SECTION 319 NONPOINT SOURCE POLLUTION CONTROL PROGRAM

WATERSHED PROJECT FINAL REPORT

Northeast Glacial Lakes Watershed Improvement and Protection Project

Segment 3

By

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

Grant # C9-998185-12, C9-998185-14

EXECUTIVE SUMMARY

PROJECT TITLE: Northeast Glacial Lakes Watershed Improvement and Protection Project Segment 3

PROJECT START DATE: June 14, 2014

PROJECT COMPLETION DATE: July 31, 2017

FUNDING:	TOTAL BUDGET	$1,511,282.00
	TOTAL EPA BUDGET	$400,000.00
	TOTAL EXPENDITURES OF EPA FUNDS	$308,713.58
	TOTAL SECTION 319 MATCH ACCRUED	$317,329.45
	OTHER FEDERAL FUNDS	$590,488.07
	TOTAL EXPENDITURES	$1,216,531.10

SUMMARY ACCOMPLISHMENTS

The project has exceeded its goal for implementing riparian buffers utilizing the Continuous Conservation Reserve Program (CCRP) by 388 acres. The project milestone was 150 acres; to date a total of 538 acres of CCRP have been implemented. A total of 843 acres of riparian buffers utilizing EPA 319 funds have been implemented, the projects goal was 447 acres. An additional 1,759 acres of general Conservation Reserve Program (CRP) were implemented in the project area restoring 220 acres of wetlands.

Stabilization of 2,291 lineal feet of shoreline and streambank has been completed utilizing rock rip-rap, exceeding the projects goal of 1,000 lineal feet. 1,150 lf of streambank stabilization was completed utilizing Natural Resource Conservation Services Environmental Quality Incentive Program (EQIP) and 121 lf. utilizing EPA 319 Clean Water Grant funds. An additional 1,020 lf of streambank was stabilized

with the implementation of thirty-two stream crossings constructed where livestock had degraded streambank vegetation and erosion was occurring.

The implementation of CCRP, CRP, stream crossings and streambank stabilization protected and improved 434,653 lineal feet or 82 miles of streambank and shoreline in the project area.

A total of 20 grazing management plans have been written to improve 10,180 acres of pasture and rangeland exceeding the projects goal of 4 grazing management plans.

Implementation of best management practices resulted in a total calculated reduction of 65,274 lbs. per year of nitrogen, 19,026 lbs. per year of phosphorus, and 23,088 tons per year of sediment in the watersheds included in Segment 3 (Table 7, page 34).

Milestones for information and education activities have been completed. An audience of 8,192 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 3 of the Northeast Glacial Lakes Watershed Improvement and Protection Project was amended in 2014 and 2015. 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.

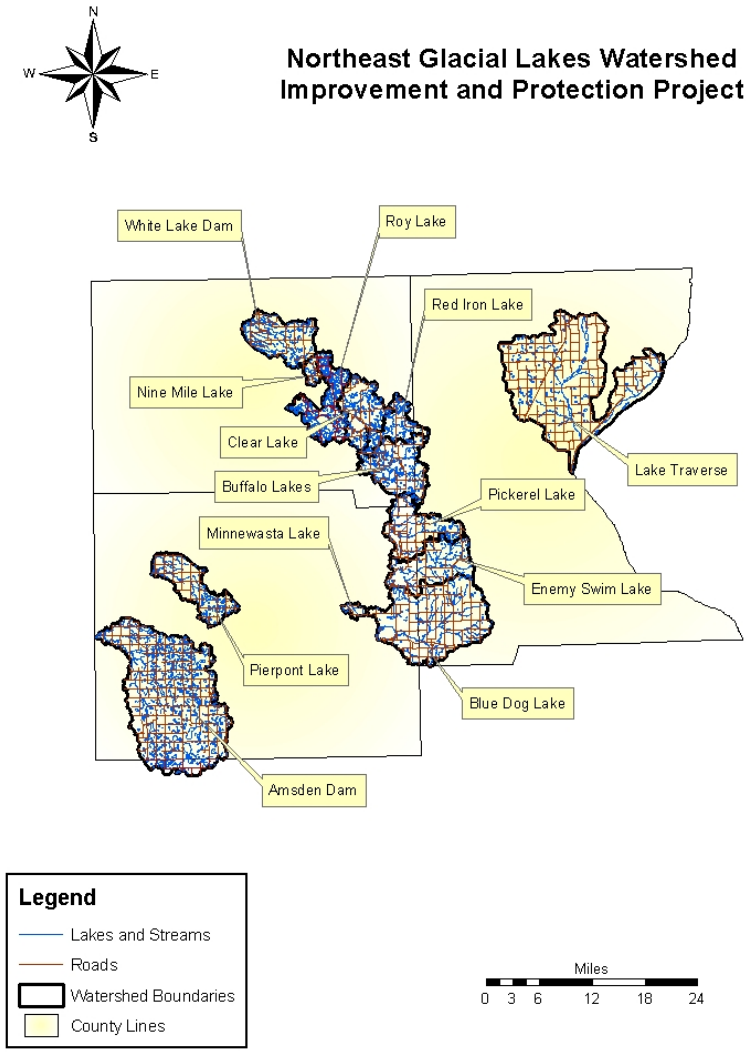
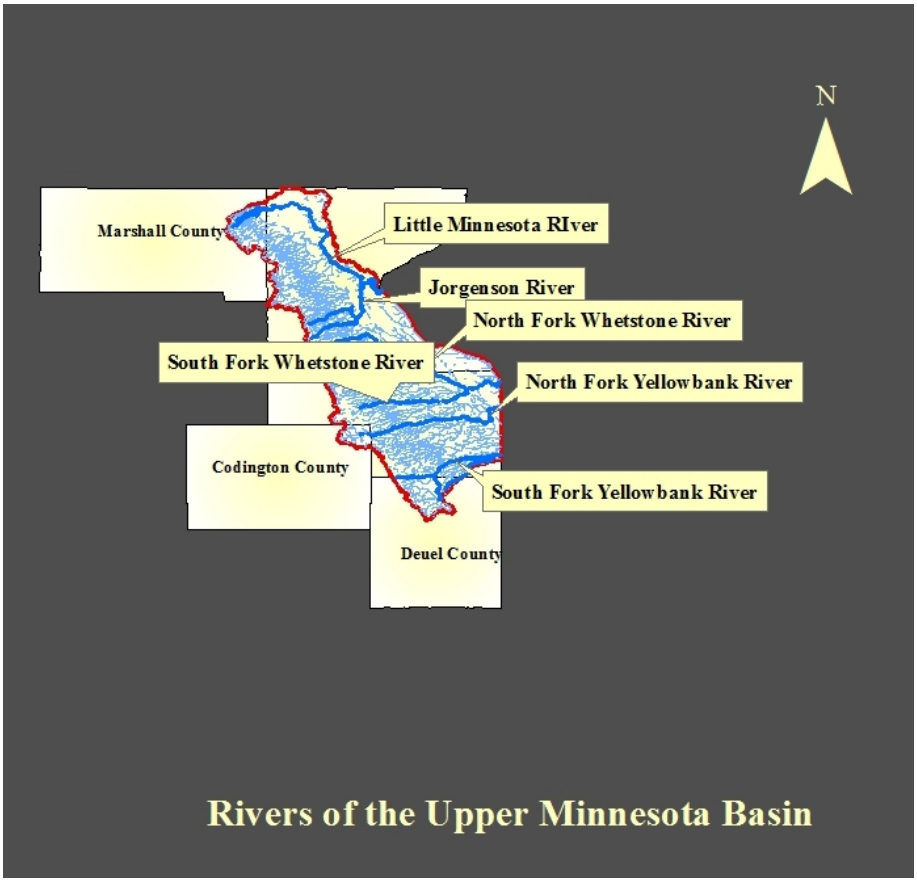


Figure 2.



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 3. This data was retrieved from various SD Dept. DENR publications.

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)	Max. 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	2,722	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	153,836	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 3.

