with a watershed of approximately 79,931 acres. This tributary is located within the Big Sioux River Basin (HUC10170202) in the eastern part of Codington County and northwestern Deuel County, South Dakota. The watershed of this stream lies within Grant, Deuel, and Codington Counties. Willow Creek's riparian area is used primarily for summer livestock grazing.

Map (Figure 1.2-1) shows the portion of Big Sioux River and Willow Creek watersheds above Castlewood in Project Area (126,321 acres).

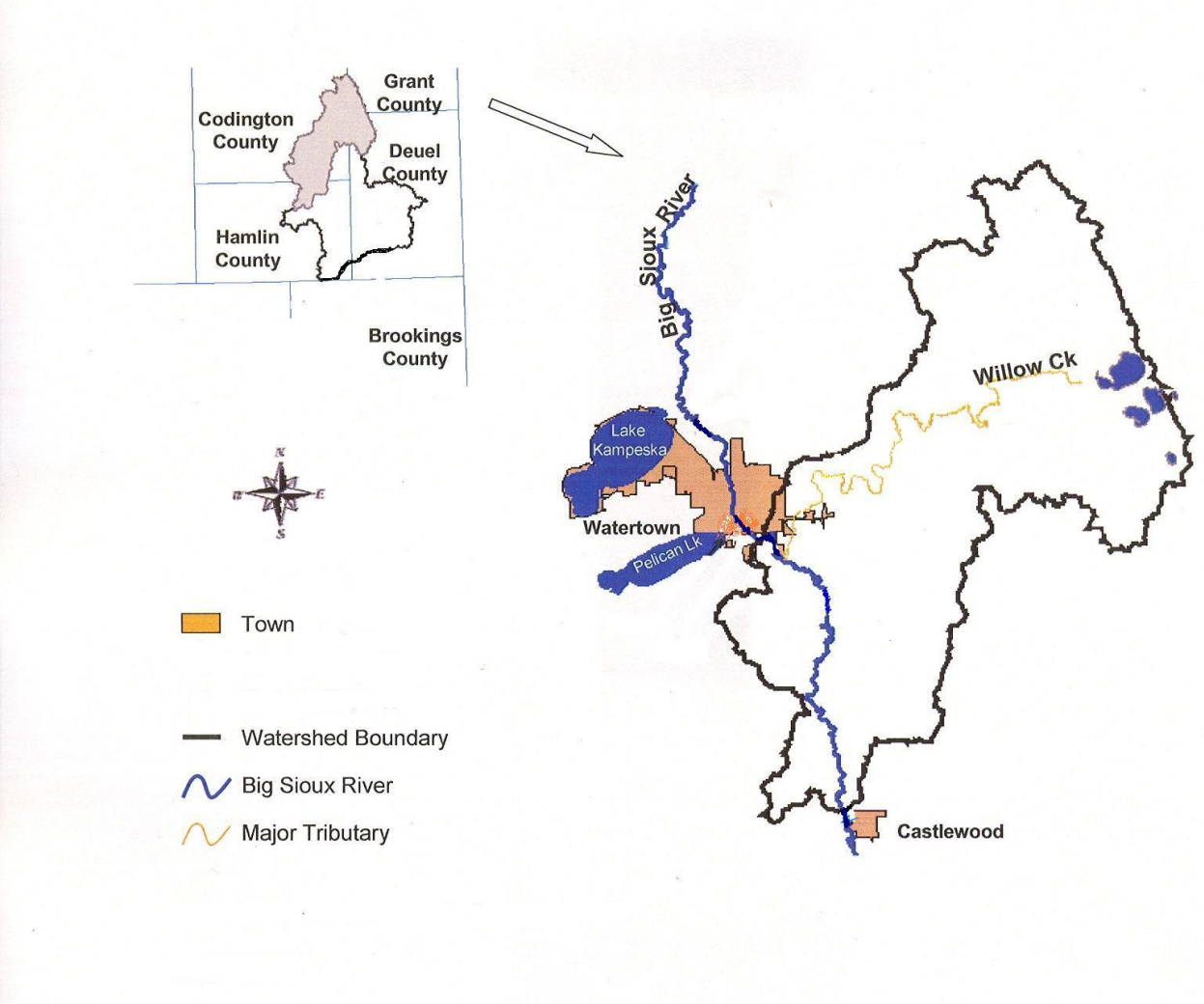

Figure 1.2-1: Willow Creek and Big Sioux River Watershed Boundaries

Stray Horse Creek:

The main stem of Stray Horse Creek, beginning south of Kranzburg, is approximately 23.2 miles long with a watershed of approximately 57,548 acres. This tributary is located within the Big Sioux River Basin (HUC 10170202) in the north-central part of Hamlin County and southeastern Codington County, South Dakota. The watershed of this stream lies within Hamlin, Deuel, and Codington Counties. Stray Horse Creek's riparian area is used primarily for summer livestock grazing.

