SECTION 319 NONPOINT SOURCE POLLUTION CONTROL PROGRAM

WATERSHED PROJECT FINAL REPORT

Northeast Glacial Lakes Watershed Improvement and Protection Project

Segment 2

By

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Day Conservation District

October 2014

This project was conducted in cooperation with the State of South Dakota and the United States Environmental Protection Agency, Region 8

Grant # C9-99818507-0, C9-99818509-0, C9-99818512-0

EXECUTIVE SUMMARY

PROJECT TITLE: Northeast Glacial Lakes Watershed Improvement and Protection Project Segment 2

PROJECT START DATE: July 10, 2009

PROJECT COMPLETION DATE: July 31, 2014

FUNDING:	TOTAL BUDGET	$1,650,874.17
	TOTAL EPA BUDGET	$685,000.00
	TOTAL EXPENDITURES OF EPA FUNDS	$566,099.00
	TOTAL SECTION 319 MATCH ACCRUED	$1,715,389.62
	TOTAL EXPENDITURES	$2,281,488.62

SUMMARY ACCOMPLISHMENTS

The project has exceeded its goal for implementing riparian buffers utilizing the Continuous Conservation Reserve Program by 2,206 acres. The project milestone was 1,071 acres; to date a total of 3,277 acres of CRP have been implemented. A total of 433 acres of riparian buffers utilizing EPA 319 funds have been implemented, seventy percent (70%) of the projects goal of 621 acres.

A total of 223 acres of critical areas have been seeded to pasture or hayland to date, thirty-seven percent (37%) of the projects goal of 600 acres.

Grazing management improvements have been implemented on 2,518 acres, eighty-four percent (84%) of the projects goal of 3,000 acres.

Stabilization of 2,237 lineal feet of shoreline and streambank has been completed utilizing rock rip-rap, exceeding the projects goal of 1,900 lineal feet. Forty-two lineal feet of stream bank was stabilized utilizing vegetative practices, well short of the projects goal of 2,000 lineal feet. Eleven stream crossings were constructed where livestock had degraded streambank vegetation and erosion was occurring.

The above practices protected and improved 266,145 lineal feet or 50 miles of streambank and shoreline in the project area.

Implementation of best management practices resulted in a total calculated reduction of 55,000 lbs. per year of nitrogen, 19,000 lbs. per year of phosphorus, and 20,000 tons per year of sediment in the watersheds included in Segment 2.

Milestones for information and education activities have been completed. An audience of over 12,000 youth and adults attended presentations by project personnel at workshops, water festivals, environmental education programs, farm and home shows. A website is now providing project information to the public at *www.neglwatersheds.org*. Information available from the website includes information on cost share available for implementing agricultural best management practices, best management practices for lakeshore property owners, natural history, information and educational opportunities, and attributes of project lakes and watersheds.

Segment 2 of the Northeast Glacial Lakes Watershed Improvement and Protection Project was amended in 2010 and 2012. All changes in project activities and milestones are reflected in this report.

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1.0 Introduction

The Northeast Glacial Lakes Watershed Protection and Improvement Project encompass four northeast South Dakota counties: Day, Grant, Marshall, and Roberts, and portions of four major river basins; Big Sioux, James, Minnesota, and Red Rivers. Locations of project lakes and reservoirs are shown in Figure 1. The locations of project streams and rivers are shown in Figure 2.

Figure 1.

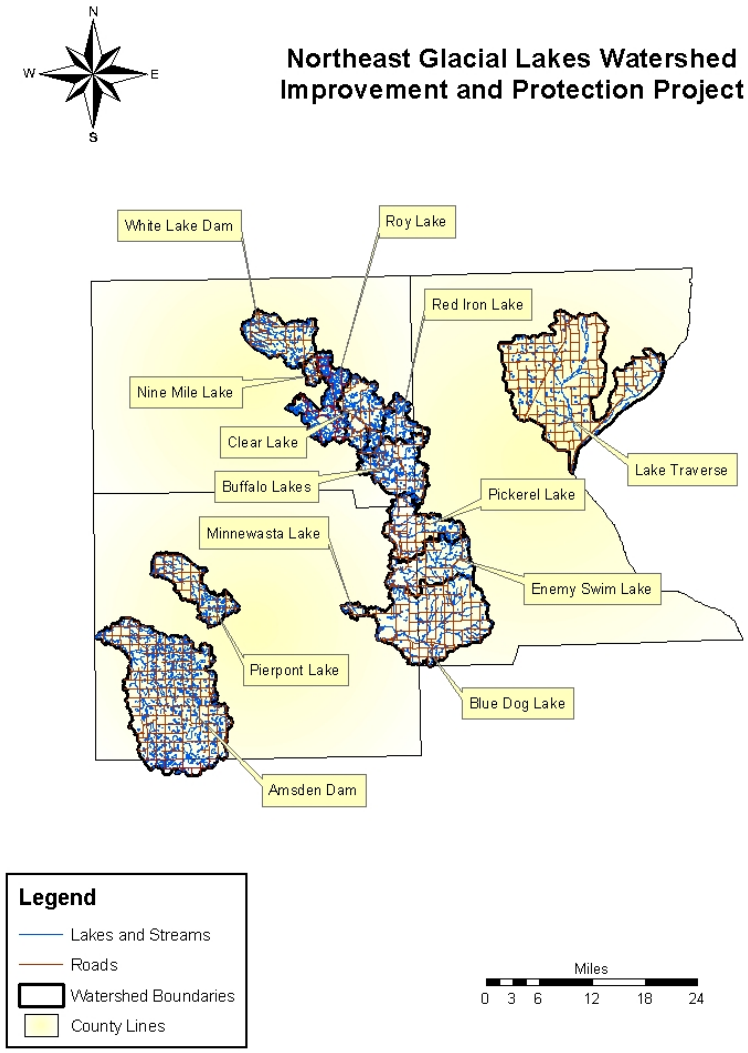
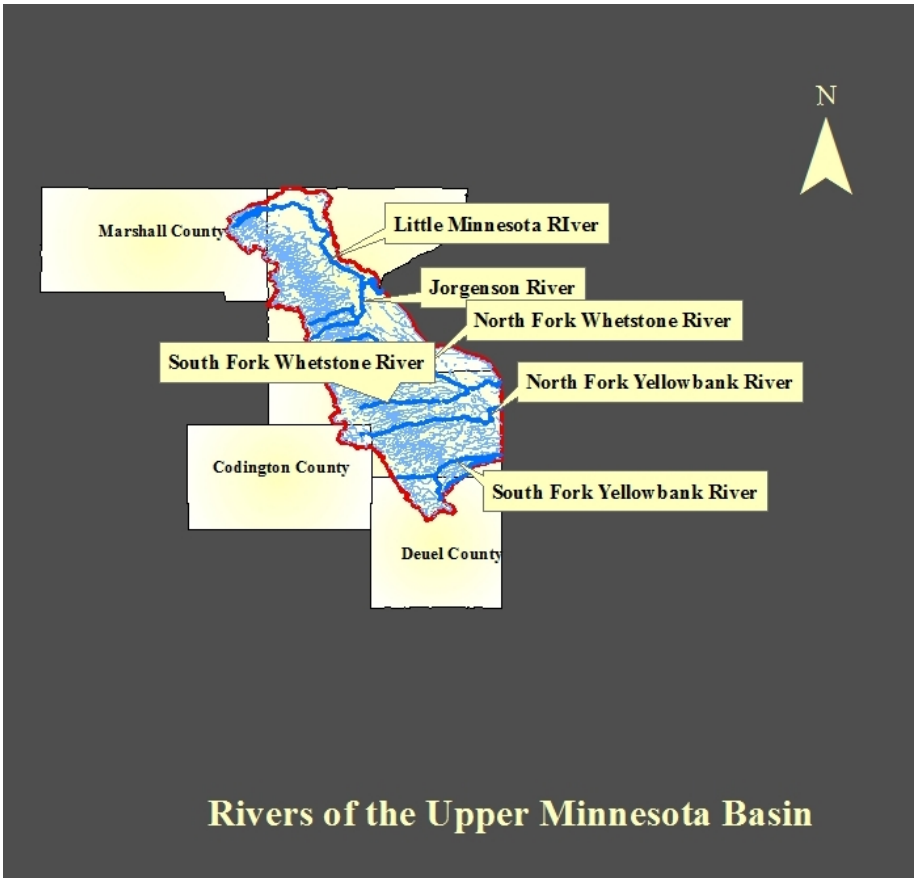


Figure 2.



The majority of the water bodies located in Day and Marshall County portions of the project area lie atop high tableland early French explorers named the Coteau Des Prairie or Hill of the Prairies. The topography of the Coteau was formed by the stagnation of glacial ice during the Late Wisconsin Glaciations that occurred approximately 12,000 years ago. As the glacier stagnated and began to fragment and melt, large blocks of ice were buried in melt water outwash. Melting of the ice blocks left depressions in the outwash of various size and depth. These depressions are the thousands of potholes, sloughs, and lakes characteristic of the modern day topography of the Coteau Des Prairie.

Melt water flowing from the top of the Coteau cut several deep channels along the eastern and western slopes. Along the eastern slope of the Coteau, these channels, called coulees are deep enough to expose groundwater that lays above the Pierre shale bedrock. The groundwater flowing above the bedrock forms dozens of small perennial streams that are the headwaters of the Red River that flows north and the Minnesota River that flows east. East facing coulees provide cool-wet conditions that support remnants of the eastern deciduous forest community once prevalent approximately 6,000 years ago.

The much drier western slope of the Coteau supports fewer perennial streams. The few wooded coulees that exist are dominated by bur oak. Many of the perennial streams that flow from the western slope have been dammed to form reservoirs. Among these are Amsden Dam and Pierpont Lake. These two reservoirs discharge to the James River.

Many of the lakes perched atop the Couteau are situated in closed basins. The largest closed basin is called the Eastern Lakes Subsystem, or more recently the Waubay Lakes Chain. The Eastern Lakes Subsystem is comprised of eleven major lakes that include Blue Dog, Enemy Swim, and Pickerel Lakes; and several minor lakes including Minnewasta. A group of aquifers and several surface drainages surround and connect these lakes. While the Eastern Lakes Subsystem is closed, the potential exists for these lakes to eventually drain to the Big Sioux River. This potential was realized in the 1990's when greater than normal precipitation, and less than normal evaporation caused many of the lower lakes in the subsystem to rise twenty feet above normal lake level elevations.

Buffalo Lakes, Clear Lake, Roy Lake, and South Red Iron Lake lie in the Coteau Lakes Outwash Deposit. Like the Eastern Lakes Subsystem, aquifers and surface drainages connect these Marshall County lakes.

The watershed of White Lake is located at the northwest base of the Coteau. This reservoir is located on the Wild Rice River that drains into the Red River.