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

The most recent integrated report at the time the original project implementation plan was written "***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 3. 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 third 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 3.

2.0 Project Goals, Objectives, and Activities

This project was the third 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 subsequent project segments. Revised memoranda of understanding that define the responsibilities and obligations of each district in the support and execution of Segment 3 will be entered into between the Day, Codington, Deuel, Grant, Marshall, and Roberts Conservation Districts. A Project Coordinator and two Conservation Technicians employed by the project sponsor will aid in the implementation of project activities within the four county project area.

Product:

1. Project management structure.

Milestones:	**Planned**	**Total Completed**
Advisory council	1	1
Memoranda's of Understanding	5	4

Resource agencies and organizations represented on the advisory council include:

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, Deuel, 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
Pickerel Lake Conservancy
Enemy Swim Sanitary Sewer District
Lac qui Parle Yellow Bank Watershed District

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.

The BMPs planned are based on those recommended in the assessments and TMDLs, and identified during implementation of the project work plan(s). It is anticipated that as additional studies and TMDLs are completed for water bodies in the project area, the suite of BMPs offered will change accordingly.

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. Funding will be attained through the Natural Resources Conservation Service's Environmental Quality Incentive Program (EQIP) from both general and special initiative funds. The systems planned include both conventional (zero-discharge), alternative systems (vegetative treatment systems, hoop and mono-slope barns) with the type of system being dependent on site conditions and operator preference, or relocating feedlots to less sensitive locations.

Milestones:	**Planned**	**Total Completed**
Systems	2	1

One animal waste management systems has been completed. This system was funded by a special Environmental Quality Incentive Program (EQIP) under the Natural Resources Conservation Service's (NRCS) Mississippi River Basin Healthy Watersheds Resource Conservation Partnership. A second system was designed but the producer was out of compliance with NRCS regulations and the system was not funded.

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 Continuous Conservation Reserve Program (CCRP), CP8A Grassed Waterways, CP21 Filter Strips, CP23 and CP30 Marginal Pastureland-Wetland Buffer administered by USDA will be the preferred options for providing financial assistance for this product. 319 funds and South Dakota Clean Water SRF (SDCWSRF) funds will provide additional incentive payments at 35% of the CCRP rental rate for interested producers. If a site does not qualify for CCRP, riparian BMPs will be funded using grant funds. The financial assistance from EPA 319 will follow the docket established by USDA for CCRP and requirements listed in the project's practice manual.

Milestones:	**Planned**	**Total Completed**
Continuous CRP	150 acres	538 acres
EPA 319 Riparian Area Mgt. Program	447 acres	843 acres

The majority of riparian buffers implemented during the reporting period were located in the Minnesota River watershed in Grant and Roberts Counties, South Dakota. EPA 319 and South Dakota Clean Water SRF funds were utilized to add additional acres and payments to Continuous Conservation Reserve Program (CCRP) rental rates paid to producers to idle land for ten to fifteen years. During this segment 538 acres of CCRP were enrolled. Of these acres EPA 319 and SDCWSRF grant funds were utilized to pay an additional incentive payment on 261 acres. EPA 319 and SDCWSRF grant funds were used to fund 77 acres of buffers beyond the CCRP 120 foot maximum buffer width, 99 acres of buffers that did not qualify for CRP, and 406 acres of forage and biomass plantings on cropland adjoining waterways. The majority of these buffers were Marginal Pastureland Wetland Buffers (CP-30) placed on pasture and rangeland adjoining perennial streams in the Minnesota River watershed. To date, a total of 213,644 lineal feet of streambank and shoreline have been protected with riparian buffers.

An additional 1,759 acres of general CRP was implemented in the project area, converting cropland back to grass and forbs. 220 acres of wetlands were also restored with these contracts.

Product:

4. Grassed Waterways

To reduce water erosion on cropland located on land where CRP is not applicable, plantings of tame and/or exotic grasses and legumes will be established utilizing EPA 319 and SD Clean Water SRF funds.

Milestones:	Planned	Total Completed
Grassed Waterways	10 acres	3 acres

One grassed waterway totaling three acres (2,000 lineal feet in length) was funded by an Environmental Quality Incentive Program (EQIP) contract through the Natural Resources Conservation Service's Mississippi River Basin Healthy Watersheds Resource Conservation Partnership.

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 BMPs 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 existing programs including the NRCS Environmental Quality Incentive Program (EQIP), USF&WS "Partners for Wildlife" program, GFP "Private Lands Program", and SD Coordinated Soil and Water Conservation commission grant funds.

Milestones:	Planned	Total Completed
Grazing Systems	4	20

Twenty grazing management plans have been implemented through the Environmental Quality Incentive Program's Mississippi River Basin Healthy Watersheds Resource Conservation Partnership. A total of 10,180 acres of pasture and rangeland have been improved under this initiative through the implementation of cross fencing, water development, and grazing management plans.

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
Shoreline Stabilized	500 LF (hard practices)	2,291 lf.
	500 LF (soft practices)	0 lf.
Stream Crossings	10	32

Twenty-one stream crossings were funded utilizing EQIP funds through the Upper Minnesota River Basin Resource Conservation Partnership, four crossings were funded using a combination of project grant and EQIP funds, and seven crossings were funded solely by project 319 grant funds. Stream crossings reduced the impact of cattle crossing 88,394 lf. of stream bank. 1,020 feet of stream bank were stabilized by the implementation of these stream crossings. Mississippi River Basin Healthy Watersheds Resource Conservation Partnership EQIP funds were used to stabilize 1,150 feet of stream bank, and project grant funds were utilized to stabilize 121 lf. with rock rip-rap along the Whetstone River.

Figure 3.

Stream Bank Stabilization implemented with EQIP initiative funds. Picture taken during high water after summer rainstorm

Figure 4.

Eroding Streambank from livestock activity before construction

Figure 5.

Completed Stream Crossing

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:

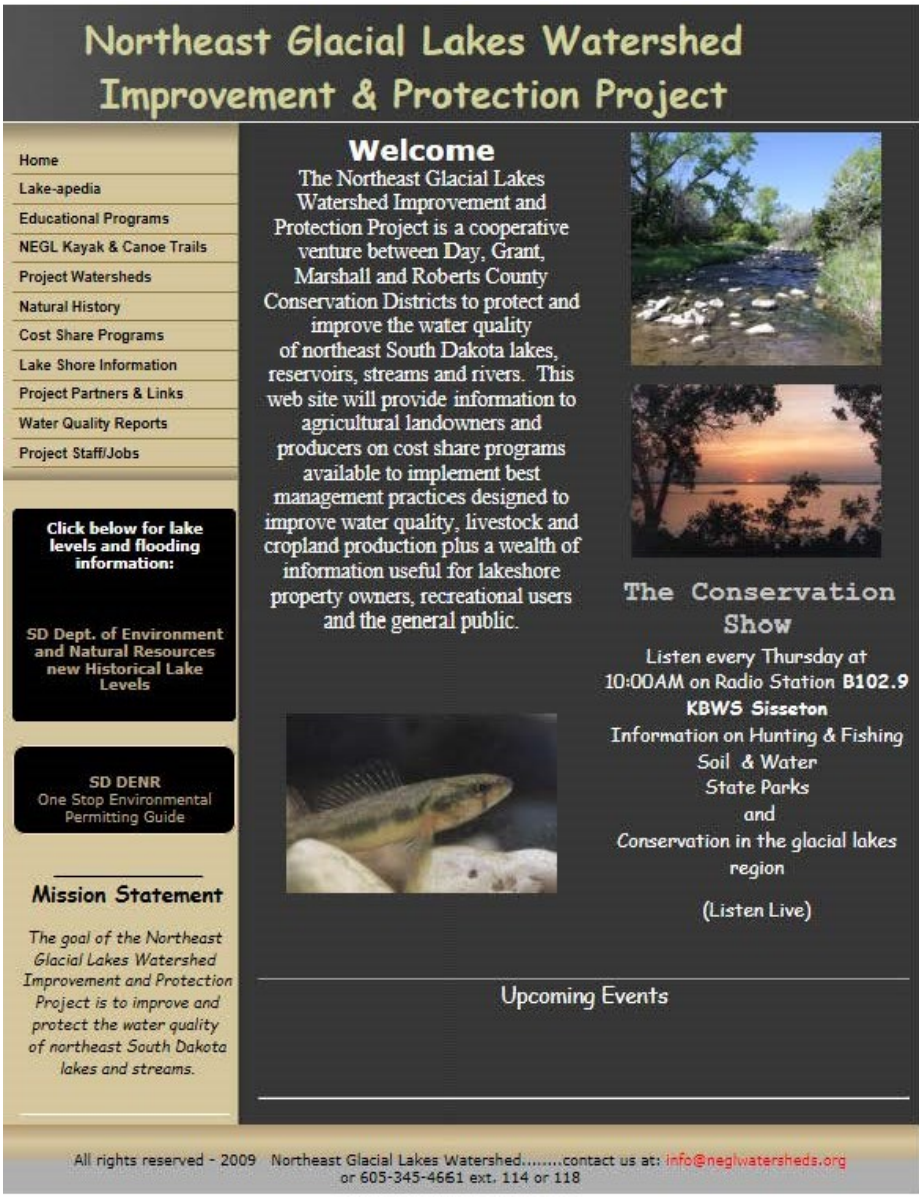
7. Project web site

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	12,000	7,401

The website: www.neglwatersheds.org was updated yearly as needed.

Figure 6. Home Page of the NEGL Project Website



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 (Participating partner newsletters; Sisseton, Webster, and Britton newspapers)	8	15
Radio/Television Interviews	4	5

The Project Coordinator appeared on radio station KBWS "Conservation Report" program on five separate dates to promote project activities and discuss conservation issues. The radio station is located in Sisseton, South Dakota and broadcast coverage includes the entire project area. Fifteen articles about the project were published in the Day and Robert's Counties Conservation District newsletters that are mailed to local producers and posted on District's websites, and in three local newspapers, the Grant County Review, Sisseton Courier, and Webster Reporter and Farmer.

Product:

9. Direct personal contact with and involvement in project opportunities

Information and educational displays, programs, public meetings, and workshops will provide project area residents a direct personal contact with the project and project involvement opportunities, and students of all ages an opportunity to learn about natural resources and resource conservation in the project area. Print material will be developed and distributed at these public events.

Milestones:	Planned	Total Completed
Farm, Home & Sports Show	8	7
Water Festivals	4	6
Step Outside Programs	4	5
EcoEd Day Program	2	3
Northeast Range & Land Contest	2	3
South Dakota Envirothon	2	3
Lake & Stream Ecology Workshops	4	3

Total Events: 30

Informational meetings and educational programs project personnel presented or participated in:

7/15/2014 Step Outside, Hartford Beach State Park
7/16/2014 Step Outside Hartford Beach State Park
7/26/2014 Conservation Connections, Bramble Park Zoo, Watertown
9/10/2014 EcoEd Day, Fort Sisseton State Park
9/20/2014 Step Outside, Lake Traverse
9/24/2014 Northeast Land and Range Judging Contest, Webster
9/25/2014 Northern Prairie Water Festival, Aberdeen
10/2/2014 SD Envirothon Contest, Waubay
10/2/2014 South Dakota State University Ecology Club: Stream Ecology Class, Sica Hollow SP
1/22/2015 Enemy Swim Day School: Judged Science Fair
1/30-31/2015 Webster Farm and Home Show
2/11/2015 Waubay High School: Judged Science Fair
5/4/2015 NeSoDak Environmental Learning Center: Lake Ecology Class, Florence Middle School
5/7/2015 NeSoDak Environmental Learning Center: Lake Ecology Class, Milbank Middle School
5/11/2015 NeSoDak Environmental Learning Center: Lake Ecology Class, Britton/Hecla and Summit Middle Schools
5/12/2015 Big Sioux Water Festival, Brookings
6/5/2015 Grassland Bird Tour - Abbey of the Hills, Marvin, SD: Stream Ecology Presentation
7/8/2015 Enemy Swim Day School: Lake Ecology Class
7/25/2015 Bramble Park Zoo, Conservation Connections Program: Fish Printing
9/9/2015 Waubay National Wildlife Refuge, 123 to the Refuge: Aquatic Animals
11/6/2015 Webster Area High School Ag Class (presentation on non-point source)
11/19/2015 Northern State University, Environmental Science Class (presentation on lake ecology)
1/12/2016 Prairie Restoration Seminar, USFWS Fergus Falls, MN
1/10/2016 Waubay High School (judge science fair)
1/11/2016 Enemy Swim Day School (judge science fair)
1/29-31/2016 Webster Farm and Home Show
2/17/2016 Envirothon Planning Committee Mtg. Brookings
4/21/2016 Aberdeen Roncalli, preschool (presentation)
4/23/2016 Earth Day Festival, NeSoDak Environmental Learning Center (outdoor activities)
5/28-29/2016 NeSoDak Environmental Learning Center, Britton-Hecla Middle School (teach environmental education classes)
5/4/2016 Stream Ecology Class #1, Hartford Beach State Park, Milbank High School
5/5-6/2016 NeSoDak Environmental Learning Center, Elkton-Lake Benton Middle School (teach environmental education classes)
5/11/2016 Stream Ecology Class #2, Hartford Beach State Park, Milbank High School
5/12/2016 Big Sioux Water Festival, SD State University, Brookings
5/12-13/2016 NeSoDak Environmental Learning Center, Summit Middle School (teach environmental education classes)
5/19-20/2016 NeSoDak Environmental Learning Center, Milbank Middle School (teach environmental education classes)

5/25/2016 South Dakota Envirothon Planning Committee Mtg., Pierre
6/20-23/2016 Fishing Camp, NeSoDak Environmental Learning Center (taught classes, activities)
6/28/2016 Camp Gilbert, NeSoDak Environmental Learning Center (environmental activities for campers)
7/15/2016 South Dakota Envirothon Planning Committee Mtg., Pierre
7/16/2016 PaddlePalooza, NeSoDak Environmental Learning Center (beginning kayaking class)
7/18/2016 SDSU Conservation Camp, Oak Lake (stream ecology)
7/25-26/2016 NeSoDak Environmental Learning Center (aquatic animals)
7/28-29/2016 Becoming an Outdoor Family, Pickerel Lake State Rec. Area (kayaking)
9/1/2016 Prairie Restoration Tour, Madison, MN
9/14/2016 EcoEd Day, Fort Sisseton State Park, Britton-Hecla and Langford Middle Schools (stream ecology)
9/17/2016 Step Outside, Lake Traverse
9/22/2016 Northern Water Festival, Northern State University, Aberdeen
9/28/2016 Northeast SD Land and Range Judging Contest, Webster
10/4/2016 123 to the Refuge, Waubay National Wildlife Refuge
10/5/2016 Summit Elementary After School Program
11/16/2016 Sisseton Wahpeton Community College, Environmental Science Class, Agency
1/27-28/2017 Webster Farm and Home Show
2/15/2017 Waubay High School, judged science fair
2/23/2017 Enemy Swim Day School, judged science fair
2/23/2017 Enemy Swim Day School Academic Night
4/2/2017 South Dakota Envirothon Contest, Oacoma
4/13/2017 Northern State University, Research, Scholarship, and Creativity Forum, Aberdeen
5/3/2017 Stream Ecology Field Trip, Harford Beach State Park, Milbank High School
5/9/2017 Big Sioux Water Festival, SD State University, Brookings
5/20/2017 South Dakota Ornithologists Union Spring Mtg., Aberdeen
6/20/2017 Camp Gilbert, NeSoDak Environmental Learning Center, Waubay
6/25-29/2017 Fishing Camp, NeSoDak Environmental Learning Center, Waubay
7/12-14/2017 Lake & Stream Ecology & Water Quality Workshop, NeSoDak, Waubay
7/23-27/2017 Kayak Camp, NeSoDak Environmental Learning Center, Waubay

A total of 8,288 persons attended programs and presentations by NEGL personnel during the project. Programs were presented to a variety of age groups from 1st through 3rd grade students (123 to the Refuge), 4th grade students Northern Prairie (Aberdeen, SD) and Big Sioux (Brookings, SD) water festivals), 5th & 6th grade students (NeSoDak Lake Ecology Classes), 7th and 8th grade students (EcoEd Day), high school and college age students and adults (Lake and Stream Ecology and Water Quality Workshop). Lake and Stream Ecology and Water Quality Workshop college graduate and undergraduate students could earn 1 college credit hour for completing the workshop, elementary and secondary teaches can earn 1 college credit hour or 2 Continuing Education Credits (CEUs) for completing the workshop. Project information was disseminated at local farm, home and sports shows held in Webster, SD (Day County), Britton, SD (Marshall County), Sisseton, SD (Roberts County), and Milbank, SD (Grant County).