Hidewood Creek:

Hidewood Creek is a 25.7 mile tributary to the Big Sioux River with a watershed of approximately 85,815 acres, located within the Big Sioux River Basin (HUC 10170202) in the south-eastern part of Hamlin County and southwestern Deuel County, South Dakota. The watershed of this stream lies within Hamlin and Deuel Counties. Hidewood Creek's riparian area is primarily used for summer livestock grazing.

Big Sioux River- Willow Creek to Stray Horse Creek:

The section of the Big Sioux River from Willow Creek to Stray Horse Creek is a 22.4 mile segment with a watershed of approximately 144,371 acres and is located within the Big Sioux River Basin (HUC 10170202) in the south-central part of Codington County and the north central part of Hamlin County, South Dakota. The watershed of this segment lies within Hamlin, Codington, Grant, and Deuel Counties. This sections riparian area's agricultural use is evenly divided between livestock grazing, row crop farming and conservation easements.

Map (Figure 1.2-2) Willow Creek to Estelline portion of Big Sioux River, Stray Horse Creek and Hidewood Creek Watershed areas within Project area (193,500 acres).

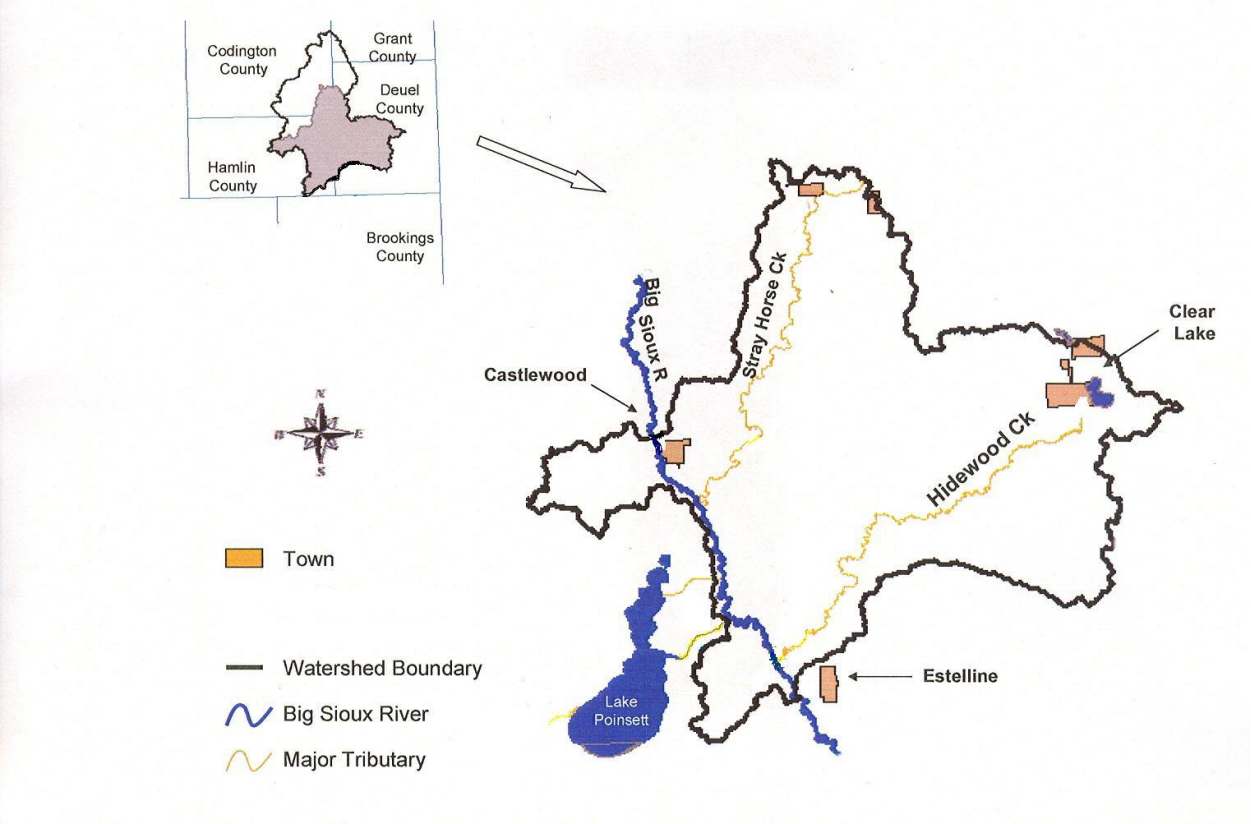

Figure 1.2-2: Stray Horse Creek, Hidewood Creek and Big Sioux River from Willow Creek to Estelline Watershed Boundaries

1.3 Watershed Information

The Lake Poinsett watershed is in the Northern Glaciated Plains, Level III, Ecoregion and the Prairie Coteau sub-ecoregion. The landscape is flat to gently rolling composed of glacial drift with a poorly defined drainage pattern. The subhumid conditions foster a transition between the tall and short grass prairie. High concentrations of temporary and seasonal wetlands create favorable conditions for duck nesting and migration. The North Central Big Sioux River watershed contrasts the Lake Poinsett watershed by having well defined drainage patterns with fewer wetland designations.