Lake Traverse lies in the main channel of what remains of Glacial River Warren, the major outflow channel of pro-glacial Lake Agassiz formed approximately 10,000 years ago. The South Dakota portion of Lake Traverse's watershed is relatively small with only one tributary, Jim Creek. The majority of Lake Traverse's watershed (90%) lies in Minnesota. Lake Traverse drains into the Bois De Sioux River, a tributary of the Red River that drains north to Lake Winnipeg.

Table 1 lists the locations and attributes of the thirteen project lakes and reservoirs that were included in Segment 2.

The South Dakota portion of the Minnesota River Basin (Figure 2) includes three major stream systems; the Little Minnesota River, Whetstone River (North and South Forks), and Yellowbank River (North and South Forks). These three rivers are the headwaters for the Minnesota River which begins near the South Dakota/Minnesota Border below Big Stone City, SD.

The Little Minnesota River, beginning near Veblen, SD and flowing into Big Stone Lake south of Browns Valley, MN, drains the majority of Roberts County and a portion of east central Marshall County. The drainage includes hundreds of small named and unnamed tributaries that

begin as small coldwater spring fed streams in the forested coulees located along the east escarpment of the Coteau des Prairie, and flow into bottomlands known as the Whetstone Valley. One of the larger headwater tributaries Big Coulee Creek flows from the escarpment into the Jorgenson River, the largest tributary of the Little Minnesota River in Roberts County. Pasture and range make up the major land use along the escarpment where these small headwater tributaries begin. The major land us changes to row crops as these headwaters enter the Whetstone Valley. Tile drainage of cropland in the Whetstone Valley is becoming a common practice.

Table 1. Attributes of Targeted Project Lakes and Reservoirs

River Basin and Waterbody	County	Longitude Latitude	Watershed Area (acres)	Maximum Depth (feet)	Surface Area (acres)	Shoreline Length (miles)	Watershed to Lake Ratio	Waterbody Type
Upper Big Sioux River Basin HUC # 10160010								
Blue Dog Lake	Day	45° 21'06"N 97° 17'48"W	73,811	8	1,502	8.7	49/1	Natural
Enemy Swim Lake	Day	45° 26'24"N 97° 16'00"W	22,310	26	2,146	11.8	10/1	Natural
Minnewasta Lake	Day	45° 23'24"N 97° 21'42"W	2,564	14	601	5.5	4/1	Natural
Pickerel Lake	Day	45° 30'24"N 97° 16'24"W	17,165	43	931	9.7	18/1	Natural
Upper James River Basin HUC # 10160005								
Amsden Dam	Day	45° 21'30"N 97° 58'06"W	31,961	27	235	5.9	136/1	Reservoir
Buffalo Lake	Marshall	45° 37'00"N 97° 16'48"W	16,781	12	1,780	27.8	9/1	Natural
Clear Lake	Marshall	45° 41'36"N 97° 21'36"W	11,682	20	1,087	7.6	11/1	Natural
Nine Mile Lake	Marshall	45° 46'04"N 97° 29'26"W	NA	10	282	4.5	NA	Natural
Pierpont Lake	Day	45° 27'42"N 97° 49'48"W	5,885	16	77	2.2	76/1	Reservoir
Red Iron Lake	Marshall	45° 40'12"N 97° 19'06"W	9,862	15	610	7.5	16/1	Natural
Roy Lake	Marshall	45°42'06"N 97°26'06"W	9,614	21	2,054	14.5	6/1	Natural
Red River Basin HUC # 09020101								
Lake Traverse	Roberts	45° 42'12"N 97° 44'06"W	729,005	12	11,530	40.3	63/1	Natural
White Lake Dam	Marshall	45° 51'36"N 97° 36'54"W	21,184	20	187	6.3	113/1	Reservoir

The Whetstone River starts at the confluence of its major tributaries named the North and South Forks northeast of Milbank, South Dakota; and flows a short distance east where it joins the Minnesota River near the South Dakota/Minnesota border. The North Fork of the Whetstone River drains the southern third of Roberts County. The South Fork of the Whetstone River drains the north half of Grant County and begins as several small spring fed streams located along the east escarpment of the Prairie Coteau. Lake Farley located in Milbank South Dakota is a small dammed reservoir located on the South Fork of the Whetstone River.

The North Fork of the Yellowbank River drains central Grant County and is the confluence of several small springs located along the east escarpment of the Prairie Coteau. The South Fork of the Yellowbank River begins in Deuel County and flows through the southeast corner of Grant County. The North and South Forks of the Yellowbank River join to form the Yellowbank River northwest of Bellingham, Minnesota.

These streams and rivers support a number of wildlife species. Forty-three species of fish occur in the rivers and streams of the Upper Minnesota River Basin, including one state endangered species the Blacknose Shiner, and one state threatened species the Northern Redbelly Dace. Several fish found in the Upper Minnesota River Basin are considered rare. These include the Carmine Shiner, Hornyhead Chub, Central Mudminnow, Blackside Darter, and the only known South Dakota population of the Slenderhead Darter, found only in a small segment of the Whetstone River. Twelve species of freshwater mussels occur in the Upper Minnesota River Basin. Seven of these species are considered rare. One state threatened mammal occurs in this basin, the Northern River Otter.

The climate of the project area is classified as Sub-humid Continental. Mean climatic conditions of the area are:

- Winter Average Daily Minimum Temperature - 4 degrees F
- Summer Average Daily Maximum Temperature - 82 degrees F
- Total Annual Precipitation - 21 inches
- Average Seasonal Snowfall - 31 inches

Approximately 75 percent (=16 inches) of the annual precipitation falls between the months of April to September. Tornadoes and severe thunderstorms occasionally strike. These storms, usually local and of short duration, occasionally produce heavy rainfall. (Data from Webster, SD reporting station)

Agriculture is the major land-use in northeast South Dakota. Ownership and agricultural data for each county in the project area are given in Table 2.

Table 3 lists the beneficial uses for the lakes and reservoirs in the project area. Table 5 lists 303 (d) listing, impaired beneficial uses and reasons for impairment for each of the thirteen lakes and reservoirs in Segment 2.

Table 4 list beneficial uses for project streams and rivers. Table 6 lists 303 (d) status, impaired uses, and reason for impairment.

The "***2012 South Dakota Integrated Report for Surface Water Quality Assessment***", prepared by the South Dakota Department of Environment and Natural Resources provides the basis for the values in Tables 5 and 6.

Table 2. Land Ownership and Agricultural Data

		County		
*Data from South Dakota Agricultural 2012 Bulletin No. 72	**Day**	**Grant**	**Marshall**	**Roberts**
Population (2010 census)*	5,710	7,356	4,656	10,149
Land Area* (Acres)	658,329	436,818	536,888	704,856
Land Ownership				
Private (Acres)	626,319		483,944	627,087
Tribal (Acres)	10,033 acres		26,363	66,448
Federal (Acres)	10,679 acres		11,180	5,117
State (Acres)	11,298 acres		15,401	6,204
Agricultural Data				
Number of Farms* (2007)	675	555	523	887
Total Cropland Acres* (2007)	386,994	263,680	328,243	412,361
Corn/Soybeans Acres* (2011)	230,000	193,000	167,500	297,500
Small Grain Acres* (2011)	52,500	30,900	1,000	39,000
CRP (Acres)	38,720	12,233	50,386	34,488
Hay Acres* (2011)	18,000	20,000	34,000	52,000
Range/Pasture (Acres)	155,900	173,138	101,661	139,000
Livestock Numbers* (2007 census)				
Cattle	46,488	60,000	76,918	54,487
Swine	1,581	3,117	2,725	21,460
Sheep	732	2,659	1,177	5,377

Table 3: Beneficial Uses for Priority and Targeted Lakes and Reservoirs Beneficial Use:	Amsden Dam	Blue Dog Lake	No. Buffalo Lake	So. Buffalo Lake	Clear Lake	Enemy Swim Lake	Minnewasta Lake	Nine Mile Lake	Pickerel Lake	Pierpont Lake	Roy Lake	So. Red Iron Lake	Lake Traverse	White Lake Dam
(4) Warmwater permanent fish life propagation	X	X	X		X	X			X	X	X	X	X	X
(5) Warmwater semipermanent fish life propagation				X			X	X						
(7) Immersion recreation	X	X	X	X	X	X	X	X	X	X	X	X	X	X
(8) Limited contact recreation	X	X	X	X	X	X	X	X	X	X	X	X	X	X
(9) Fish & wildlife propagation, Recreation and stock watering	X	X	X	X	X	X	X	X	X	X	X	X	X	X
(10) Irrigation Waters													X	

Table 4: Beneficial Uses Designated for Targeted Project Streams and Rivers

Beneficial Use:	Lt Minnesota River	Big Coulee Creek	Whetstone River	Whetstone River South Fork	Yellowbank River North Fork	Yellowbank River South Fork
(3) Coldwater marginal fish life propagation						X
(4) Warmwater permanent fish life propagation					X	
(5) Warmwater semipermanent fish life propagation	X		X			
(6) Warmwater marginal fish life propagation				X		
(8) Limited contact recreation	X		X	X	X	X
(9) Fish & wildlife propagation, Recreation and stock watering	X	X	X	X	X	X
(10) Irrigation waters	X	X	X	X	X	X

Table 5: Water Quality Data and Impaired Beneficial Uses for Priority and Targeted Lakes and Reservoirs		**Impaired Beneficial Use and Cause***					
Waterbody	**303 (d) Listed (2012**)**	**4**	**5**	**7**	**8**	**9**	**10**
Amsden Dam	No	Full	NA	Full	Full	Full	NA
Blue Dog Lake	Yes	Non (pH)	NA	Ins	Ins	Ins	NA
Clear Lake	No	Full	NA	Full	Full	Full	NA
Enemy Swim Lake	No	Full	NA	Full	Full	Full	NA
Lake Traverse	No	Full	NA	Full	Full	Full	Full
Minnewasta Lake	No	NA	Full	Full	Full	Full	NA
Nine Mile Lake	Yes	NA	Non (pH)	Full	Full	Full	NA
No. Buffalo Lake	No	Full	NA	Full	Full	Full	NA
Pierpont Lake	Yes	Non	NA	Ins	Ins	Full	NA
Pickerel Lake	No	Full	NA	Full	Full	Full	NA
Roy Lake	No	Full	NA	Full	Full	Full	NA
So. Buffalo Lake	Yes	NA	Non (DO)	Full	Full	Full	NA
So. Red Iron Lake	No	Full	NA	Full	Full	Full	NA
White Lake Dam	No	Full	NA	Full	Full	Full	NA

* Number corresponds to beneficial uses listed in Table 1

** Source: *The 2012 South Dakota Integrated Report for Surface Water Quality Assessment – SD Dept. of Environment and Natural Resources*