Figure 7.

Big Sioux Water Festival participants learn about frogs

Figure 8.

Lake and stream ecology workshop participants collecting invertebrates on Little Minnesota River

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 be conducted on Clear, Enemy Swim, Pickerel, and Roy Lakes. Composite surface and bottom water samples will be taken during May, June, July, August, and September from two to three sites each water body. Laboratory analysis will be conducted by RMB Laboratories located in Detroit Lakes, MN. The Dakota WaterWatch volunteer monitoring program will be utilized to gather water quality data from Blue Dog Lake, South Buffalo Lake, and South Red Iron Lake.

Water quality samples were taken from nine tributary sites in Pickerel Lake's watershed. Data from these monitoring programs is 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:	Total Sample Sets Collected
Enemy Swim Lake	13
Pickerel Lake	14
Clear Lake	9
Roy Lake	10
Blue Dog Lake	3
South Buffalo Lake	3
South Red Iron Lake	3
Waubay Lake	0
Pickerel Lake Tributaries	20

Water quality testing was conducted on Clear, Enemy Swim, Pickerel, and Roy Lakes during summer months. Testing on Enemy Swim and Pickerel Lakes has been on-going yearly since 2002, and Clear and Roy Lake's beginning in 2015. Project funds were used to pay for water quality analysis of Clear and Roy Lakes, and May and September testing of Enemy Swim Lake. The Enemy Swim Sanitary Sewer District paid for water quality analysis for the months of June, July, and August. The Pickerel Lake Conservancy paid for water quality analysis of Pickerel Lakes for the months of May thru September. The Dakota WaterWatch program sponsored by the East Dakota Water Development District provided funding and equipment for sampling Blue Dog, South Buffalo and South Red Iron Lakes during the month of August. Pickerel Lake's tributaries were sampled from the spring of 2014 thru the fall of 2015 to determine what effects land use changes in the watershed were having on water quality. Water quality data collected during this segment has been submitted to the SD DENR for filing in the STORET data base. Further discussion on water quality testing results can be found beginning on page 34.

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

Milestones:	Planned	Total Completed
Annual Reports (GRTS)	2	2
Monthly Reports	36	31

Final Report	1	1

Monthly reports are those given to the project sponsors and co-sponsors that include the Day, Grant, Marshall, and Roberts Conservation Districts during monthly Board of Supervisor Meetings, and yearly reports given to project partners including East Dakota Water Development District, Enemy Swim Sanitary Sewer District, and Pickerel Lake Conservancy.

3.0 Best Management Practices Implemented

Best management practices developed and implemented during Segment 3 include riparian buffers on marginal pastureland and cropland, improved grazing management, streambank and shoreline stabilization. BMP program descriptions are given below. Figure 19 (page 48) shows the locations of all BMPs implemented during this segment.

Riparian Area Management Program (RAM)

Funding Source

EPA 319 Clean Water grant funds and South Dakota Clean Water State Revolving 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).

RAM funds were also approved to be utilized for forage and biomass plantings along riparian areas. Grant funds payed for seed, planting, and one year of chemical weed control in lieu of yearly rental rates. Contracts for forage and biomass plantings like RAM/CRP where for ten or fifteen years.

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

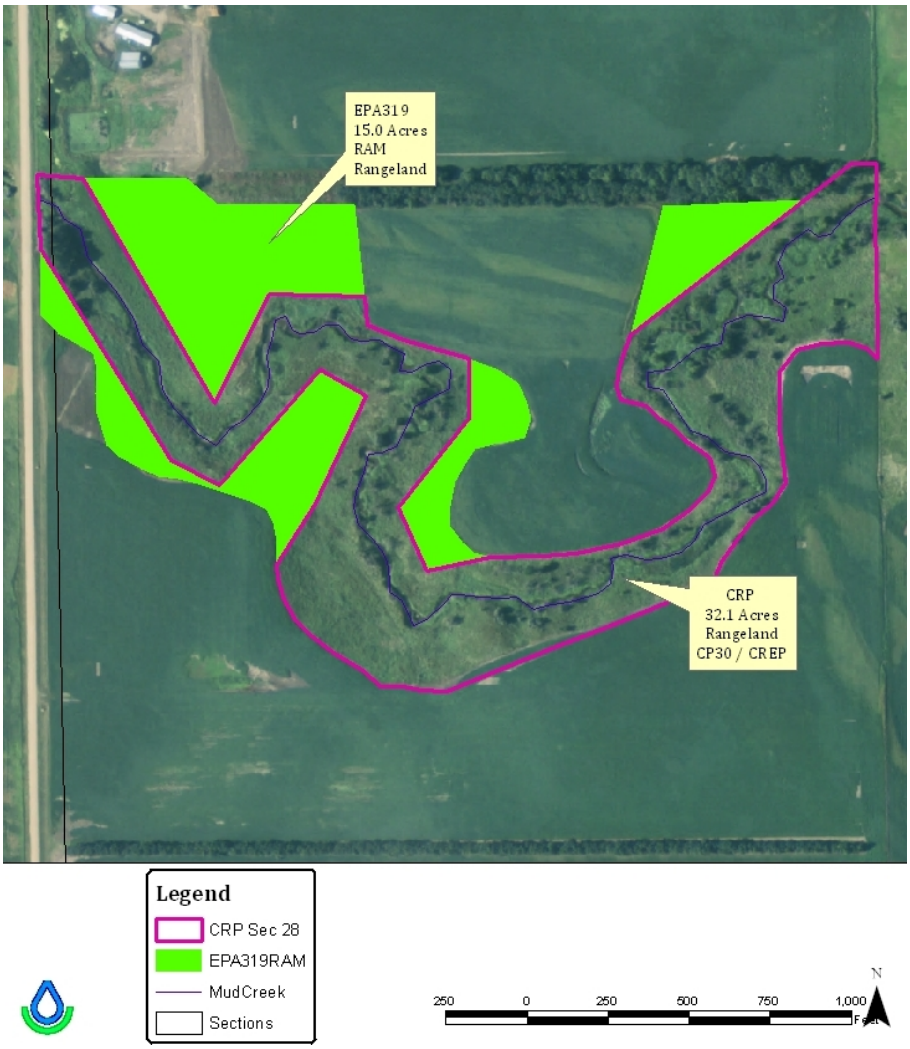


Figure 9. RAM/CRP Buffer Conservation Plan

Streambank and Shoreline Stabilization

Funding

Funds for stabilizing eroding streambank and shoreline were available from EPA 319 Clean Water grant funds, South Dakota Clean Water State Revolving 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

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 stating he will implement the conservation practices as described in the conservation plan in the location shown on the conservation plan map for the life span of the practice (typically 10 to 20 years). As defined in the contract, failure to implement all of the required practices or maintain the practice 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

EPA 319 Clean Water grant funds were available to pay up to 60% of the total cost of construction of both stream crossings and streambank stabilization. Stream crossings and streambank stabilization constructed using EQIP funds through the initiative paid $44 per cubic yard of rock riprap for streambank stabilization, and $2.74 per square foot for stream crossings.