Average precipitation in the watersheds is 22-24 inches of rainfall per year, with 75 percent received during the April through September period. Snowfall averages 25-30 inches per year. Runoff occurs primarily from occasional heavy thunderstorms and from spring snow melt.

The watershed is composed of cretaceous sedimentary rock overlain by approximately 500 feet of glacial drift. Many of the soils were formed in loess that overlies the drift while others were formed in alluvium. Land use in the watershed is predominantly agricultural and land ownership is 95 percent private.

Table 1.3-1: Land use for the Lake Poinsett and North Central Big Sioux River Watersheds

	Lake Poinsett		**Big Sioux River Willow Creek to Stray Horse Creek**		**Willow Creek**		**Stray Horse Creek**		**Hidewood Creek**	
Land use	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Cropland	175500	61	100548	70	49319	62	45629	79	58318	68
Grassland	49428	17	38226	26	26511	33	10412	18	25752	30
Water			2887	2	2887	4				
Farmsteads	12700	5	2364	>2	1168	1	1044	2	1711	2
Wildlife	50000	17	347	<1	46	0	463	1	34	0

1.4 Water Quality Evaluation Timeline

A Diagnostic Feasibility Study was completed for Lake Poinsett during 1996. From 1998 through July 2007, two phases of implementation plans through **Lake Poinsett Watershed Project** -**Segment 1 (LPWP-1)** were targeted towards improving Lake Poinsett water quality. This second segment,**LPWP-2**, of the implementation strategy continued the effort and began to also use the data available from the Diagnostic Feasibility Studies for Lakes St. John, Norden, and Albert to target BMPs that would affect these upper chain lakes.

The ***2006 South Dakota Integrated Report For Surface Water Quality*** did not list Lake Poinsett on the 303(d) list but listed the lake as EPA category 4 "water impaired but has an approved TMDL". Lakes Norden, Albert, and St. John were listed on the 303(d) list as priority 1 waterbodies, and as EPA category 5 lakes "impaired requires a TMDL".

Following these designations of the 2006 report, **LPWP-2** expanded BMP work to include the upper lakes in **2007**.

The ***2010 South Dakota Integrated Report For Surface Water Quality*** listed Lake Poinsett as EPA category 1* "*All uses met-with approved TMDL for nutrients*". Lakes Albert, St. John and Norden were *delisted* from the 303(d) list and given EPA category 1 status of "*All uses met*". Lake Marsh was listed as EPA category 3 "*Insufficient data*".

Following the completion of assessments on adjoining areas to the Poinsett watershed new data was available for the ***2010 South Dakota Integrated Report For Surface Water Quality***. Willow Creek, Stray Horse Creek and Hidewood Creek were EPA category 4A*, "*Impaired with Approved TMDL for Fecal Coliform*". The Big Sioux River from Willow Creek to Stray Horse Creek was EPA category 5* "*Impaired with TMDL for Fecal Coliform and Impaired and in need of TMDL for E Coli*".

Following these designations in 2010**, LPWP-2** expanded BMP work to include these upper tributaries to the Big Sioux River and the river itself in **July 2011**.

The recent ***2014 South Dakota Integrated Report For Surface Water Quality*** listed Lake Poinsett, Lake Norden, Lake St.John and the Big Sioux River from Stray Horse Creek to Volga as EPA category 1 "*All uses met*". The Big Sioux River from Willow Creek to Stray Horse Creek, Hidewood Creek, Stray Horse Creek and Willow Creek as EPA category 4A* "*Water impaired but has an approved TMDL*". Lake Albert slipped to EPA category 5 "*Water impaired/requires a TMDL*", non-supporting for *Dissolved Oxygen*. Only Lake Albert remains currently on the 303(d) list with a Priority 2 rating. The impaired streams are not supporting of Limited Contact Recreation due to *Escherichia coli and Fecal Coliform* from livestock grazing operations exceeding the 2000 cfu/ 100ml- one sample limit- during the months of May to September.

