

Project Proposal Summary Sheet
Spiritwood Lake Watershed Project
City of Spiritwood Lake
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STATE: North Dakota WATERSHED: Spiritwood Lake
HYDROLOGICAL UNIT CODE: 101600030-101 HIGH PRIORITY WATERSHED: No
Project Type Waterbody Type NPS Category
Watershed Lake/Stream Agriculture
Project Location: Latitude 47 degrees 04 minutes, Longitude -98 degrees 34 minutes

Project Description:

In the summer of 2013 the Spiritwood Lake Association, Inc. and the City of Spiritwood Lake approached the North Dakota Department of Health (NDDoH) with the idea of monitoring Spiritwood Lake to identify the lake's current condition, track its seasonal and long term trends and to the extent possible, identify pollution impacts that could be linked to sources within the watershed. To accomplish the objectives, a volunteer monitoring plan was developed and implemented beginning in August 2013. A complete discussion of the water quality summary may be found in Appendix A and raw data is available from the NDDoH.

Results indicated nitrogen and phosphorus levels were elevated and trending higher. As a result of the monitoring, project sponsors intend to reduce non-point source pollution contributions from agricultural lands and private lots within the Spiritwood Lake watershed. In addition, project sponsors intend to repair the existing hypolimnetic drawdown system and utilize it to remove excess nutrients that have accumulated.

Major Goal:

The primary goal is to restore and protect the beneficial use of fish and other aquatic biota to fully supporting, for Spiritwood Lake and its tributaries. This will be accomplished through nutrient management, grazing management, riparian improvements, reducing n-lake nutrient cycling and decreasing residence time.

Objectives:

- 1) Provide technical and financial assistance to producers and landowners, particularly in applying best management practices that protect and enhance riparian areas,
- 2) Address near lake septic systems and fertilization practices,
- 3) Reduce in-lake nutrient cycling,
- 4) Inspect and if possible renovate the hypolimnetic drawdown system, and
- 5) Develop an education/information program that increases public awareness of NPS.

Funding:

FY2016 319 Funds Requested:	\$175,377	Match:	\$116,918
Other Federal Funds:	\$119,500	Total Project Cost:	\$411,795

319 Funded Full Time Personnel: One

2.0 STATEMENT OF NEED

2.1 Project Need and Priority

Water quality sampling completed in 2013-15, indicated elevated levels of phosphorus and nitrogen, which are trending higher. The decomposition of these nutrients and the plant life they feed have resulted in dissolved oxygen levels that fall far below the state guideline of 5mg/L. Additionally, the increased nutrients have resulted in chlorophyll-a levels that exceed the state standard of 20ug/L. Currently, Carlson's Trophic State Index indicate Spiritwood Lake is in the eutrophic range. This is supported by reports from cabin owners and people using the lake for recreation that have noticed an increase in the frequency and severity of algal blooms.

2.2 Waterbody Description

Spiritwood Lake is a natural lake located 10 miles north and 4 miles east of Jamestown, North Dakota (Figure 1). Spiritwood Lake has a surface area of 488.8 acres, a maximum depth of 55.5 ft and an average depth of 31.0 ft (Figure 2). Spiritwood Lake is classified in the state "Standards of Quality for Waters of the State" (NDDoH, 2014) as a Class III lake or reservoir. Class III lakes or reservoirs are defined as a "warm water fishery" or "waters capable of supporting natural reproduction and growth of warm water fishes (e.g., largemouth bass and bluegill) and associated aquatic biota. Some cool water species may also be present."

2.3 Maps

The attached maps in Appendix B illustrate the Spiritwood Lake watershed and location of monitoring sites (Figures 1-2) and high priority areas as determined by the AnnAGNPS model (Figures 3-4).

2.4 General Information

Spiritwood Lake's watershed lies within the Northern Glaciated Plains Level III Ecoregion, part of the broader Cultivated Plains region (Figure 1). This region is the transitional zone between tall and mixed grass prairie. The region has numerous wetlands essential for spring and fall migrations of wetland dependent birds. Flood plain slopes and hillsides are usually native grass while the uplands and flood plains proper have mostly been converted to small grains, row crops and alfalfa.

Land use in the Spiritwood Lake watershed is primarily agricultural. According to the 2013 National Agricultural Statistical Service (NASS) land survey data, approximately 62 percent of the the contributing watershed is cropland, 21 percent - water, 10 percent - native rangeland 4 percent - developed/roads, 2 percent - tame grasses and 1 percent - woodlands/trees.