Grassed Waterways

Funding

Funds for constructing grassed waterways were available from EPA 319 Clean Water grant funds, South Dakota Clean Water State Revolving funds, and the Environmental Quality Incentive Program (EQIP) through the Mississippi River Healthy Watersheds Initiative.

Purpose

Grassed waterways were available for producers to restore gullies and washouts on cropland, and protect these areas by reshaping and planting a permanent vegetative cover of grass.

Eligibility

Eligible land had to be located in a project watershed.

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 stating he will implement the conservation practices as described in the conservation plan in the location shown on the conservation plan map for the life span of the practice (typically 10 to 20 years). As defined in the contract, failure to implement all of the required practices or maintain the practice 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

Project grant funds were available to pay up to 60% of the total cost of construction of grassed waterways (10% EPA Clean Water Grant funds, 50% SD Clean Water State Revolving Funds). Grassed waterways constructed using EQIP funds through the initiative paid $2,296 per acre.

Range and Pastureland Improvement and Grazing Management

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 payments for producers who implemented prescribed grazing management or implemented grazing management improvements including water development and cross fencing. NRCS established an application deadline for the EQIP initiative,

4.0 Monitoring Results

4.2 BMP Effectiveness Evaluations

The effectiveness of Best Management Practices (BMPs) installed and load reductions achieved relative to improvement in water quality were evaluated using tools available from SD Dept. of Environment and Natural Resources and Natural Resources Conservation Service. Reductions

for BMPs implemented during this segment are given in Table 7 and were calculated using the StepL Model.

Table 7. Load Reductions from Implemented BMPs

	Load Reductions		
Watershed	Nitrogen (lbs/yr)	Phosphorus (lbs/yr)	Sediment (tons)
Upper James River Basin HUC #10160005			
Amsden Dam	127	36	21
Buffalo Lake	0	0	0
Clear Lake	133	45	30
Roy Lake	0	0	0
Mud Creek	0	0	0
Total:	**260**	**81**	**51**
Upper Big Sioux River Basin HUC #10160010			
Blue Dog Lake	13	3	2
Pickerel Lake	818	253	152
Total:	**831**	**256**	**154**
Red River Basin HUC #09020101			
Lake Traverse	6255	1357	1745
White Lake Dam	251	81	50
Total:	**6506**	**1438**	**1795**
Upper Minnesota River Basin HUC #07020001			
Big Stone Lake	363	73	41
Drywood Lake	92	34	21
Little Minnesota River	13985	4654	5906
North Fork Whetstone River	26009	7092	8129
South Fork Whetstone River	192	72	65
North Fork Yellowbank River	5834	1913	2509
South Fork Yellowbank River	11202	3413	4417
Total:	**57677**	**17251**	**21088**

Implementation of best management practices resulted in a total calculated reduction of 65,274 lbs. per year of nitrogen, 19,026 lbs. per year of phosphorus, and 23,088 tons per year of sediment in the watersheds included in Segment 3

4.3 Surface Water Improvements

In-lake sampling of several project lakes continued from Segment 2 and sampling of Pickerel Lakes tributaries were conducted during 2014 to 2015. 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.

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 RMB Laboratories located in Detroit Lakes, MN.

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

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

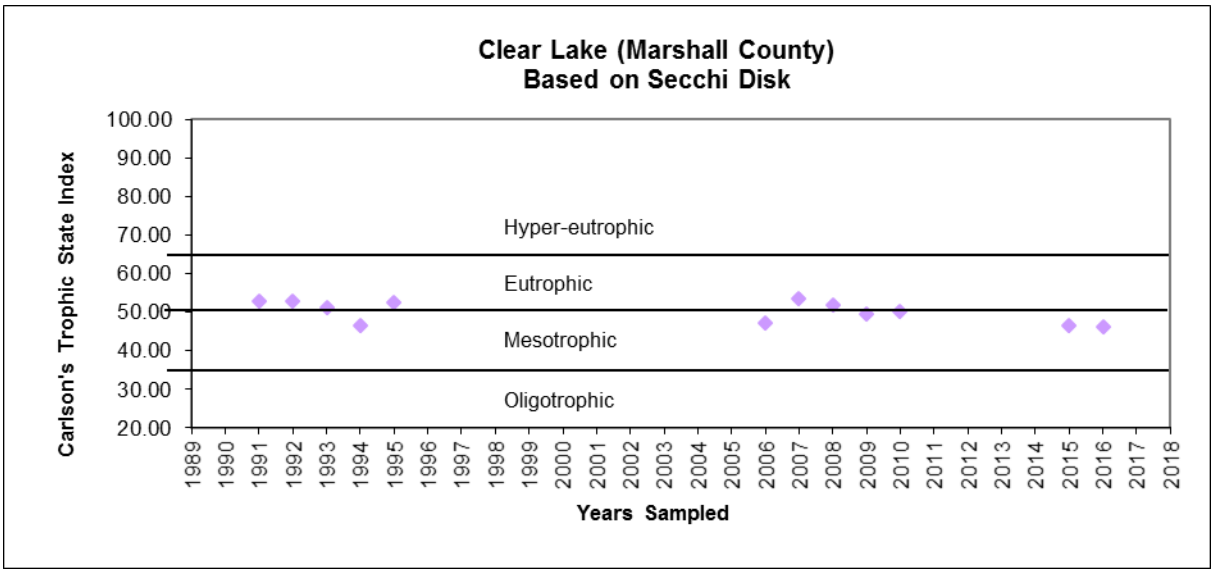
During this segment water sampling procedures were modified to consider aquatic invasive species. Sampling equipment including carboys used to hold sample water and VanDorn Bottles were rinsed immediately after use with distilled water before being used in the next lake. Boat plugs were pulled to follow state law, and trailers inspected at each lake for macrophytes. One invasive species, the curly-leaf pondweed, does occur in Roy Lake one of the lakes sampled during this segment.

Clear Lake

In-lake sampling of Clear Lake occurred during the months of May through September from May 2015 thru July 2017. 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 mesotrophic based on Secchi depth (Figure 10) readings taken during the summers of 2015-2016.

Funding for sampling of Clear Lake during this segment was provided by 319 Clean Water Grant funds, South Dakota Clean Water State Revolving funds, and in-kind contributions from the Day Conservation District.