Table 1.4-1. 2014 South Dakota Integrated Report for Surface Water Quality

	Designate Use Status			
Waters	Full Use	Non-Supporting	EPA Category	On 303(d) list & Priority
Lake Albert	5,6	1,4	5	Yes - 5
Lake Norden	1,4,5,6		1	No
Lake Poinsett	2,4,5,6		1	No
Lake St. John	1,4,5,6		1	No
Big Sioux River Willow Creek-Stray Horse Creek	2,7	5	4A*	No
Big Sioux River Stray Horse Creek-Volga	2,5,7		1	No
Hidewood Creek	1,7	5	4A*	No
Stray Horse Creek	Insufficient Data	Insufficient Data	4A*	No
Willow Creek	Insufficient Data	5	4A*	No

Designated Use Key

(1) Warmwater Marginal Fish Life
(2) Warmwater Semi-Permanent Fish Life
(3) Warmwater Permanent Fish Life
(4) Fish, Wildlife Propagation Recreation Stockwater
(5) Limited Contact Recreation
(6) Immersion Contact Recreation
(7) Irrigation

EPA Category Key

(1) All uses met
(2) Some uses met but insufficient data
(3) Insufficient data
(4) (4A*) Water impaired but has TMDL
(5) Water impaired/requires TMDL

2.0 Water Quality Problems

2.1 Lake Poinsett Watershed Lakes

Excessive algae blooms had been observed consistently over the years on Lake Poinsett, Lake Albert, Lake St. John, and Lake Norden hampering recreational uses during the high use periods of the year. These algae blooms were caused by excessive nutrients delivered from the watershed. The data collected from the 1996, Diagnostic Feasibility Study, indicated that phosphorus loading was determined to be the limiting nutrient.

Lake Poinsett outlets into the Big Sioux River and all other lakes in this project are in the Lake Poinsett watershed . The installation of BMPs in this project area benefited the water quality of individual priority lakes (Albert, Norden, St. John) as well as always benefiting the downstream water quality of Lake Poinsett.

The goal of the Lake Poinsett Watershed Project was to restore Lake Poinsett to ensure the long term full realization of all designated uses of the lake. Project objectives included; reducing phosphorus loading by 20 percent, reducing sediment loading by 20 percent, and completing an information campaign.

This project's goal and objectives were based on the water quality conditions of Lake Poinsett, with targeting of BMP implementation to the entire watershed. As the assessment process was evaluated for the other priority lakes in the watershed, BMP implementation in these watersheds were based on their individual study recommendations for their water quality improvement.

The TMDL for Lake Poinsett was established in 1996 with an end point of " 158 tons of total lake algal biomass 40% reduction in total phosphorus". The TMDL established coincides with the Diagnostic Feasibility Study recommendation to reduce phosphorus loading from the watershed by 40 percent. In comparison to other watersheds in Eastern South Dakota, the sediment and nutrient loadings to Lake Poinsett appear to be low.

Phosphorus loads from the watershed to Lake Poinsett enter through the inlet from Lake Albert or the inlet from Dry Lake. The total phosphorus load to Lake Poinsett is from the following watersheds areas and/or sources:

- 73 percent from Lake Albert
- 24 percent from Dry Lake
- 3 percent from failing septic systems

Flood water diversions through the Boswell Diversion or back-up waters through the outlet from Lake Poinsett to the Big Sioux River have not been allowed to enter the lake in recent years due to management plans by SD Game Fish and Parks and Flood Control Permit FC-5 issued by the SD Water Rights Board for use of control gates on Lake Poinsett Outlet. However, during Big Sioux River flood

events where the control gates are overtopped, the Boswell Diversion Channel becomes a conduit for river water to reach Dry lake and subsequently Lake Poinsett. Monitoring and sampling of water on the Big Sioux River by South Dakota DENR and East Dakota Water Development District consistently recorded potential phosphorus loading into Lake Poinsett from an uncontrolled diversion or backflow from the Big Sioux River would be three times the load estimated from Lake Albert were the Flood Control and Diversion Control gates not in place to protect Lake Poinsett.

The BMPs recommended for installation **to reduce nutrient** loading to Lake Poinsett:

- Animal Waste Systems
- Integrated Crop Management
- Grazing Management
- Expansion of the existing centralized sanitary sewer system on Lake Poinsett.

The BMPs recommended **to reduce sediment** loading and phosphorus loading :

- Lake Shoreline Stabilization and Management
- Riparian Demonstration Sites
- Residue Management
- Grassed waterways on Marginal Cropland.
- Filter strips and/or grassed buffers
- Small ponds or dams on tributaries
- Wetland restoration.

A public awareness program to be conducted by the project coordinator was recommended **to provide education** of water quality issues and program initiatives by implementing:

- Workshop and Meeting Presentations
- Demonstrations
- Tours
- Publications
- Media Interviews and News Releases
- Advisory Panel Partner to related water quality issues
- Annual Reports to Federal, State and Local Agencies
- Individual contacts

2.2 North Central Big Sioux River System

For the segment of Big Sioux River which passes through southern Codington and Hamlin Counties, as well as the tributaries of Willow Creek, Stray Horse Creek and Hidewood Creek, fecal coliform bacteria is the pollutant of concern. Fecal coliform bacteria impairments were encountered throughout the North-Central Big Sioux study area. The source of the bacteria is believed to be primarily domestic livestock, although human and wildlife sources might contribute a small portion of the total load encountered. Fecal coliform 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 here are carried into the receiving waters by runoff, most likely from feed lots. However, elevated levels of fecal coliform bacteria were also encountered during periods of low flow, often many weeks after a runoff event. Under these conditions, feedlots would not be expected to contribute, and the source is likely to be animals grazing in close proximity to the river and creeks.