2.5 Water Quality

An assessment of water quality within Spiritwood Lake was conducted in 2013-15 by sampling at the deepest site in Spiritwood Lake (Table 1, Appendix A Figure 2).

Table 1. Water Quality Monitoring Stations in the Spiritwood Lake Watershed.

Station	Description	Parameter	Years	Samples
380060	Deepest Point - Spiritwood Lake	*Water Quality & Clarity	2013-2015	24

Water Quality includes Nutrients Complete (Temperature, Dissolved oxygen, Total Nitrogen, Total Kjeldahl Nitrogen, Nitrite-Nitrate, Ammonia, And Total Phosphorus, and Chlorophyll-a). Secchi Disk Transparency was also measured during open water periods.

2.5.1 Nutrients

Nitrogen and phosphorus are nutrients necessary for plant growth in a lake, just as in a field or yard. For purposes of this report and comparison with historical data, samples collected at the one-meter depth are displayed (Figures 1 and 2). The amount of nutrients at the one-meter depth help to “feed” the growth of algae, thus affecting water clarity. Both total nitrogen and phosphorus data are showing an increasing trend, which indicates potential water quality concerns for the lake. Currently, the state is in the process of developing standards/guidelines for these nutrients. Guidelines for interim use are 1.0 mg/L for total nitrogen and 0.1 mg/L for total phosphorus

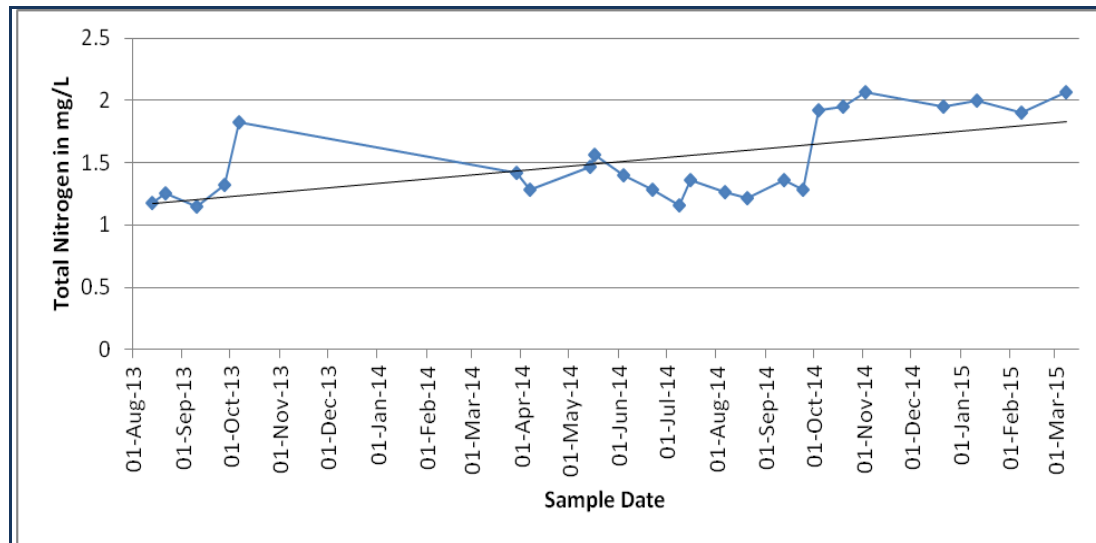


Figure 1. Total Nitrogen Samples and Trendline.