Figure 10. Clear Lake Secchi Depth TSI

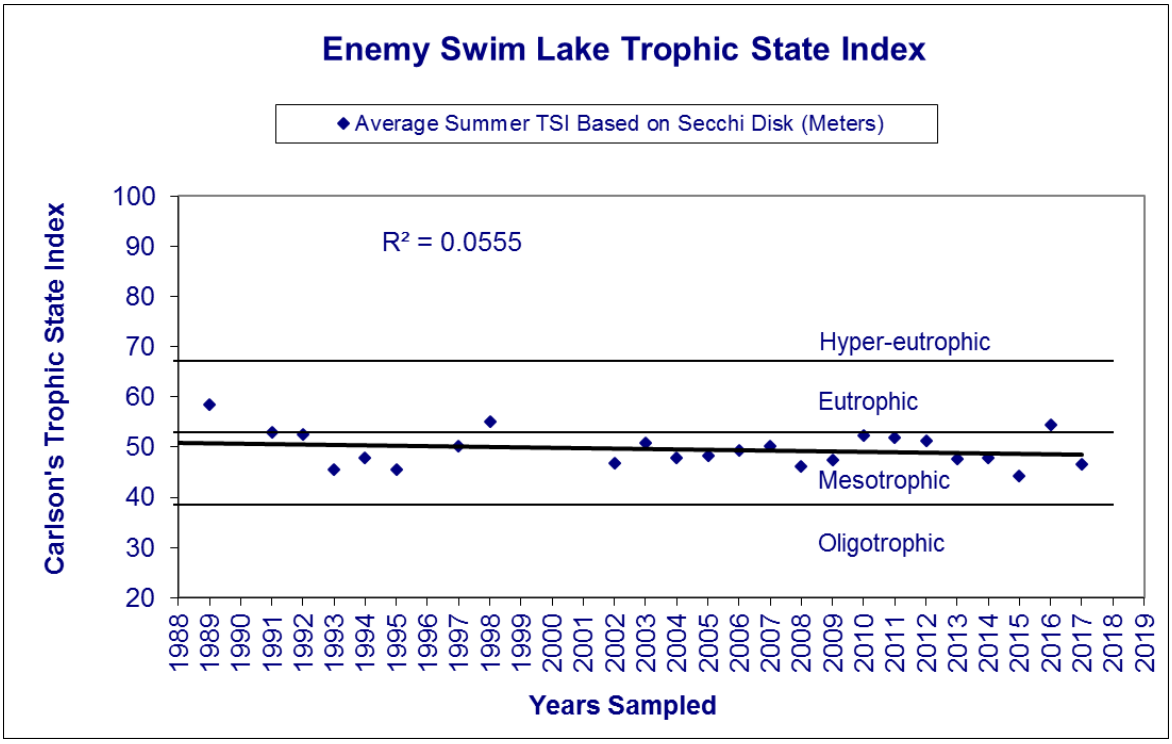


Enemy Swim Lake

In-lake sampling of Enemy Swim Lake occurred during the months of May thru September 2014 through 2017. 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 based on Secchi depths taken from June thru August show the lake remaining in the low eutrophic to the mid-mesotrophic range during this segment (Figure 11).

The Enemy Swim Sanitary Sewer District provided funding to pay for in-lake water quality sample lab fees for the months of June, July, and August; and additional funds were provided by 319 Clean Water Grant funds and South Dakota Clean Water State Revolving Funds to pay for sampling during the months of May and September. In-kind contributions from the Day Conservation District were also utilized to complete this task.

Figure 11. Enemy Swim Lake Secchi Depth TSI



Pickerel Lake

In-lake sampling of Pickerel Lake occurred during the months of May through September from July 2014 through July 2017. Composite surface and bottom samples were collected from three sites located on the lake.

Pickerel Lake's water quality continues to decline with more frequent summer algae blooms (Figures 12 and 13). The two species of blue-green algae that are most frequently observed blooming are Gleotrichia occurring late-June through July, and Microcystis occurring late July into September. Anabaena and Aphanizomenon are two other blue-green algae recently observed in Pickerel Lake but have not caused heavy blooms. A tributary water quality study completed the fall of 2015 showed no significant increase in external loadings for phosphorus and only a slight increase in nitrogen from the lakes watershed. It appears the increase in nuisance algae blooms is due to internal loadings of phosphorus triggered by the lake stratifying during summer months and becoming anoxic at depth releasing dissolved phosphorus from the lakes sediment. The lakes Trophic State Index (TSI), based on Seechi Disk readings taking in June, July, and August, show the lake trending toward a more eutrophic state (Figure 14).

Figure 12. Pickerel Lake Algae Bloom

Figure 13. Pickerel Lake July/August Chlorophyll a

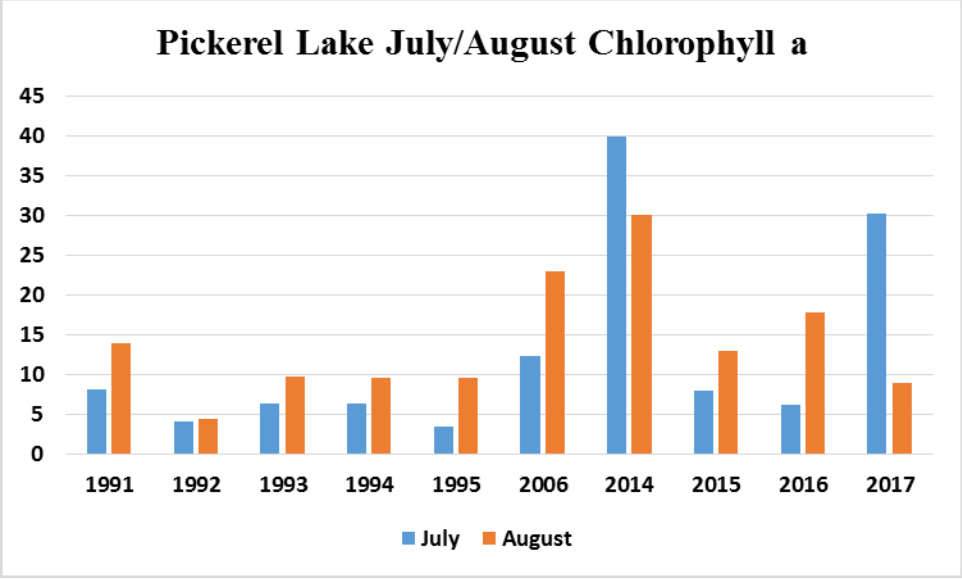
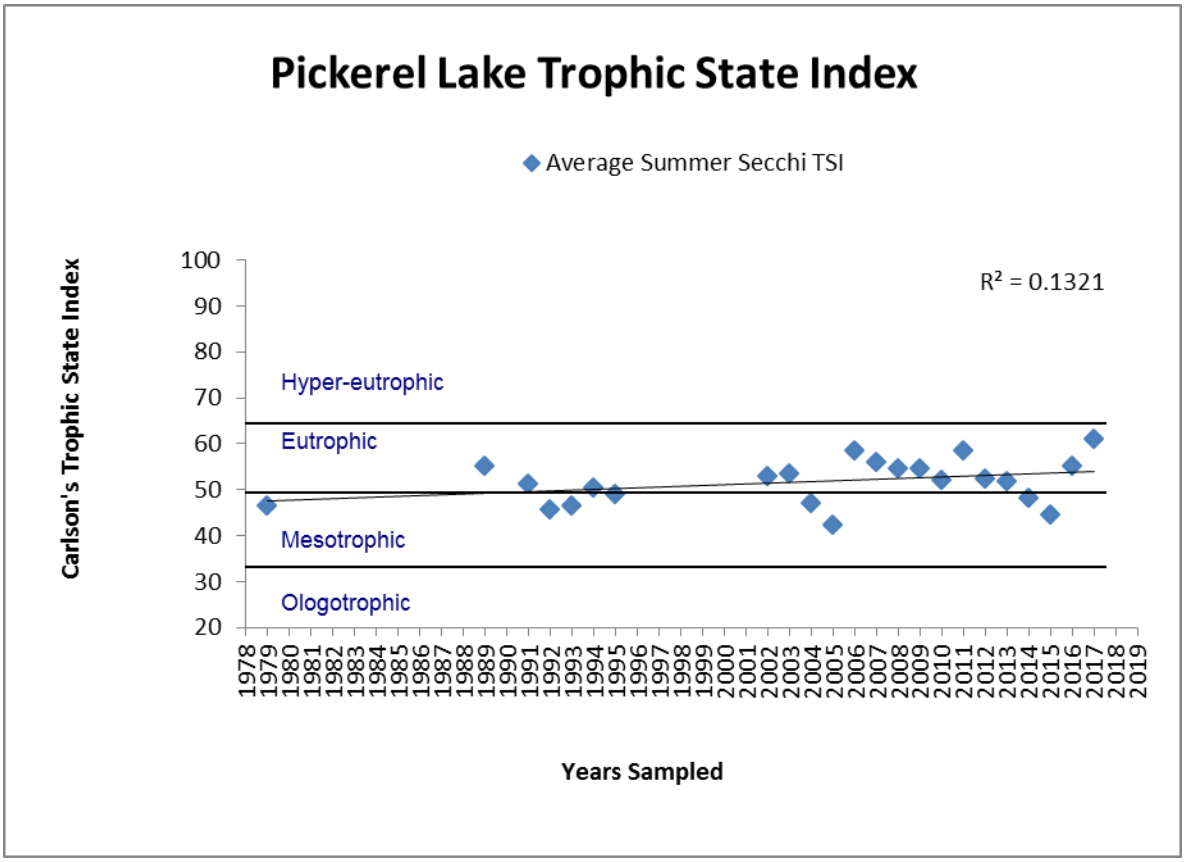


Figure 14. Pickerel Lake Secchi Depth TSI



The Greater Pickerel Lake Association/Pickerel Lake Conservancy provided funding to pay for in-lake water quality sample lab fees. 319 Clean Water Grant funds and South Dakota Clean Water State Revolving Funds were used to fund the Pickerel Lake tributary water quality study.