Several water bodies, over a substantial geographic area, are impaired within the Central 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 current water quality problems may eventually result in an impairment. As the City of Sioux Falls currently extracts about 65% of its drinking water from the Big Sioux River, correcting these problems will have an impact well beyond the current recreational and aesthetic problems. BMPs to address the fecal coliform bacteria impairments are listed in Table 2.2-1.

Table 2.2-1: Best Management Practices and Reduction Rating for North Central Big Sioux River

BMP	Potential Reduction of Fecal Coliform Bacteria from Practice
Feedlot Runoff Containment	High
Manure Management	High
Grazing Management	Moderate
Alternative Livestock Watering	Moderate
Buffer/Filter Strips	Moderate
Wetland Restoration or Creation	High
Riparian Vegetation Restoration	High
Conservation Easements	High
Livestock Exclusion	High

Note: approximate range of reductions: Low = 0-25% Moderate = 25-75% High = 75-100%

3.0 Project Description:

3.1 Project Goal:

The goal of the Lake Poinsett watershed implementation project was to restore Lake Poinsett to ensure the long term full realization of all designated uses of the lake. This project was the second segment of the local effort to complete BMP installation to reduce phosphorus loading by 35 percent and sediment loading by 40% to Lake Poinsett, originating from watershed feeding areas, grasslands, shorelines, cropland and failing septic systems. The goal of the expansion into the North Central Big Sioux River and tributaries is to implement practices dealing with livestock management, which will reach a target of $\leq$ 2000 cfu/ 100 ml of fecal coliform bacteria during the months of May to September in the flowing streams. Conservation and community partners were to be solicited to provide local financial support and leverage EPA 319 dollars to maximum benefit. An ongoing public awareness campaign was to be facilitated by the coordinator to promote the practices and educate land users, homeowners, students, government officials and the media on water quality issues affecting watersheds.

3.2 Project Funding Sources

Table 3.2-1: Funding Sources for LPWP Segment 1&2 Implemented BMPs

Sources	**Segment 1** **Completed**	**Segment 2** **Used as of 7/1/2014**	**Combined** **Segments 1 & 2**
EPA 319	$ 751,949	$ 601,475	$ 1,353,424
Local / Landowner/ Homeowner	501,157	1,415,434	1,916,591
SD Consolidated Water	120,003	-----	120,003
Lake Poinsett Water Project District	109,623	235,037	344,660
South Dakota Conservation Commission	73,752	7,368	81120
USDA-NRCS EQIP		113,960	113960
USDA-FSA Conservation Reserve Program		56167	56167
Other Federal Grants	35,815		35,815
Public meeting Supporters/ advertisers	5,022		5,022
SD Game Fish & Parks	3,500	1,193	4,693
Totals	$1,625,154	$ 2,430,635	$ 4,055,789

The 1996 Diagnostic Feasibility Study identified a need to expand the Lake Poinsett Sanitary System beyond the 153 units present. By 2006, Lake Poinsett's water quality began to show improvements from BMPs implemented. The watershed project encouraged homeowners to support the Lake Poinsett Sanitary District's plan to apply for grants and loans to expand the centralized sewer system. The grant application required a $24/mo. increase in sewer rates per unit. In 2007, the first grant to begin the expansion was awarded by the South Dakota Board of Water and Natural Resources (BWNR). Subsequent requests for grants and loans were awarded with another major increase in sewer rates anticipated for the third round of expansion.

Table 3.2-2 Funding Sources for Expansion of Centralized Sanitary System

Sources	Contributions	Loans	Project expense
Consolidated Water Facilities Construction Program	$1,300,000		1,300,000
Clean Water State Revolving Fund Water Quality Grant	$ 812,000		812,000
Clean Water State Revolving Fund Program Loans			
2007		$1,094,700	1,094,700
2010 (52.1%) principle forgiveness	$1,603,000	$1,472,000	3,075,000
2014		$1,917,000	1,917,000
Contribution for 197 hook-ups:*			
Homeowners @$1500 each	$ 295,500		295,500
Lake Poinsett Water Project District @$500 ea.	$ 98,500		98,500
		Project Total to Date	**$8,592,700**
* Monthly sewer rates increased $24/month			

3.3 Project Completed Activities

The Project's accomplishments implementing practices and the additional assessments and TMDLs completed, were primary to the changing of operational priority goals. As goals were met, some practices had reduced need, and other areas were added that required different practices. More emphasis was placed on informing the public on the causes of water impairments from non-point sources. Additional changes were partnering with multiple agencies for funding of practices and leveraging the EPA 319 dollars to maximum use. Practices that were directly related to the riparian areas of lakes, streams and wetlands were primary focus toward the end of project. Practices implemented in areas without significant connection to any waterbodies accessed funds through conservation programs other than EPA 319. Those changes are reflected in a comparison of practices between Segment 1 & 2 in Table 3.3-1.