Ins – insufficient data, NA – not applicable

Table 6: Water Quality Data and Impaired Beneficial Uses for Priority and Targeted Streams and Rivers

		Impaired Beneficial Use and Cause*						
Waterbody	**303 (d) Listed (2012**)**	**3**	**4**	**5**	**6**	**8**	**9**	**10**
Little Minnesota River	Yes	NA	NA	Non	NA	Non	Full	Full
Big Coulee Creek	No	NA	NA	NA	NA	NA	Ins	Ins
Whetstone River	No	NA	NA	Full	NA	Full	Full	Full
South Fork Whetstone River*	Yes	NA	NA	NA	Full	Non	Full	Full
North Fork Yellowbank River*	Yes	NA	Full	NA	NA	Non	Full	Full
South Fork Yellowbank River*	Yes	Full	NA	NA	NA	Non	Full	Full

* Number corresponds to beneficial uses listed in Table 1

** Source: The 2012 South Dakota Integrated Report for Surface Water Quality Assessment – SD Dept. of Environment and Natural Resources

Ins – insufficient data, NA – not applicable

Several EPA 319 funded watershed assessment and improvement projects have been completed for lakes and reservoirs located in the project area (Figure 1). Watershed assessments have been completed and published for Amsden Dam, Blue Dog Lake, Enemy Swim Lake, Lake Traverse, Minnewasta Lake, Nine Mile Lake, North and South Buffalo Lakes, Roy Lake, South Red Iron Lake, and White Lake reservoir. Watershed implementation projects were completed for Pickerel Lake in 1996, Enemy Swim Lake in 2005, and Blue Dog Lake in 2006. The town of Pierpont, South Dakota funded a two year study of Pierpont Dam Reservoir's water quality that was completed in 2009. The Clear Lake Betterment Association paid for in-lake water quality testing on Clear Lake from 2009 thru 2010. On-going water quality studies of Enemy Swim Lake and Pickerel Lake were funded by the Greater Pickerel Lake Association/Pickerel Lake Conservancy, and the Enemy Swim Sanitary Sewer District each year of Segment 2. Final reports for most of these projects can be viewed at www.neglwatersheds.org.

The main non-point pollutants impairing the water quality of project lakes, reservoirs, streams and rivers are fecal coliform bacteria, nutrients, and sediments carried by runoff from agricultural lands located in their watersheds. The goal of this project is to continue protecting and improving water quality of northeast South Dakota glacial lakes by implementing best management practices (BMPs). BMPs reduce the amount of non-point source pollutants entering project water bodies, thus maintaining their assigned beneficial uses.

This was the second segment of a multi-year locally led effort to implement best management practices recommended by completed watershed assessments, to build on previous efforts, and protect water quality improvements realized from previous implementation projects. The project was sponsored by the Day Conservation District, with the Grant, Marshall, and Roberts Conservations Districts as co-sponsors. This report will describe the activities completed for Segment 2.

2.0 Project Goals, Objectives, and Activities

This project was the second segment of an area wide water quality improvement/protection strategy that began in 2007. The project goal is:

"Restore and protect the water quality of northeast South Dakota glacial lakes."

To attain the goal, the following actions were completed:

- Establish an advisory council made up of local, state, tribal, and federal partners to oversee project activities.

- Develop a strategy that will guide activities in subsequent project segments by providing the tools needed to implement the strategy.

- Implement BMPs that reduce nutrient, fecal coliform bacteria, and sediment loads to targeted waterbodies.

- Implement a public outreach program to inform project area stakeholders about the opportunities for involvement in and progress of the project.

- Track project milestones and progress toward reducing nutrient, fecal coliform bacteria and sediment loadings to targeted waterbodies.

Objective 1: Complete activities that will lead to successful protection and restoration of the beneficial uses of lakes and reservoirs in northeast South Dakota.

Task 1: Institute the project management structure developed during Segment 1 to guide successful protection and restoration of lakes and reservoirs in northeast South Dakota.

An advisory council made-up of local, state, tribal, and federal partners will continue to manage the Northeast Glacial Lakes Watershed Improvement and Protection Project. The council was formed during the first segment of the project and will oversee the implementation of the strategic plan completed during Segment 1, annually review the practice manual that establishes priorities for BMP implementation, and develop the work plan for the third and subsequent project segments. Revised memoranda of understanding that define the responsibilities and obligations of each district in the support and execution of Segment 2 will be entered into between the Day, Grant, Marshall, and Roberts Conservation Districts. A Project Conservation Technician will be hired by the project sponsor to aid in the implementation of project activities within the four county project areas.

Product:

1. Project management structure.

Milestones:	**Planned**	**Total Completed**
Advisory Council Meetings	4	7
Memoranda of Understanding	5	5
Project Conservation Technician	1	1
Project Segment 3 Work Plan	1	1

Resource agencies represented on the advisory council included;

Natural Resources Conservation Service (NRCS)
South Dakota Dept. of Environment and Natural Resources (DENR)
South Dakota Dept. of Agriculture - Division of Forestry and Resource Conservation
United States Fish and Wildlife Service (USFWS)
South Dakota Dept. of Game, Fish, and Parks (SDGFP)
East Dakota Water Development District (EDWDD)
James River Water Development District (JRWDD)
Day, Grant, Marshall and Roberts Conservation Districts
Sisseton Wahpeton Oyate
Clear Lake Betterment Association
Roy Lake Associations
Nine Mile Lake Association
Pickerel Lake Sanitary Sewer District
Greater Pickerel Lake Association/Pickerel Lake Conservancy
Enemy Swim Sanitary Sewer District
Lac qui Parle Yellow Bank Watershed District

All milestones for this task have been completed.

The Advisory Council met seven times during the project to review the progress of the project and develop the work plan for Segment 3. The Advisory Council was also convened to develop the application, work plan, and budget for the Mississippi River Basin Healthy Watersheds Initiative funded through the Natural Resources Conservation Service. The Roberts County Conservation District was the lead project partner for this initiative and the Northeast Glacial Lake Watershed Project Coordinator was named the project manager for this initiative which was awarded to the project partners in 2012.

The project sponsor, the Day Conservation District, submitted a new Project Implementation Plan to the SD DENR the fall of 2013 based on the Advisory Council's Segment 3 work plan, and was awarded a new EPA 319 Clean Water Grant to fund Segment 3 in June of 2014.

Objective 2: Install best management practices (BMPs) in critical areas to protect and restore the beneficial uses of lakes and reservoirs in northeast South Dakota.

Task 2: Install BMPs that reduce nutrient, sediment, and fecal coliform bacteria nonpoint source pollution originating from livestock operations.

Assistance will be provided to livestock producers to reduce nonpoint source pollution associated with livestock feeding operations (AFOs) and grazing.

Product:

2. **Animal waste management systems**

Animal waste management systems (AWMS) will be funded in this segment to reduce nutrient, fecal coliform bacteria, and sediment loading to water bodies located in the project area if additional funds can be acquired. The systems planned include both conventional (zero-discharge), alternative systems with the type of system being dependant on site conditions and operator preference, or relocating feedlots to less sensitive locations.

Milestones:	Planned	Total Completed
Engineering Services	2	1 (Ag. Waste System)
Conventional AWMS	3	1 (Waste Storage Facility)
Alternative AWMS	1	1 (Feedlot Relocation)

One waste storage facility was constructed and engineering plans for a full containment system were completed during Segment 2. Both systems are located in the Upper Minnesota River watershed located in Grant and Deuel Counties and were funded by the Mississippi River Basin Healthy Watersheds Environmental Quality Incentive Program (EQIP) Initiative through the Natural Resources Conservation Service. The planned system may be constructed in 2014 during Segment 3 of this watershed project. EPA 319 Clean Water Funds were utilized to relocate one animal feeding operation on Clear Lake. 319 funds were also utilized to implement riparian buffers around the perimeter of this AFO.

Product:

3. Riparian buffers

To reduce nutrient, fecal coliform bacteria, and sediment loads entering project water bodies from lakeshore and stream bank segments degraded by livestock, riparian buffers and grassed waterways will be established. Establishment of riparian buffers may require the installation of fence and the development of alternative watering sources. The Conservation Reserve Program (CRP) CP8A Grassed Waterways, CP21 Filter Strips, and CP30 Marginal Pastureland-Wetland Buffer administered by USDA will be the preferred options for providing financial assistance for this product. If a site does not qualify for CRP, riparian BMPs will be funded using 319 funds. The financial assistance from EPA 319 will follow the docket established by USDA for CRP and requirements listed in the project's practice manual.

Milestones:	Planned	Total Completed
Conservation Reserve Program	1,071 acres	3,277 acres
EPA 319 Riparian Area Mgt. (RAM)	621 acres	433 acres

Conservation Reserve Program funds were utilized to implement 3,277 acres of riparian buffers adjacent to project lakes, streams, and rivers. EPA 319 Clean Water grant funds were utilized to sign-up additional acres of riparian buffers adjacent to CRP acres, and to increase CRP rental payments on 433 acres. 319 funds were also utilized to pay part of the cost of constructing 5,232 lineal feet of grassed waterways. A total of 266,145 lineal feet (50 miles) of stream bank and shoreline were protected by the implementation of riparian buffers during Segment 2. Cropland converted back to grass by CRP during Segment 2 resulted in the restoration of 298 acres of wetlands. Section 3.0 of this report describes the riparian area management (RAM) program requirements.

Product:

4. Pasture/Hay Planting

To reduce water and wind erosion on cropland located in critical areas pasture and hay will be planted where CRP is not applicable, plantings of tame and/or exotic grasses and legumes will be established.