During the summer of 2016, the project surveyed Pickerel Lake to determine how many lineal feet of shoreline have been disturbed or altered (Figure 17). Four categories were used to describe the current condition of the shoreline. Disturbed shoreline and upland was used where both native vegetation and rock were removed from along the shore and only Kentucky bluegrass or other type of exotic grass exists on the upland. Undisturbed shoreline and disturbed upland indicated the native shoreline was left un-altered, however, the native upland vegetation had been converted to Kentucky bluegrass or other type of exotic grass planted (Figure 15). Undisturbed shoreline and undisturbed upland denotes where both the shoreline and at least 50 feet of the native upland vegetation is intact (Figure 16). Nearly half of the native shoreline along Pickerel Lake has been altered. The Pickerel Lake Conservancy and Northeast Glacial Lakes Watershed Improvement and Protection Project will use this information to locate property owners willing to install vegetative buffers in areas where the native vegetation has been removed and altered.

Figure 15.

Pickerel Lake disturbed shoreline and disturbed upland. Note rock riprap has replaced the natural shoreline, mostly bluegrass on upland. Areas like this will be targeted for shoreline vegetative buffers.

Figure 16.

Pickerel Lake undisturbed shoreline with disturbed upland. Trees have been pruned to allow view of lake.

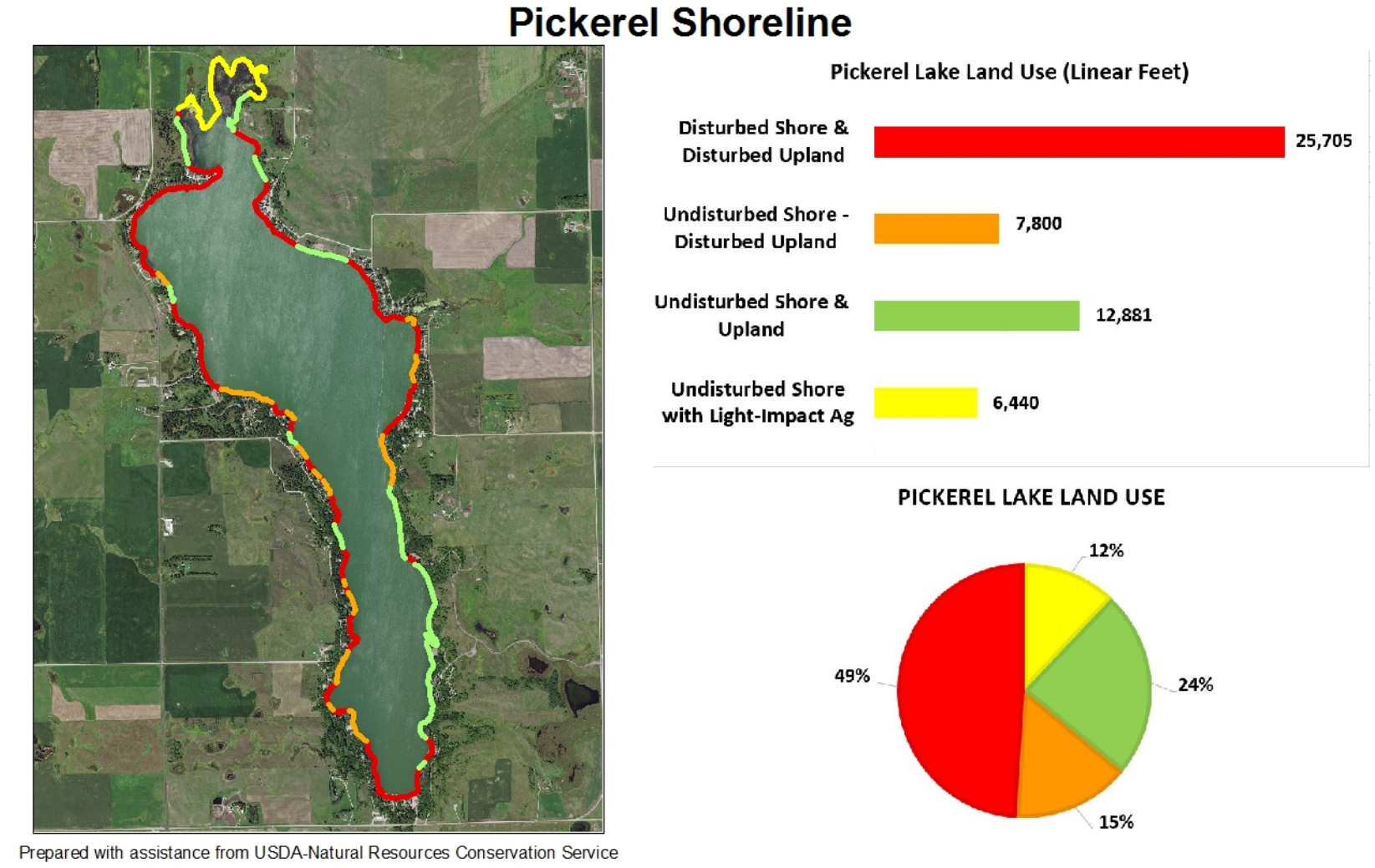
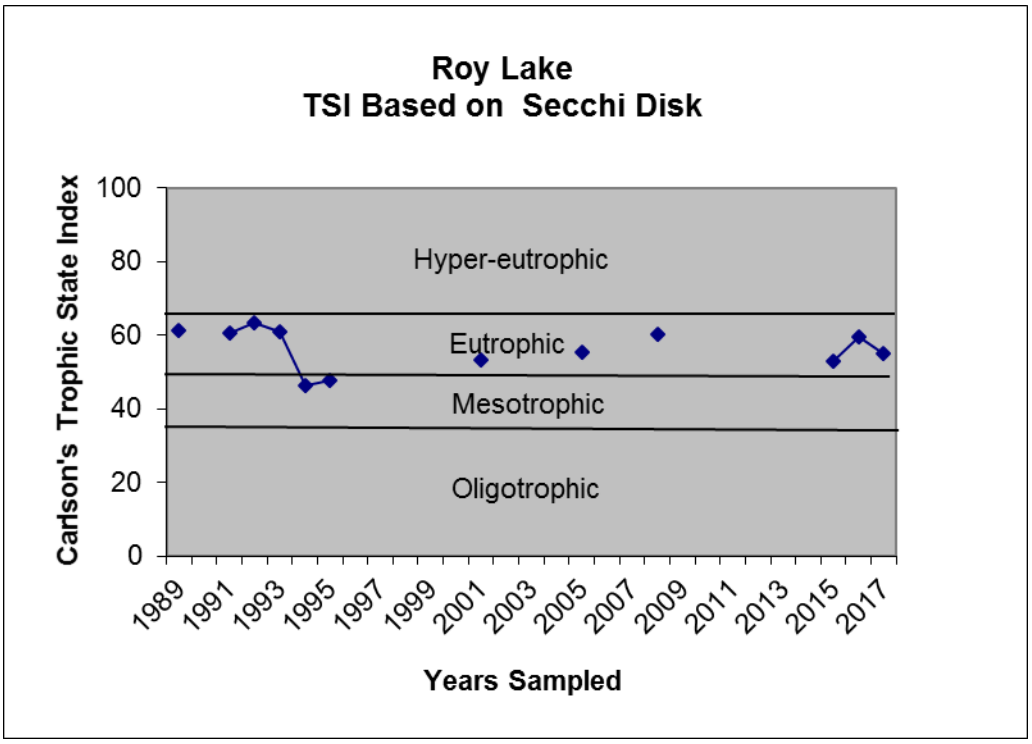


Figure 17. Pickerel Lake Shoreline Survey Map

Roy Lake

In-lake sampling of Roy Lake occurred during the months of May through September from May 2015 thru July 2017. Composite surface and bottom samples were collected from three sites located on the lake. Water quality samples and field data collected from Roy Lake during this segment showed the lake meeting all state water quality standards for its assigned beneficial uses (Table 3). The lakes trophic state remains in the eutrophic category based on Secchi depth (Figure 18) readings taken during the summers of 2015-2017.