Table 3.3-1: Lake Poinsett Watershed Project Completed Results

Products	Segment 1 Completed	Segment 2 Completed	Total Completions
Nutrient Control:			
Integrated Crop Management	12,182 acres		12,182 acres
Grazing Management	3,500 acres	1,139 acres	4,639 acres
Riparian livestock exclusion		28,007 ft.	28,007 ft.
Animal Waste Control Systems	21 locations	6 locations	27 locations
Centralized Sanitary System		197 new connections	197 connections
Sediment Control:			
Shoreline Stabilization	12,000 ft.	11,177 ft.	23,177 ft.
Crop Residue Management.	3,000 ac/yr.	3,000 ac/yr.	3000 ac/ yr.
Small Dams/ Ponds	11 sites	NA	11 sites
Wetland Restoration	471 acres	996 ac	1467 acres
Nutrient & Sediment Control:			
Alternative Water Source	20 sites	27 sites	47 sites
Filter Strip/ Grass Seeding	5,331 acres	646 acres	5,977 acres
Riparian Protected Sites	7 sites	9 sites	16 sites
Riparian Protection		1457 acres	1457 acres
Information and Education:			
Public Workshops/Conferences	10	7	17
Rainfall Simulator Demonstrations		6	6
Public Tours	10	14	24
Radio / TV interviews		11	11
Public Presentations	NA	52	52
Student Education Tours		6	6
Printed Brochures	3,000	None	3000
Printed Newsletters Articles	15	8	23
e-news articles and updates		84	84

3.4 Project Load Reductions

Table 3.4-1 Load Reductions from BMPs implemented

Load Reductions from Lake Poinsett Watershed Project-Segment 2				
Practice Description	**Sediment (tons)**	**Nitrogen (lbs.)**	**Phosphorus (lbs.)**	**# of Projects**
Bank Stabilization	13,689	0	573	86
Grassed Waterway	150	0	6	1
Grazing Management	955	2374	1310	11
Nutrient Management	0	2716	5443	6
Riparian Protection	1196	3468	1266	16
Wetland Restoration	1384	3685	1135	2
Totals	17,374	12,243	9,733	122

3.5 Project Milestones

Comparison of Milestones Expected to the actual Project Activity are included in Table 3.4-1 highlighting those BMPs and their Final Status

Table 3.5.1 Comparison of Planned BMP Milestones and Implemented Practices for Segment 2

BMP	Unit	Total Expected	Total Implemented	Status
Bank Stabilization	Shoreline Protection-Ft	2000	11177	Exceeded
Grassed Waterway	Grassed Waterway-units	25	1	Units Not Achieved
Grazing management	Planned Grazing Systems-Ac	2500	1139.2	Acreage Not Achieved
	Individual Sites-units	8	27	Exceeded
	Riparian Streams-Ft	20,000	28,007	Exceeded
	Seeding (Re-Vegetation)-Ac	600	646	Exceeded
Information &Education	Demonstrations-Units	0	6	Added BMP
	Meeting/Field Days	0	6	Added BMP
	Newsletters	4	2	Alternative used
	Coordinator Presentations	0	52	Added BMP
	Producer Tours	2	10	Exceeded
	Public & Media Tours	2	4	Exceeded
	Publication of info-articles	0	48	Added BMP
	Radio/ TV Interviews	0	11	Added BMP
	Regional Grazing Conference	2	1*	2nd scheduled after Project close
	Student Education/ Tours	0	6	Added BMP
Nutrient Management	Waste management Systems	9	6	Units Not Achieved
Riparian Restoration and Protection	Continuous Conservation Reserve Program Partner-Ac	200	1457	Exceeded
Wetland Restoration	NRCS Wetland Reserve-Ac	20	996	Exceeded

3.6 Expense Report by Category and Source

Table 3.6-1 Lake Poinsett Watershed Segment 2 Expenses by Category and Source

	EPA 319	Cons. Comm.	GF&P	LPWPD	Local Owner	Other Local	FSA	NRCS	Total Spent
Grazing Management	**23,630**	**7,368**	**1,193**	**-**	**50,259**	**-**	**56,167**	**-**	**138,617**
Nutrient Management	**194,096**	**-**	**-**	**-**	**456,201**	**-**	**-**	**113,960**	**764,257**
Grassed Waterway	**2084**	**-**	**-**	**-**	**2647**	**-**	**-**	**-**	**4,731**
Shoreline Stabilization	**-**	**-**	**-**	**235,037**	**900,434**	**-**	**-**	**-**	**1,135,471**
Riparian Protection Incentive	**2800**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2,800**
Information & Education	**908**	**-**	**-**	**-**	**-**	**1,291**	**-**	**-**	**2,199**
Non-Salary Office Operations	**17,160**	**-**	**-**	**-**	**-**	**4,613**	**-**	**-**	**21,773**
Coordinator Mileage	**7,308**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**7,308**
Personnel Administration	**360,460**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**360,460**
Totals	**608,446**	**7,368**	**1,193**	**235,037**	**1,409,541**	**5,904**	**56,167**	**113,960**	**2,437,616**
Percentage of Project completed	**24.96**	**.30**	**.05**	**9.64**	**57.82**	**.24**	**2.30**	**4.68**	