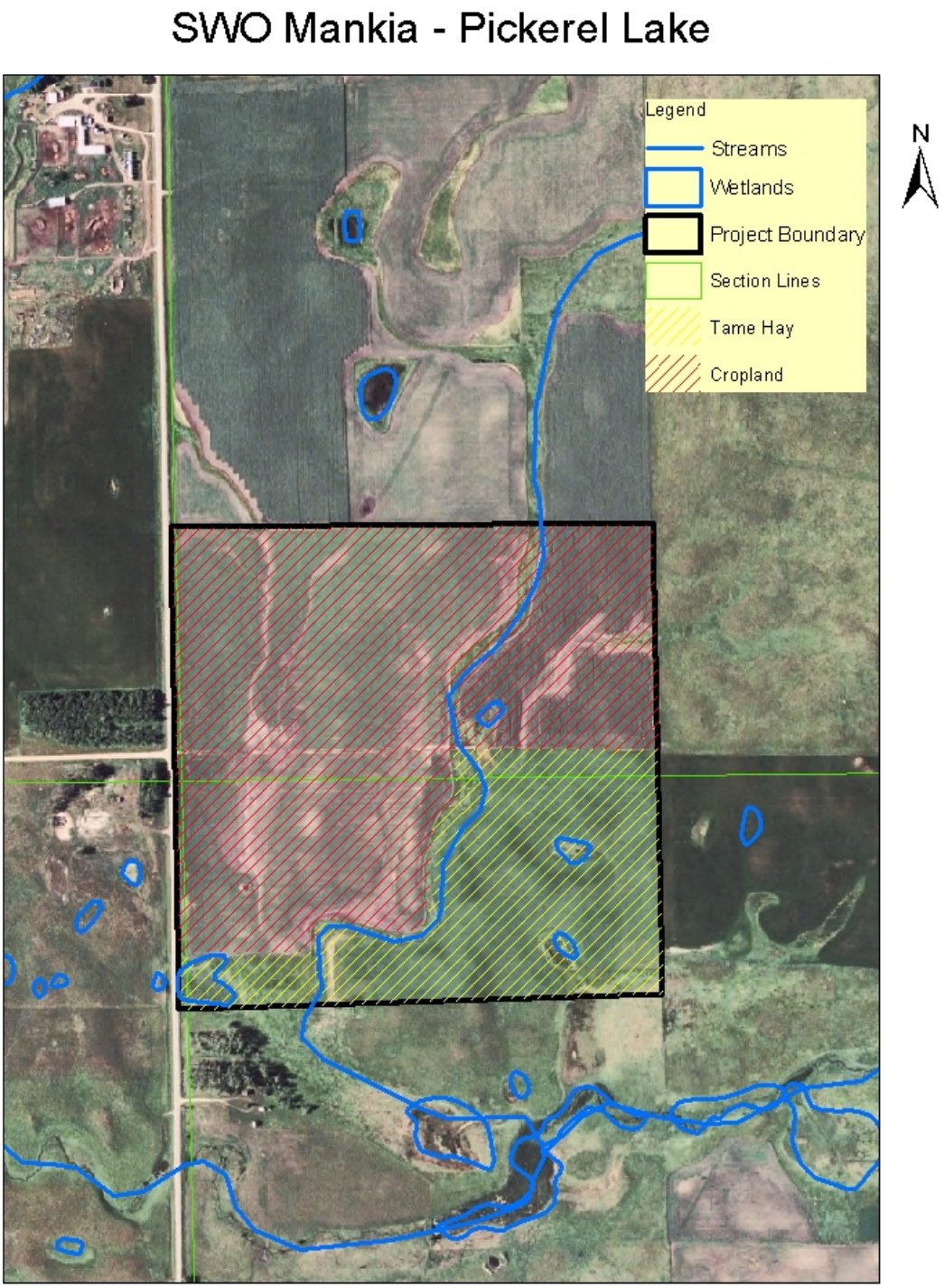
Milestones:	**Planned**	**Total Completed**
Pasture/Hay Planting	600 acres	223 acres

Funding from two South Dakota Dept. of Agriculture Coordinated Soil and Water Conservation Commission Grants were available to plant 600 acres of cropland back to hay or pasture. During Segment 2, record high commodity prices for corn resulted in pasture and hayland being converted to cropland, therefore little interest was shown by producers to plant new pastures or hay fields during the project. 223 acres of cropland were planted to forage, mainly grass/legume mixes in areas along riparian areas or areas were severe erosion had been observed.

One grass/legume planting was implemented on 107 acres of cropland found to be severely eroding during snowmelt and storm events (Figure 3). This field was located just north of Pickerel Lake's main tributary (Figure 4). The photo point shown in Figure 3 was located on the southwest corner of the hatched field shown in Figure 4. The area colored red was planted to a grass/legume mix during Segment 2.

Figure 3. Sediment laden runoff flowing to Pickerel Lake.

Figure 4. Grass/Legume Planting near Pickerel Lake's Main Tributary



Product:

5. Grazing Management Improvements

Through conservation planning, pasture health and rangeland condition will be improved. Resource technicians will work with landowners to promote and implement basic grazing management principles such as rotation, rest, grass banking, and other Best Management Practices that sustain quality grasslands. If needed, financial assistance for implementing conservation practices like cross fence and water development (ponds, pipelines, tanks, wells, solar systems, nose pumps) will come from the Natural Resources Conservation Service's Environmental Quality Incentive Program (EQIP), the United States Fish and Wildlife Service's "Partners for Wildlife" program, South Dakota Game, Fish, and Parks "Private Lands Program", and South Dakota Dept. of Agriculture's Coordinated Soil and Water Conservation Commission grant funds.

Milestones:	Planned	Total Completed
Grazing Management	3,000 acres	2,518 acres

Funding was available from two South Dakota Dept. of Agriculture Coordinated Soil and Water Conservation Commission Grants to implement grazing practices on 2,000 acres of pasture and rangeland. An additional 1,000 acres of pasture and rangeland were to be improved utilizing EQIP funds through the Natural Resources Conservation Service. The Mississippi River Basin Healthy Watersheds Initiative provided special EQIP funds for grazing practices implemented in the project watersheds of the Little Minnesota, Yellowbank, and Whetstone rivers. This program funded the implementation of prescribed grazing and grazing improvements on 2,350 acres during Segment 2. Prescribed grazing and grazing improvements were implemented on 168 acres utilizing the Conservation Commission Grant funds. Grazing improvements included water development (rural water hook-ups, wells, pipelines, watering tanks and dugouts), and cross and perimeter fencing.

Task 3: Reduce sediment loads entering project water bodies by reducing shoreline and stream bank erosion.

Product:

6. Shoreline and stream bank stabilization

Shoreline and stream bank erosion will be stabilized using hard (rip-rap) and soft (vegetative) practices.

Milestones:	Planned	Total Completed
Hard practices	1,900 LF	2,237 Lineal Feet
Soft practices	2,000 LF	42 Lineal Feet

The Mississippi River Basin Healthy Watersheds Initiative provided special EQIP funds to stabilize 789 lineal feet of streambank stabilization in the Minnesota River Watershed during Segment 2. EPA 319 Clean Water grant funds provided cost-share to stabilize 1,490 lineal feet of streambank stabilization including 900 lineal feet along the Amsden Reservoir dam (Figures 5 and 6). The South Dakota Dept. of Game, Fish, and Parks provided state funds to match federal dollars spent on shoreline stabilization at Amsden Dam. The majority of streambank stabilization called for the installation of rock rip-rap, 42 lineal feet of stabilization included the implementation of soft practices that included fabric bundles and shrub plantings. Fifteen stream crossings were constructed to reduce streambank degradation from livestock.

Figure 5. Amsden Dam before Stabilization

Figure 6. Amsden Dam after Stabilization

Objective 3: Implement a public outreach program to inform project area stakeholders about the opportunities for involvement in, and progress of the project.

Task 4: Develop and implement a multimedia outreach program to promote the project, offer opportunities for involvement, and inform the public of project progress.

Product:

7. Project web site

A project web site developed during Segment 1 will be maintained and updated to inform and educate the public on project opportunities and activities. The web site will contain information on each water body, downloadable fact sheets, calendar of events, workshops and meetings, information on BMPs available to landowners, photo gallery, project articles and news releases, and direct links to other websites useful to agricultural producers (weather, USDA, extension).

Milestones:	Planned	Total Completed
Number time's site accessed	1,200	26,889 (visits)

A project website www.neglwatersheds.org was developed during Segment 1. Web pages were updated and new pages added during Segment 2. The capability to track site access is available from the webhost and website visitations have been recorded above.

Product:

8. News Releases

Local radio, television, and print media will be used to inform the public about project opportunities and activities.

Milestones:	Planned	Total Completed
New Articles	10	9
Radio/Television Interviews	10	13

The Project Coordinator appeared on radio station KBWS "Conservation Report" program on thirteen separate dates to promote project activities and discuss conservation issues during Segment 2. The radio station is located in Sisseton, South Dakota and broadcast coverage includes the entire project area. News articles about the project were published in the Day, Marshall, Grant, and Roberts Conservation District's newsletters that are mailed to local producers. Information about the project was also placed in online newsletters published by the Greater Pickerel Lake Association and Enemy Swim Lake Sanitary Sewer District.

Product:

9. Direct personal contact with and involvement in project opportunities

Displays, public meetings, forums, and workshops will provide project area residents a direct personal contact with the project and project involvement opportunities. The project or project partners will sponsor public meetings. Print material will be developed and distributed at these public events. Existing fact sheets will be updated and posted on the projects website.

Milestones:	**Planned**	**Total Completed**
Day County Farm, Home Show	5	5
Sisseton Winter Show	5	4
Britton Winter Show	5	4
Fact Sheets	4	4
Updated Fact Sheets	4	2

Project information was disseminated at the Day County Farm Show, Britton and Sisseton Winter Shows, and Grant County Farm and Home Show. Project personnel developed and participated in several workshops, seminars, water festivals, and other venues where project information or water quality education was presented. A list of the major activities and target audience are listed below.

- Big Sioux Water Festival – Brookings, SD (4^{th} grade students)
- Northern Prairie Water Festival – Aberdeen, SD (4^{th} grade students)
- 123 to the Refuge – Waubay National Wildlife Refuge (1^{st} – 3^{rd} grade students)
- EcoEd Day – Fort Sisseton State Park (7^{th}-8^{th} grade students)
- Step Outside Program – Hartford Beach State Park and Lake Traverse (elementary through high school students)
- Lake and Stream Ecology and Water Quality Workshops – NeSoDak Environmetal Education Center – Enemy Swim Lake, and Outlaw Ranch – Custer, SD (adult teachers and resource agency personnel)
- Lakes Are Cool – NeSoDak Enviromental Education Center – Enemy Swim Lake (5^{th} – 6^{th} grade students)
- South Dakota Envirothon Contest (high school students)
- Northeast South Dakota Range and Land Judging Contest – Webster, SD (high school students)

Descriptions of the above programs can be found on the projects website at www.neglwatersheds.org. A total of 12,528 individuals (mostly K through 12 students) attended the above listed programs and presentations by NEGL staff during Segment 2.

Figure 7. EcoEd Day

Students identify a sample of aquatic invertebrates using a simple key, and then determine the water quality of the stream based on the invertebrate's pollution tolerance.

Below (Figure 8) teachers learn how to collect aquatic invertebrates for identification and use in their classrooms during the Lake and Stream Ecology/Water Quality Workshops held at NeSoDak Environmental Learning Center, and Outlaw Ranch near Custer, SD.

New project fact sheets and brochures were produced or existing updated. These fact sheets and brochures were disseminated at farm and home shows and workshops or can be viewed and downloaded from the projects website.

Figure 8. Lake and Stream Ecology/Water Quality Workshop

Objective 4: Monitor, Evaluate, and Report Project Progress

Task 5: Evaluate the effectiveness of selected past watershed efforts to determine if any BMP implementation needs to be made in future segments of this project to protect or improve water quality of selected lakes and reservoirs.