Figure 18. Roy Lake Secchi Depth TSI



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 project personnel wages and benefits and administrative costs.

- **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.

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. Table 9 (page 49) shows expenditures per product and overall project match.

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 and administrative costs.

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.

The Greater Pickerel Lake Association and Enemy Swim Sanitary Sewer District provided local cash for water quality studies of 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 50% 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)	$ 590,488.07	$ -	$ -	$ -
South Dakota Dept. of Ag. Conservation Commisssion Grant	$ -	$ 101,839.73	$ -	$ -
South Dakota Clean Water State Revolving Fund	$ -	$ 100,509.41	$ -	$ -
Greater Pickerel Lake Association/Pickerel Lake Conservancy	$ -	$ -	$ 2,717.49	$ -
Enemy Swim Sanitary Sewer District	$ -	$ -	$ 1,672.00	$ -
Day County Conservation District	$ -	$ -	$ 7,167.86	$ 5,100.00
Roberts/Marshall County Conservation District	$ -	$ -	$ 324.00	
Producer Cost Share Match	$ -	$ -	$ 97,998.96	$ -
Totals:	$ 590,488.07	$ 202,349.14	$ 109,880.31	$ 5,100.00

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 Greater Pickerel Lake Association/Pickerel Lake Conservancy, and Enemy Swim Sanitary Sewer District 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.

- **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 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.

- **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 3.

7.0 Aspects of the Project That Did Not Work Well

The majority of project goals, objectives, and activities were completed in an acceptable fashion without problems or delays.

8.0 Future Activity Recommendations

Segment 4 will continue the efforts brought about by this project. While some of the waterbodies listed as impaired during the writing of this Project's Implementation Plan in 2012 are no longer listed as so, efforts will continue to preserve the water quality of these lakes. Future project segments will continue to implement riparian buffers along pastures and cropland to reduce nutrient loading to project waterbodies.

Figure 19. Location of Best Management Practices Implemented During Segment 3.

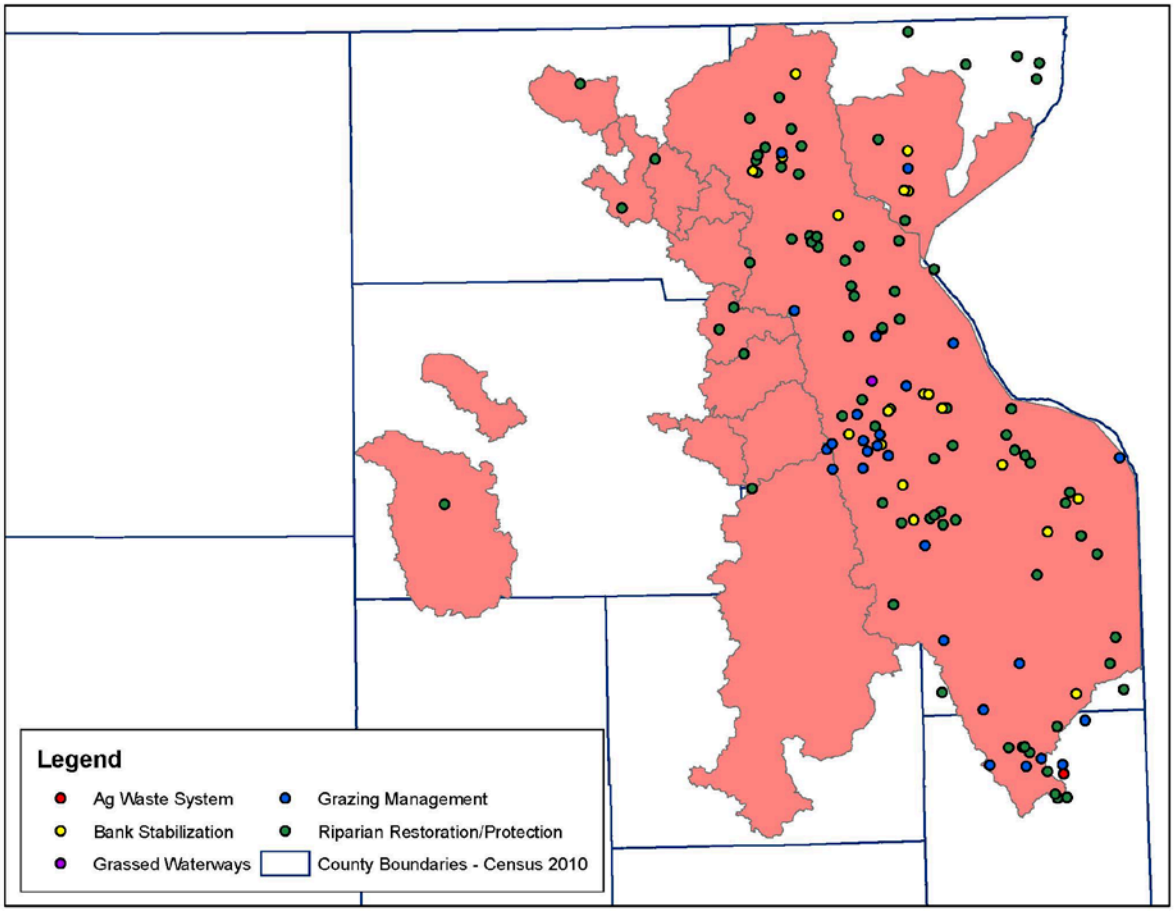


Table 9. Northeast Glacial Lakes Segment 3 Budget Expenditures

June 14, 2014 Through July 31, 2017

ITEM	319-EPA	CWSRF-WQ	Con Com	USDA EQIP/CRP	Conservation Districts	Local	Total
Personnel Support							
Staff: Coordinator (1 FTE)	$73,487		$48,908		3562.65		$125,958
Project Conservation Tech (1.4 FTE)	$74,657	$992	$47,816		1656.72		$125,122
Administrative Support	$7,674		$5,116		2074.58		$14,865
Travel	$10,315						$10,315
Subtotal: Personnel Support	**$166,133**	**$992**	**$101,840**	**$0**	**$7,294**	**$0**	**$276,259**
Objective 2: BMP Installation							
Task 2:							
Product 2: Ag Waste System				$199,950			$199,950
Product 3: Riparian Restoration/Protection	$121,062	$73,518		$17,112		$67,488	$279,180
Product 4: Grassed Waterways				7172.39		$8,397	$15,569
Product 5: Grazing Management				268067.99		2529.03	$270,597
Product 6: Bank Stabilization	$20,692	$10,164		$98,185		$19,585	$148,627
Subtotal: BMP Installation	**$141,754**	**$83,682**	**$0**	**$590,488**	**$0**	**$97,999**	**$913,923**
Objective 3: Outreach							
Product 7: Information and Education					197.91		$198
Objective 3: Water Quality							
Product 8: Sampling	$827	$15,836				$9,489	$26,152
Subtotal: Outreach and Monitoring	**$827**	**$15,836**	**$0**	**$0**	**$198**	**$9,489**	**$26,349**
Total Project Cost:	**$308,714**	**$100,509**	**$101,840**	**$590,488**	**$7,492**	**$107,489**	**$1,216,531**
Match:							
Ineligible Match - Federal and/or Project Allocated				$590,488			
Eligible Match - Local and State		$100,509	$101,840		$7,492	$107,489	
Match: Project Totals For Match	$308,714	$100,509	$101,840		$7,492	$107,489	$626,043
Match Percentages:	**49%**	**16%**	**16%**		**1%**	**17%**	**100%**