4.0 Project Evaluations

4.1 What worked.

Over the course of seven years of Segment 2 there were many successes with completed implementation tasks that led to ever changing milestones and new goals to strive for. Having a project that could adapt to new priorities, new partners and new project activities allowed for these opportunities.

Segment 1 laid the groundwork of a project that would become familiar to the public and a resource for water quality issues. Segment 2 began as an expansion into a new area, but benefited from the name recognition and project awareness in place.

New programs offered through USDA-Farm Service Agency to address riparian areas through Continuous Conservation Reserve Program 10-15 year contracts were vital in promoting water quality issues. Segment 2 used those contracts as a base and combined either 319 funds or SD Conservation Commission Grants to provide additional cost share if needed. Having the base contract with USDA, allowed federal contractual oversight continuing beyond the timeframe of an EPA 319 project.

Electronic messaging, e-mails, web sites etc. became popular with the public during Segment 2. What worked for the project was to create e-mail distribution lists so that the coordinator could direct specific information to different segments of the watershed population. This media allowed the coordinator to write numerous detailed articles on water quality issues and how the recipient could affect change or improvement. Many of the articles were a result of questions posed by the public, or in response to inaccurate stories being circulated. These articles were often placed on other organizations' websites. The lists also provided a method to alert individuals of events, meetings or new programs offered through the Project or related agencies. Distribution lists included: Lake Poinsett homeowners, Livestock producers, Wildlife and outdoor recreational users, Federal and State agency personnel, Various elected officials.

'Poinsett Update' written by the coordinator was used to inform many of these distribution lists of current conditions affecting the Lake Poinsett Watershed. In Fall of 2010 the 'Poinsett Update' started warning of potential flood conditions, if even normal snowfall was accumulated within the watershed due to heavy Fall precipitation events filling all the watershed's storage capacity. These warnings included: storing docks,boats and outdoor equipment away from the lake shores, making sure propane tanks were secure, emptying septic tanks, knowing locations to shut-off utilities, removing chemicals, fertilizers and petroleum products from lower levels of homes or garages with potential to flood. The winter of 2010-2011 resulted in near record snowfall and as a result Lake Poinsett had record flood levels in Spring 2011. Nearly 75% of Lake Poinsett homeowners are only summer users and live or vacation in other parts of the United States. For some, the 'Poinsett Update' became their only link to the disaster on Lake Poinsett. Because the informational warnings came before the flooding began, many absentee lake residents returned early or were able to make arrangements with lake neighbors or contractors to address issues with their property and avert some potential harmful effects. During the flooding, requests to be included on the 'Poinsett Update' list came from FEMA, Corps of Engineers, National Weather Service and all the local television stations.

Following the 2011 flood, the task of restoring damaged shoreline began in 2012. The project had extensive experience implementing stabilization of Lake Poinsett prior to the 2011 flood. That work was tested to the extreme during the record flood and served as a demonstrated success except for the new record water level causing some minor damage to the top of structures. The Lake Poinsett Water Project District approached the Watershed Project to offer finances for stabilization, if the coordinator would develop criteria and run the program. The result was a $235,000 incentive based program for

homeowners with several improvements to prior stabilization efforts and resulted in over 11,000 feet of shoreline being stabilized in 2012 and 2013.

4.2 What didn't work.

Animal waste facilities are a hard sell to those that are most likely impacting water quality. The project only completed 6 of the 9 facilities it planned for. The amount of technical and financial assistance available had little effect on having producers voluntarily participate. Those producers we did partner with had long range goals of continuing a feeding operation with the next generation. Existing operations without an obvious succession were more likely to just ignore any the assistance available. As the Project expanded into the river and tributary area of the Big Sioux River, several approached producers rejected proposals either before or after a design. The biggest obstacle cited was being tied to a plan of nutrient management, which limited or disallowed spreading manure on frozen ground. At the same time, the Project turned away producers located in areas far from the river or tributaries that wanted to participate in cost share program for manure storage.

Grassed waterways have fallen out of favor as the price of land has increased and the desire to get a few more bushels of corn or soybeans from a field prevails along with larger equipment and less maneuverability. Weed chemicals for genetically modified row crops that kill established grass plants also are causing loss of existing waterways. Some producers are installing drain tile with surface inlets as their response to gully erosion.