Product:

10. Water quality data

Comprehensive in-lake water quality sampling will continue during this segment. Composite surface and bottom water samples will be taken during May, June, July, August, and September from two to three sites each water body. Dakota Water Watch volunteer monitoring program will be utilized on lakes where funding for more comprehensive sampling is lacking. Data from these monitoring programs will be used to evaluate the effectiveness of past watershed efforts and determine if any BMP implementation needs to be made in this and future segments of the project to protect or improve water quality of these lakes.

Milestones:	**Planned**	**Total Completed**
	Sample Sets:	
Clear Lake	14	12
Enemy Swim Lake	18	32
Pickerel Lake	50	50
Blue Dog Lake	10	2
Roy Lake	10	2
Buffalo Lake	6	0
South Red Iron Lake	6	0

Comprehensive in-lake water quality monitoring continued on Enemy Swim and Pickerel Lakes throughout Segment 2. Funding for water quality monitoring was received from the Enemy Swim Lake Sanitary Sewer District and Greater Pickerel Lake Association/Pickerel Lake Conservancy for their respective lakes. Clear Lake was sampled during the 2009 and 2010 summer months, but funding by the Clear Lake Association was discontinued after 2010. The Dakota WaterWatch program was utilized for sampling Blue Dog and Roy Lakes during Segment 2. However, due to flooding Blue Dog Lake was only sampled during the 2010 summer season. Roy Lake sampling began in 2012; however the sampling kits for this lake and Buffalo and Red Iron Lakes were not received in 2013. These lakes will continue to be sampled during Segment 3. Water quality data for these lakes can be found in Section 4.0 of this report.

Task 6: Reports detailing project activities as required by the U.S. Environmental Protection Agency, South Dakota Department of Environment and Natural Resources; and participating agencies and associations will be prepared and submitted

Product:

11. Project reports

The reports and milestones for each include;

- GRTS reports will be submitted electronically to SD DENR to meet reporting requirements for 319 funds. Reports will include information on project milestones completed and planned; load reductions for BMPs installed as estimated by the Step-L model; and locations where BMPs have been installed and/or in use utilizing ArcMap.

Milestones:	**Planned**	**Total Completed**
Annual Reports (GRTS)	5	5

- Written monthly and semi-monthly progress and financial reports will be submitted to the project sponsor and co-sponsors. These will be submitted electronically or by attendance of the Project Coordinator.

Milestones:	**Planned**	**Total Completed**
Progress/Financial Reports Co-sponsors (semi-monthly)	30	20
Project Sponsor (monthly)	60	40

- A year-end annual report will be submitted to the local Advisory Council. Reports will include specific information on milestones reached during each year of the project.

Milestones:	**Planned**	**Total Completed**
Annual Reports (1 per year)	5	5

- Final Report

  The final project report will follow EPA format requirements and include the final status of all project milestones, final project budgets, pictures of project activities, and maps showing the locations of completed BMPs.

Milestones:	Planned	Total Completed
Final Project Report	1	1

3.0 Best Management Practices Implemented

Best management practices developed and implemented during Segment 2 include riparian buffers on marginal pastureland and cropland, improved grazing management, streambank and shoreline stabilization, and planting highly erodible cropland to hay. BMP program descriptions are given below.

Riparian Area Management Program (RAM)

Funding Source

EPA 319 clean water funds were utilized to increase rental rates for Conservation Reserve Program (CRP) acres, and pay for additional buffer (120+) acres or ineligible CRP acres as described below. Payments for eligible CRP acres were made through the USDA Conservation Reserve Program administered by the Farm Service Agency (FSA).

Purpose

The Riparian Area Management Program was designed to reduce non-point source pollutants from entering surface waters from adjoining cropland, pastures, and animal feeding operations.

Eligibility

Eligible land must be located in a project watershed and must be adjacent to a stream or wetland draining to a project lake, or shoreline adjacent to a project lake. This program was for agricultural land only and not available for residential or commercial properties. EPA 319 Clean Water grant funds for RAM were utilized to increase the soil rental rate by 35% for acres enrolled in the CRP program, and for land not eligible under USDA's Conservation Reserve Program (CRP) under the following conditions.

- Landowner has applied for and accepted into USDA CRP program; however, a small portion of land does not qualify and would leave this portion isolated from the main operation for cropping, haying, or grazing utilization (field corners etc.).

- Land that does not qualify for a USDA CRP program because of current land use (or allocation on USDA CRP funds have been reached) that would however, be beneficial to water quality if utilized as a riparian buffer will be eligible for RAM funding.

Lands that are currently grazed or cropped up to the lake shore or stream bank will be a high priority. Lands that are currently maintained as a riparian area will have a lower priority.

Requirements

Proof of ownership was required for landowners. If the applicant did not own the land, a written affidavit defining the relationship between the landowner and applicant must be provided to the Conservation District covering the entire length of the contract period. The landowner must sign a contract and conservation plan with the Day, Grant, Marshall, or Roberts Conservation Districts for the RAM program that will equal the length of time of the CRP contract with USDA (10 to 15 years). As defined in the contract, failure to implement all of the required practices or maintain the buffer for the length of the contract, will require repayment of all funds and liquidated damages of twenty-five percent (25%) of the total payments disbursed to the participant. If the status of agricultural land enrolled into the RAM program changes to residential or commercial lakeshore property, all funds dispersed to the participant must be repaid to the Conservation District unless a minimum of seventy-five percent (75%) of the buffer zone along the lakeshore is maintained under the new land-use.

Cost Share and Incentive Payments

RAM soil rental rates were the same as those available for CRP programs including; CP21 – Filter Strips, CP22-Riparian Buffers, CP29-Marginal Pastureland Wildlife Habitat Buffer, CP30 Marginal Pastureland Wetland Buffer. RAM funds were used to increase the CRP soil rental rate by 35%. If the RAM program was used to add adjacent acres to a USDA CRP contract, total RAM acres could not exceed thirty-five percent (35%) of the total acres enrolled in CRP.

Example:

- A landowner is accepted to enroll 7 acres into a CRP program and has an adjacent 5 acres of land to include in the contract beyond the maximum CRP buffer width of 120 feet. The soil rental rate is $46 per acre. RAM funds can be used to increase the soil rental rate by $16 an acre increasing the soil rental rate to $62 per acre. Of the 5 acres of

additional (120+ buffer), 2.5 acres (rounded) or 35% of the 7 acres of CRP could be paid for with RAM funds at the CRP soil rental rate of $46 per acre. If the number of acres is below thirty-five percent (35%), all acreage will be eligible for RAM payments. The Ram contract must be of equal length (10 or 15 years) as the CRP contract.

RAM funds were used to pay seventy-five percent (75%) of the eligible CRP soil rental rates. The remaining twenty-five percent (25%) were considered landowner matching funds. Using the example above; the producer would be eligible for $1,680 for a 15 year contract on the 7 acres of CRP buffer ($16 x 7 acres x 15 years), and an additional $1,725 for the 2.5 acres of 120+ buffer ($46 x 2.5 acres x 15 years) for a total of $3,405. A lump sum payment of $2,553.75 (75%) would be paid to the producer, the remaining $851.25 (25%) would be considered the producer's cash match.

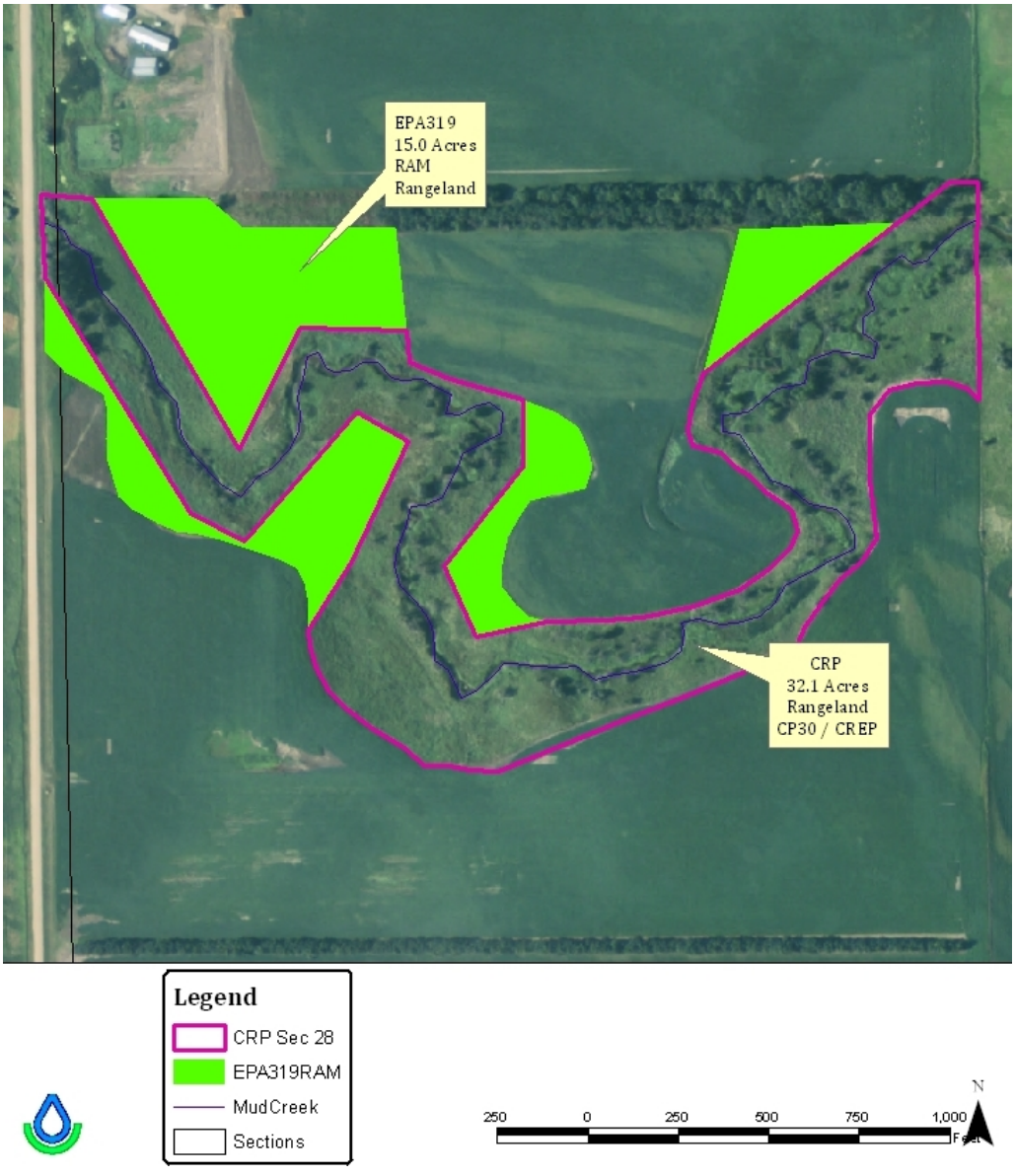
All RAM payments were made lump sum to the landowner upon completion of required practices and approval of all contracts; including completion of all contract requirements of adjoining CRP acres.

Eligible conservation practices for implementing riparian buffers included buffer fencing, in-stream livestock crossings, alternative water sources (nose pumps, solar, stock dams, wells, pipelines, and stock tanks).

In addition, the South Dakota Dept. of Game, Fish and Park's Conservation Reserve Enhancement Program added additional cash incentives if the landowner allowed public hunting on enrolled CRP acres located in the James River Basin. This included all project watersheds in Marshall County, and the Amsden and Pierpont watersheds in Day County.

An example of a CRP/RAM buffer is given below in Figure 9.

Figure 9. RAM/CRP Buffer Conservation Plan



Range and Pastureland Improvement and Grazing Management

Funding Source

Cost share for implementing practices to improve grazing management were made possible through a Coordinated Soil and Water Conservation Commission Grant from the South Dakota Dept. of Agriculture – Division of Resource Conservation and Forestry, and through the

Mississippi River Basin Healthy Watersheds Initiative for the Upper Minnesota River Basin portion of the project.

Purpose

The Range and Pastureland Improvement and Grazing Management program was available for producers who wanted to improve the current utilization and condition of their native range and/or pastureland.

Eligibility

Eligible land must be located in a project watershed. High priority was given to lands adjacent to streams and wetlands draining to a project lake; or adjacent to project lake shores.
Lands that are currently grazed up to the lake shore or stream bank had the highest priority.

Requirements

Proof of ownership was required for landowners. If the applicant did not own the land, a written affidavit defining the relationship between the landowner and applicant had to be provided to the Conservation District covering the entire length of the contract period for the Conservation Commission Grant. This grant also required the landowner to implement a grazing plan defining stocking rates and days, and sign a contract and conservation plan with the Day, Grant, Marshall, or Roberts Conservation Districts where the land is located before receiving cost share. As defined in the contract, failure to implement all of the required practices or maintain the practices and grazing plan for the length of the contract will require repayment of all funds and liquidated damages of twenty-five percent (25%) of the total payments disbursed to the participant.

Cost Share and Incentive Payments

The Conservation Commission Grant Docket provided cost share for general livestock needs at 30% of the Commission grant docket costs with a 30% minimum landowner cash match

Eligible conservation practices for grazing improvements and cost share rates included cross fencing at $0.95 per lineal foot, wells at $35 per lineal foot, pipelines (above and below ground) at $0.85 per lineal foot above ground to $3.00 per lineal foot for below ground, stock tanks at $1.50 per gallon, rural water hookups at $1,650, nose pumps at $500 each, stock ponds at $2,000 each, and alternative energy sources (solar, wind and propane generators) up to $5,000. Stock ponds required fencing on a minimum of three sides, or complete protection and use of nose pumps, or alternate energy sources like solar, and stock watering tanks. Stock ponds could not be placed in perennial or ephemeral streams with defined bed and bank. New rural water hook-

ups or wells that serve both domestic and livestock purposes were only covered for the livestock portions at a maximum of 50%.

Environmental Quality Incentive Program (EQIP) funds were available through the initiative for the Upper Minnesota River Basin from the Natural Resources Conservation Service. The NRCS cost docket was used to determine incentive payments for producers who implemented prescribed grazing management or implemented grazing management improvements including water development and cross fencing. Incentive payments included prescribed grazing at $7.63 per acre, pipeline at $2.23 per lineal foot, stock watering tanks at $0.84 per gallon, stream crossings at $13,98 per cubic yard, high tensil electric fence at $0.53 per lineal foot, stock ponds at $3,000, and rural water hook-up at $2,515.

Additional cost share was available through the United States Fish and Wildlife Service's "Partners for Wildlife" program for perimeter fence, and an additional 25% to 40% cost share for watering facilities. Use of USFWS funds required the landowner to sign a cooperative agreement with the USFWS.

Pasture and Hayland Plantings for Critical Areas

Funding

Cost share for converting cropland to pasture/hayland were made possible through a Coordinated Soil and Water Conservation Commission Grant from the South Dakota Dept. of Agriculture – Division of Resource Conservation and Forestry.

Purpose

The Pasture and Hayland Planting for Critical Areas program was available for producers who wanted to convert existing cropland to grass and/or grass alfalfa mix for utilization as pasture or hay.

Eligibility

Eligible land had to be located in a project watershed. High priority was given to lands adjacent to streams and wetlands draining to a project lake; or adjacent to project lake shores, and/or highly erodible land.

Requirements

Same as previously described bmps.

Cost Share and Incentive Payments

Conservation Commission Grant funds paid fifty-percent (50%) of the Commission grant docket cost, with a minimum landowner cash match of twenty-five percent (25%). Eligible practices included seedbed preparation, seeding operation, and cost of seed based on type or mix at an average of $40 per acre. Cost share was also available for additional conservation practices for pasture utilization including; cross fencing, wells, pipelines (above and below ground), stock tanks, rural water hookups, nose pumps, stock ponds, and alternative energy sources (solar, wind, propane generators) at the same cost share rates described above for grazing management. Stock ponds required fencing on a minimum of three sides or complete protection and use of nose pumps, or alternate energy sources like solar, and stock watering tanks. Stock ponds could not be placed in perennial or ephemeral streams with defined bed and bank. New rural water hook-ups or wells that serve both domestic and livestock purposes were only covered for the livestock portions at a maximum of 50%.

Additional cost share was available through the United States Fish and Wildlife Service's "Partners for Wildlife" program for native grass plantings.

Streambank and Shoreline Stabilization

Funding

Funds for stabilizing eroding streambank and shoreline were available from EPA 319 Clean Water grant funds, and the Environmental Quality Incentive Program (EQIP) through the Mississippi River Healthy Watersheds Initiative.

Purpose

Streambank and shoreline stabilization was available for producers who wanted to implement rock rip-rap or vegetative practices to protect and restore eroding areas.

Eligibility

Eligible land had to be located in a project watershed. High priority was given to lands adjacent to major streams and rivers. Funding was available for protecting and restoring lake shorelines but only on agricultural or public lands. Funding was not available for private lake lots.

Requirements

Same as previously described bmps.

Cost Share and Incentive Payments

EPA 319 Clean Water grant funds were available to pay up to 75% of the cost of the project. Costs were based on EQIP docket prices which were $93 per lineal feet. EQIP paid $54 per acre for reseeding critical areas.

4.0 Monitoring Results

4.2 BMP Effectiveness Evaluations

The effectiveness of BMPs installed and load reductions achieved relative to improvement in water quality were evaluated using tools available from SD DENR and NRCS. Reductions for BMPs implemented during this segment are given in Table 7 and were calculated using the StepL Model.

4.3 Surface Water Improvements

In-lake sampling of several project lakes continued from Segment 1. Water quality monitoring will provide data to track changes due to the implementation of best management practices in these lakes watersheds and major changes in land-use like the expiration of Conservation Reserve Program contracts, and conversion of pasture and native range to row crops.

Table 7.

	Load Reductions		
Watershed	Nitrogen (lbs/yr)	Phosphorus (lbs/yr)	Sediment (tons)
Upper James River Basin HUC #10160005			
Amsden Dam	2914	951	738
Buffalo Lake	1275	426	142
Clear Lake	662	823	442
Roy Lake	945	1167	0
Mud Creek	7287	2677	3101
Total:	**13083**	**6044**	**4423**
Upper Big Sioux River Basin HUC #10160010			
Blue Dog Lake	211	65	37
Pickerel Lake	1111	410	389
Total:	**1322**	**475**	**426**
Red River Basin HUC #09020101			
Lake Traverse	7662	2246	2145
White Lake Dam	122	26	17
Total:	**7784**	**2272**	**2162**
Upper Minnesota River Basin HUC #07020001			
Little Minnesota River	943	348	624
North Fork Whetstone River	13111	4057	5646
South Fork Whetstone River	1253	395	379
North Fork Yellowbank River	905	291	366
South Fork Whetstone River	16789	5204	6878
Total:	**33001**	**10295**	**13893**

Water quality parameters, that were monitored included:

Total Kjeldahl - N	Total Suspended Solids
Ammonia - N	Chlorophyll a
Total Phosphorus	Total Dissolved Phosphorus

Analysis was completed at the Water Resources Institute located at South Dakota State University located in Brookings, SD until the labs closing in 2011. The South Dakota Agricultural Laboratories, also located in Brookings, was utilized beginning in 2012 for sample analysis.

Water quality parameters that were monitored by the local sampler included:

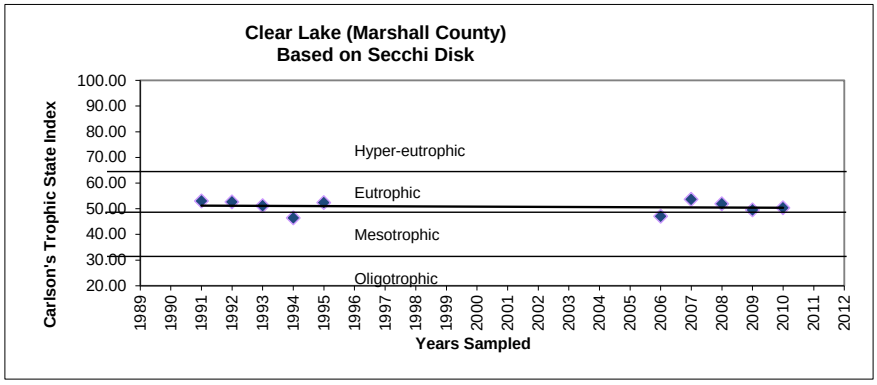
Dissolved Oxygen	Field pH	Water Temperature
Air Temperature	Field Observations	Seechi Depth

Clear Lake

In-lake sampling of Clear Lake occurred during the months of May through September in 2009, and due to a reduction in funds from the Clear Lake Association the lake was only sampled during the months of May through July in 2010. Composite surface and bottom samples were collected from three sites located on the lake. Water quality samples and field data collected from Clear Lake during this segment showed the lake meeting all state water quality standards for its assigned beneficial uses (Table 3). The lakes trophic state is eutrophic based on Secchi depth (Figure 10) samples taken from 2007 to 2010, with little change observed from year to year.