An amendment proposed in 2010 to expand the project area into the Big Sioux River watershed effective July 1, 2011 was accompanied by a new incentive payment from 319 to be added to CRP contracts of riparian marginal pastures. The incentive provided an additional $200/acre signing bonus based on a 120 ft. wide buffer along the impaired creeks and river segments. Two things happened to derail this task for the Project. First, it became effective at the height of the 2011 flooding on Lake Poinsett while the coordinator was occupied with disaster issues and preparing 150 possible contracts for $1.4M worth of shoreline work on Lake Poinsett for 2012 and 2013. Second became the unreliability of USDA programs. By June of 2012 it was realized that the US Farm Bill possibly could expire on Sept 30, 2012 along with the ability to enter CRP contracts, which it did. A temporary congressional Farm Bill agreement began in June 2013, only to have it expire Sept 30, 2013 along with a government shutdown of USDA offices. The Project was able to get one Contract Accepted during that brief period along Stray Horse Creek. On June 9, 2014 CRP applications were again being accepted. This Project expires on July 31, 2014. What we thought would be an enticing program never got the off the ground for an evaluation.

Visual Timeline of Project Activities

The following sequence of photos depicts the progression of the LPWP-2 for the period 2007-2014.

Total confinement of animal waste in new barn configurations occupied the early years of Segment 2.

New confinement barn on Dolph Creek for 200 head with manure storage

Animals enjoying a cold winter day inside confined hoop barn

Snow on roof and wet outside, but 400 head facility keeps livestock and manure confined

Hoop barn using compost method with inside feeding alley for replacement dairy heifers

Secondary hoop barn to store manure during winter from scraped alley in 200 head facility

Sunny day for animals in double hoop barn facility

Dairy compost barn for manure storage of 50 milking cows

Inside dairy composting barn

Beginning to pour concrete floor of 600 head monoslope feeding facility with manure storage containment

Inside feeding alley and working pens of monoslope

Outside feeding alley of 600 head monoslope feeding barn, that combined the livestock of three non-containment open lots locations into one confinement structure

Watershed coordinated workshops on grazing management were always well attended.

The late Terry Gompert offering his expertise to producers on grazing management

Watershed coordinator in discussion with producers at grazing workshop

Watershed coordinated producer tours highlighted exceptional operations locally.

Owner fielding questions about how his operation manages grazing livestock to control runoff

More producer tours

Recognizing outstanding producers

Letting the photo tell the story of grassland management

Sharing the watershed concept with SDSU Range Science students became an annual event.


4X4

Coordinator relating the story of grassland management's impact to surface water quality.

The project took an abrupt turn in 2011 when Lake Poinsett and many other lakes suffered through record flood levels. From early warnings, to damage control, to a massive effort to restore and stabilize the eroded shoreline of Lake Poinsett, the Lake Poinsett Watershed Project was there to help.

Lack of water storage in the entire chain of lakes prompted the Coordinator to issue Warnings in Fall of 2010 of potential flooding for the Spring 2011 snow melt.

Residents vacationing in warmer climates were advised weekly on the state of water conditions in Lake Poinsett watershed.

First danger in spring of 2011 was the impact of ice damage to shorelines and homes. Project advised owners to empty out chemicals and petroleum products from structures.

2011 Dolph Creek overflowing Highway 21 north of Lake Norden

Big Sioux River out of its banks and spilling into the Boswell diversion ditch

Big Sioux River below Stray Horse Creek flowing over county highway

North Lake Marsh drainage ditch taking out county highway and culverts

Stray Horse Creek east of Castlewood out of banks

Rising water levels combined with wind drives ice into south side cabins on Lake Poinsett

Waters still rising and eventually floods Highway 81 on west side of Lake Poinsett

Businesses flooded and bus with prisoners arrive to help with sandbagging effort

Coordinator assists Corps of Engineers in setting up automated gauging station to monitor flood levels on Lake Poinsett outlet

Assessing the damage, coordinating restoration designs with homeowners and contractors will take the next 2 ½ years of the Project and require over $1.1 million for 200 homeowners.

2012 and 2013 provided good working water conditions and resulted in restoration work on all areas of Lake Poinsett. Homeowners followed new Lake Poinsett Watershed formulated guidelines. Raising the required elevation of rip rap to a height 7 ft above ordinary high water was needed. The project also suggested practices of using new geotextile root stabilizing materials under lawn turf and restoring more shrub and tree plantings to stabilize shorelines.

Starting in late 2012 the Project Coordinator became involved in actively promoting Soil Health quality to reduce surface water runoff in Eastern South Dakota. Cover crop workshops were well attended winter events and demonstrating the effect of agricultural practices on runoff and infiltration with the NRCS Rainfall Simulator were summer tour and field day hits.

NRCS Rainfall Simulator ready to run.

From the largest farm operations to the youngest students, the Rainfall Simulator sparked interest in how water moves upon and within the soil.

Cover crops growing in Hamlin County