Some heavy growths of filamentous algae observed growing along the lakes shorelines in past years may indicate nutrients are reaching the lake from leaching shoreline septic systems. A survey of soil types around the lakes shoreline found most soils along developed areas of the lake to be unsuitable for septic drain fields. Most shoreline property has gone from small seasonal cabins to year-round homes connected to a rural water system. Thus, septic system influent has increased with a majority of lake homes now having multiple bathrooms, laundry facilities, dishwashers, and hot tubs. A fluorescent dye slug test conducted during the summer of 2010 showed that effluent from septic systems located around the shoreline was reaching the lake. The Clear Lake Betterment Association has been working to form a sanitary sewer district around the lake for several years, but to date, have been unsuccessful in procuring enough votes for the districts formation. The lake association provided funding to pay for in-lake water quality sample lab fees.

Figure 10.

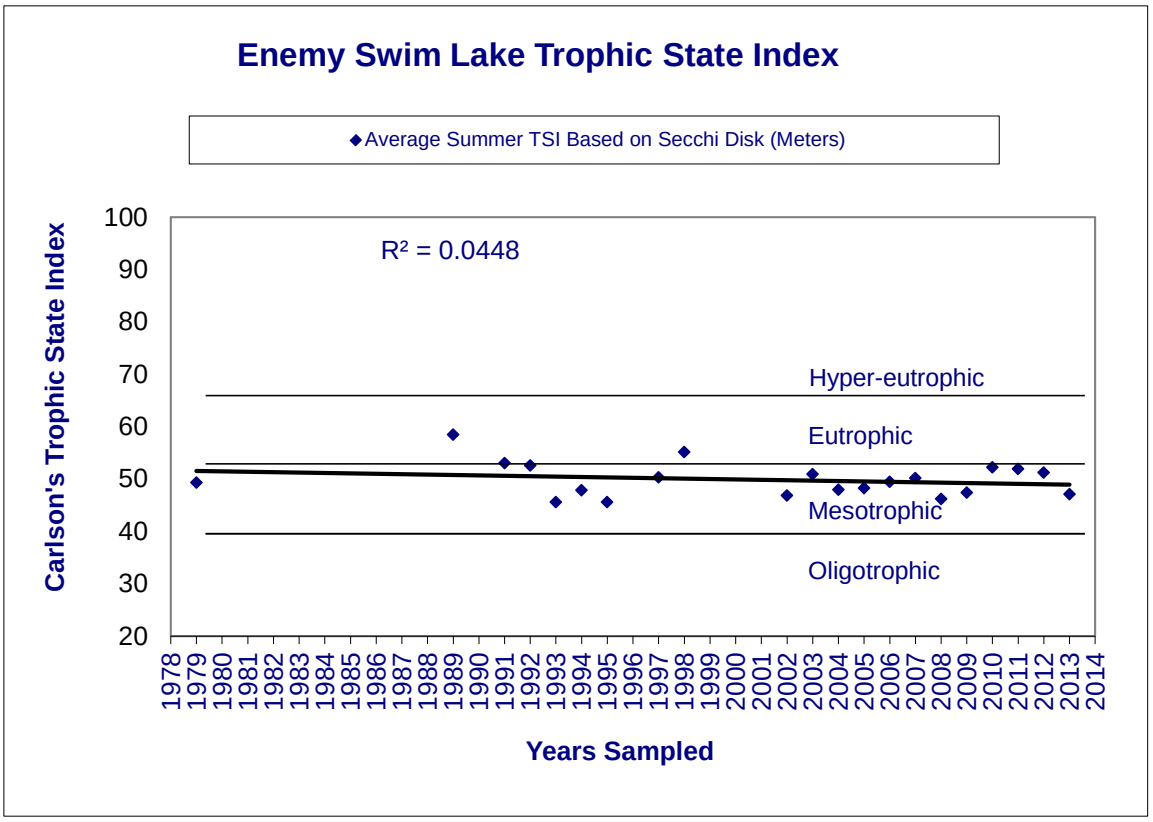


Enemy Swim Lake

In-lake sampling of Enemy Swim Lake occurred during the months of June, July, and August from 2009 through 2014. Composite surface and bottom samples were collected from three sites located on the lake. Water quality samples and field data collected from Enemy Swim Lake during this segment showed the lake meeting all state water quality standards for its assigned beneficial uses (Table 3). The lakes trophic state improved slightly becoming more mesotrophic based on Seechi depths taken from 2007 to 2013 (Figure 11).

The Enemy Swim Sanitary Sewer District provided funding to pay for in-lake water quality sample lab fees.

Figure 11.



Pickerel Lake

In-lake sampling of Pickerel Lake occurred during the months of May through September from 2009 through 2013. Composite surface and bottom samples were collected from three sites located on the lake. Water quality on Pickerel Lake has deteriorated over the past decade. In

2013 the total dissolved phosphorus in the lake increased significantly (Figure 12). The lake is deep enough to stratify and has occasionally in the past. However, beginning in 2011 the lake has stratified yearly with the hypolimnion becoming anoxic on each occasion. Currently, the reason for the increase in stratification is unknown, and it is not clear if the significant increase in total dissolved phosphorus is from internal or external loadings. There has been a significant change in the land use within the lakes watershed. Prior to 2006, the majority of cropland located in the lakes watershed was enrolled in the Conservation Reserve Program (CRP) and planted to grass. Beginning in 2006, as CRP contracts expired and commodity prices began to hit record highs, the majority of CRP and a significant amount of native grassland was converted to row crops. A tributary water quality study started during the last few months of Segment 2 will continue through the first year of Segment 3 and will provide data on external loadings from the lakes tributaries. The lakes Trophic State Index (TSI) for Seechi Disk is shown in Figure 13.

The Greater Pickerel Lake Association/Pickerel Lake Conservancy provided funding to pay for in-lake water quality sample lab fees.

Figure 12.

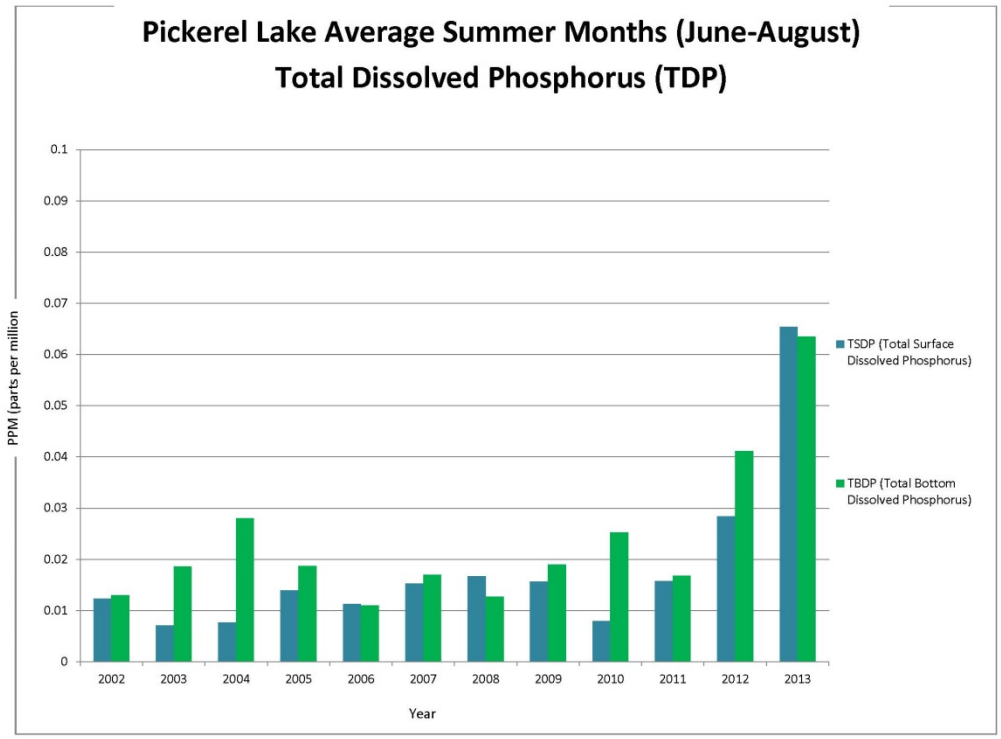
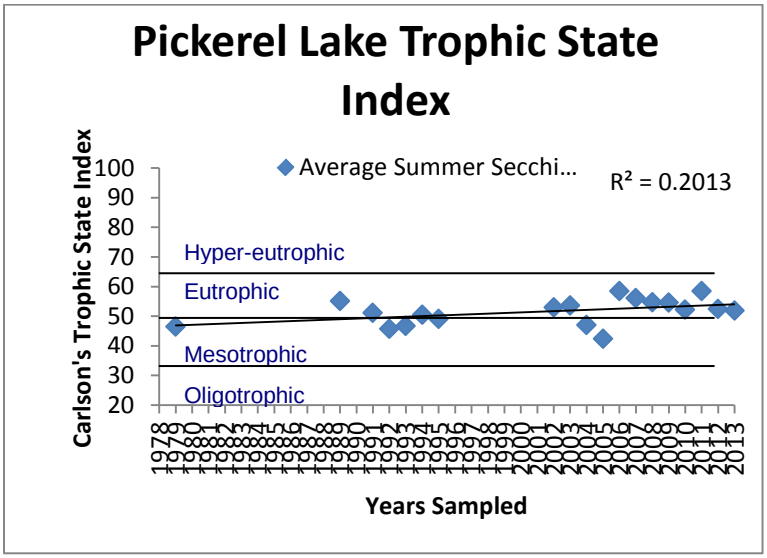


Figure 13.



4.7 Best Management Practice Operation and Maintenance

Producers receiving cost share are required to sign a contract with the co-sponsoring Conservation District, and project sponsor. The contract lists the practices being cost shared, the life span of each practice, and whether the EPA 319 funded practice is contingent upon the successful implementation of a USDA practice like the Conservation Reserve Program. The length of the contract is based upon the longest lifespan of the implemented practices. The lengths of most contracts are ten to twenty years. Field checks to ensure the practice was properly implemented are made by project sponsor, or NRCS personnel before cost share payments are made to the producer. Producers who do not maintain practices funded by EPA 319 grant funds for the full length of the contact are required to repay the sponsoring Conservation District cost share funds, plus liquidated damages of twenty-five percent.

5.0 Coordination Efforts

The lead sponsor for this project was the Day County Conservation District. The district hired a Project Coordinator who administered grant funds and coordinated day-to-day work plan activities, and a Resource Conservation Technician who worked one-on-one with watershed producers in planning and implementing best management practices. An advisory council with representatives from the resource agencies and organizations listed below and in Sections 5.3 and 6.0 advised the project sponsor, and developed priorities, practice manuals, work plans, and strategies for this and future project segments.

5.1 Coordination from Other State Agencies

The following state agencies provided or administered funds utilized to implement this project.

- **South Dakota Department of Environment and Natural Resources (SD DENR)** – Administered EPA Section 319 grant funds and provided South Dakota Clean Water State Revolving Grant Funds to fund project activities. SD DENR personnel provided oversight of all project activities through on-site office visits, watershed tours, review/approval of reports, and approval of payment requests for 319 and CWSRF funds.

- **South Dakota Department of Agriculture Division of Resource Conservation and Forestry** – Funding through the South Dakota Coordinated Soil and Water Conservation Commission Grant for technical assistance and conservation practice implementation that included grazing improvements and pasture/hayland grass planting.

- **South Dakota Game, Fish, and Parks (GFP)** – Technical advice and cost-share funds through the Department's "Private Lands Programs" for grazing improvements, wetland restoration, grass seeding, and funding and technical help for the Conservation Reserved Enhancement Program (CREP), which provided additional rental payments for producers participating in the Conservation Reserve Program in the James River Watershed.

- **South Dakota State University, Water Resources Institute (WRI)** – Technical advice for water quality testing and reporting, analysis of water samples, personnel for water sampling and Lakes Are Cool program, funding of water festivals and ecology workshops.

5.3 Federal Coordination

The following federal agencies provided or administered funds utilized to implement this project.

- **USDA Natural Resources Conservation Service (NRCS)** – Provided technical assistance for BMPs through District Conservationists, Soil and Range Conservationists, and Tribal Liaison. Provided program funds for the Environmental Quality Incentive Program (EQIP) and special watershed initiatives including the Agricultural Water Enhancement Program (AWEP) for producers in the Red River Watershed portion of the project, and the Mississippi River Basin Healthy Watersheds Initiative for producers located in the Upper Minnesota River Basin portion of the project.

- **USDA Farm Service Agency (FSA)** – Provided program funds for the Conservation Reserve Program (CRP).

- **U.S. Fish and Wildlife Service (FWS)** – Technical advice and cost-share funds through the "Partners for Fish and Wildlife" program for grazing improvements, small dams, wetland restoration, and grass seeding.

5.4 USDA Programs

Two USDA program were utilized during this segment. The Conservation Reserve Program (CRP) administered by the Farm Service Agency paid producers to implement buffers along marginal pastureland (CP-30 Marginal Pastureland Wetland Buffer) and cropland (CP-22 Riparian Buffer), or convert cropland to grass and restore farmed wetlands (CP-37 Duck Nesting Habitat), and (CP-23 Wetland Restoration). CRP practices would be implemented for a period of ten to fifteen years. Producers received an annual rental rate dependent on soil type, or whether the buffer was adjacent to a permanent or seasonal water body. Additional incentive payments for maintenance and implementation of conservation practices like fencing and alternate livestock watering sources were also available. The Environmental Quality Incentive Program (EQIP) was also used to fund implementation of best management practices in project watersheds, these included funds from a yearly general statewide EQIP program, and two special initiatives for the Upper Minnesota River and Red River Basins.

5.7 Other Sources of Funds

The project received or utilized additional federal and state funding, local cash, and in-kind contributions from a number of sources to fund project activities and generate funds to match state and federal grants as shown in Table 8.

The project applied for and received three Conservation Commission Grants from the South Dakota Department of Agriculture's Division of Resource Conservation and Forestry. These funds were utilized to pay project personnel wages and benefits, administrative costs, and provide agricultural producers cost share for implementing best management practices. Practices implemented included pipelines, livestock watering tanks, wells, solar panels and pumps, and rural water hookups to improve grazing management, and seeding cropland to hayland or pasture. The Conservation Commission Grant required producers to pay a minimum of 30% cash for each practice implemented. Cost share rates and practice costs were based on a docket set by the Conservation Commission.

The South Dakota Department of Environment and Natural Resources provided funding through its South Dakota Clean Water State Revolving Funds grant to fund implementation of best management practices.

USDA's Conservation Reserve Program (CRP) was utilized to protect riparian areas along project water bodies. CRP enrollment was often in conjunction with the projects Riparian Area Management (RAM) program. CRP provided a yearly rental rate for the length of the contract and signing, maintenance, and practice implementation incentive payments.

Funding was also received under the Mississippi River Basin Healthy Watersheds Initiative for implementing conservation practices in the upper Minnesota River watershed (Upper Minnesota River Nutrient Reduction and Water Quality Improvement Project), and the Agricultural Water Enhancement Program (AWEP) for the Red River Basin. These special initiative's provided Environmental Quality Incentive Program (EQIP) funds for streambank stabilization including rock rip-rap and stream crossings, nutrient management, prescribed grazing and grazing management improvements, grassed waterways, and cover crops. Producers did not have to compete on a statewide basis for these EQIP dollars and were ranked only with producers within these two specific watersheds.

Conservation Reserve Enhancement Program (CREP) funds were provided to producers by the South Dakota Dept. of Game, Fish, and Parks who enrolled in USDA's CRP program and allowed public hunting on these CRP acres. CREP funds paid an additional 40% of the base CRP rental rate paid to producers by USDA.

The Greater Pickerel Lake Association, Clear Lake Betterment Association, and Enemy Swim Sanitary Sewer District provided local cash for water quality studies of Clear, Enemy Swim and Pickerel lakes.

The Day, Grant, Marshall, and Roberts Conservation Districts provided both cash and in-kind match for the project. Cash match included stipends paid by the Conservation Districts for District Supervisors who attended project workgroup meetings and attended monthly board meetings where project reports and updates were given. In-kind match included the use of the project coordinators boat and other equipment utilized for lake water quality monitoring, and rental for storage of equipment utilized by the project.
Producer cash and in-kind match includes the producer's share of implemented practice costs and in-kind match for their labor and personnel equipment used to implement a conservation practice. Material costs over and above grant docket costs were also calculated from invoices provided by the producer and counted as cash match. Producer cash match ranged from 25% to 75% depending on the funding source used.

Table 8. Other Sources of Funds				
Funding Source	**Other Federal**	**State**	**Local Cash**	**Local In-Kind**
USDA Natural Resources Conservation Service (EQIP)	$ 305,371.15	$ -	$ -	$ -
USDA Natural Resources Conservation Service (CTA)	$ 20,000.00	$ -	$ -	$ -
South Dakota Dept. of Ag. Conservation Commisssion Grant	$ -	$ 119,630.53	$ -	$ -
South Dakota Clean Water State Revolving Fund	$ -	$ 3,741.00	$ -	$ -
South Dakota Game, Fish, and Parks	$ -	$ 1,435,957.69	$ -	$ -
East Dakota Water Development District	$ -	$ -	$ 2,980.00	$ -
Greater Pickerel Lake Association/Pickerel Lake Conservancy	$ -	$ -	$ 7,243.40	$ -
Clear Lake Betterment Association	$ -	$ -	$ 1,774.00	$ -
Enemy Swim Sanitary Sewer District	$ -	$ -	$ 3,374.00	$ -
Day County Conservation District	$ -	$ -	$ 9,892.31	$ 6,747.32
Marshall County Conservation District	$ -	$ -	$ -	$ 615.00
Roberts County Conservation District	$ -	$ -	$ -	$ 432.00
Producer Cost Share Match	$ -	$ -	$ 123,002.37	$ -
Totals:	$ 325,371.15	$ 1,559,329.22	$ 148,266.08	$ 7,794.32

6.0 Summary of Public Participation

Development of the project was supported by several local entities. The Day, Grant, Marshall, and Roberts Conservation District Board of Supervisors composed of local landowners and agricultural producers passed resolutions and signed Memorandum of Understandings with the Project Sponsor supporting the Northeast Glacial Lakes Watershed Improvement and Protection Project. These same Boards provided input on priority water quality issues identified by resource agencies and assessment projects in their respective counties as part of the project advisory council. The Clear Lake Association, Greater Pickerel Lake Association/Pickerel Lake Conservancy, and Enemy Swim Sanitary Sewer District all supported the watershed improvement and protection activities that were planned. The activities planned would protect their investments and infrastructures. Conservations District board meetings, farm and home shows, lake ecology workshops, lake association and sanitary sewer district meetings, all gave the general public a chance to participate in the development and monitor the progress of the watershed project. Local entities that participated in the planning and with monetary support of the watershed project are listed below.

- **South Dakota Association of Conservation Districts** – Provided technical assistance to local conservation districts. Administered 303 (d) Assistance and Conservation Technical Assistance (CTA) funds utilized by the project.

- **Grant County Conservation District –** Project partner/co-sponsor by MOU, local support and funding.

- **Marshall County Conservation District** – Project partner/co-sponsor by MOU, local support and funding.

- **Roberts County Conservation District** – Project partner/co-sponsor by MOU, local support and funding.

- **East Dakota Water Development District (EDWDD) –** Local support and funding for Grant, and eastern Day County activities.

- **Enemy Swim Lake Sanitary Sewer District** – Local support and funding for water quality testing.

- **Greater Pickerel Lake Association/Pickerel Lake Conservancy** – Local support and funding for water quality monitoring and land-use mapping.

- **Clear Lake Association** – Local support and funding for water quality testing.

- **Ne-So-Dak Environmental Learning Center –** Local support, campus and staff for workshops and Lakes Are Cool program.

- **South Dakota Discovery Center** –Provided grants from the South Dakota 319 Information and Education Project that funded the Lake and Stream Ecology and Water Quality Workshops held by the Northeast Glacial Lakes Watershed Improvement and Protection Project during Segment 2.

7.0 Aspects of the Project That Did Not Work Well

The majority of the project goals, objectives, and activities were completed in an acceptable fashion. While some milestones were not met, it is nearly impossible to promote, plan, and implement best management practices for an agricultural economy that is constantly in flux. Record high commodity prices for corn during the last years of Segment 2 resulted in the return of almost all Conservation Reserve Program grassland acres back to row crops. Native pasture was also converted due to these high prices, and many producers sold their livestock herds because of high feed prices and lack of hay. Thus, milestones for animal waste management, hay and pasture planting, and grazing management were not met during the project period. During this segment, field tiling became a dominate practice especially in the Minnesota River drainage which may negatively affect water quality in project waterbodies. The project was also affected by the federal government shutdown in 2013, and due to the lack of farm bill funding in 2012 and 2013, Conservation Reserve Program funds were not available and no new sign-ups

were held reducing the number of acres that could have been implemented during this segment. During Segment 2, the project hired four different resource technicians. Most of these technicians were hired directly after graduating from college and this was their first full time position. Because the project is funded by soft money, most once their training was complete, applied for and were hired in more permanent positions, several with the Natural Resources Conservation Service. The project was successful for setting the stage for Segment 3.

8.0 Future Activity Recommendations

Segment 3 will continue the efforts brought about by this project. While a majority of waterbodies listed as impaired during the writing of this Project's Implementation Plan in 2009 are no longer listed as so, efforts will continue to preserve the water quality of these lakes. Future project segments will concentrate on implementing riparian buffers along pastures and cropland to reduce nutrient loading to project waterbodies.