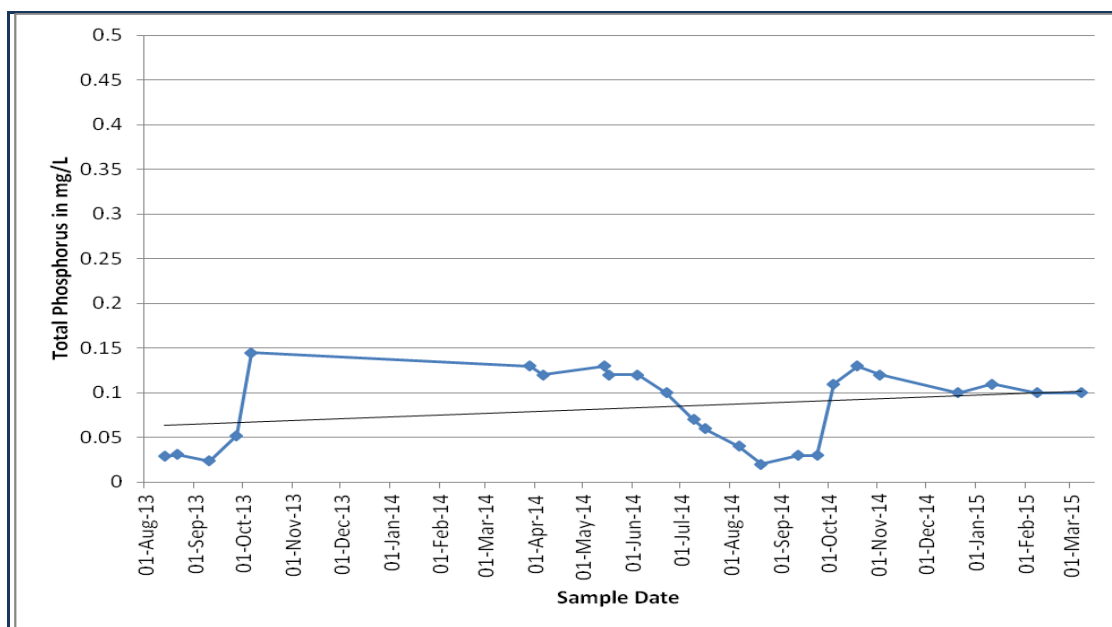


Figure 2. Total Phosphorus Samples and Trendline.

2.5.2 Carlson's Trophic State Index

Trophic status is a measure of the productivity of a lake or reservoir and is directly related to the level of nutrients (i.e., phosphorus and nitrogen) entering the lake or reservoir from its watershed and/or from the internal recycling of nutrients. Highly productive lakes, termed "hypereutrophic," contain excessive phosphorus and are characterized by dense growths of weeds, blue-green algal blooms, low transparency, and low dissolved oxygen (DO) concentrations. These lakes experience frequent fish kills and are generally characterized as having excessive rough fish populations (carp, bullhead, and sucker) and poor sport fisheries. Due to the frequent algal blooms and excessive weed growth, these lakes are also undesirable for recreational uses such as swimming and boating.

Mesotrophic and eutrophic lakes, on the other hand, generally have lower phosphorus concentrations, low to moderate levels of algae and aquatic plant growth, high transparency, and adequate DO concentrations throughout the year. Eutrophic lakes are characterized by the growth of weeds and occasional bluegreen algal blooms. Because of the algal blooms and weed growth, these lakes are can be undesirable for recreational uses such as swimming and boating. Mesotrophic lakes do not experience algal blooms, while eutrophic lakes may occasionally experience algal blooms of short duration, typically a few days to a week.

Due to the relationship between trophic status indicators and the aquatic community (as reflected by the fishery) or between trophic status indicators and the frequency of algal blooms, trophic status is an effective indicator of aquatic life and recreation use support in lakes and reservoirs. The chlorophyll-a trophic status indicator is used by the NDDoH as the primary means to assess whether a lake or reservoir is meeting the narrative water quality standards (NDDoH, 2014).

While the three trophic state indicators, chlorophyll-a, Secchi disk transparency, and total phosphorus, independently estimate algal biomass and should produce the same

index value for a given combination of variable values, often they do not. Also, while transparency and phosphorus may co-vary with trophic state, many times the changes observed in a lake's transparency are not caused by changes in algal biomass, but may be due to particulate sediment. Total phosphorus may or may not be strongly related to algal biomass due to light limitation and/or nitrogen and carbon limitation. Therefore, neither transparency nor phosphorus is an independent estimator of trophic state (Carlson and Simpson, 1996). For these reasons, the NDDoH gives priority to chlorophyll-a as the primary trophic state indicator because this variable is the most accurate of the three at predicting algal biomass (Carlson, 1980).

In-lake water quality data collected in 2013 - 2015 showed; an average chlorophyll-a concentration of 21.94 µg/l, an average total phosphorus concentration of 73 ug/l, an average Secchi Depth of 2.83 meters, and an average total nitrogen concentration of 1.40 mg/l. Based on these data and Carlson's TSI calculations, Spiritwood Lake is assessed as a eutrophic lake (Table 2).

Table 2. Carlson's Trophic State Indices for Spiritwood Lake.

Parameter	Relationship	Units	2013-15 TSI Value	Trophic Status
Chlorophyll-a	$TSI (Chl-a) = 30.6 + 9.81[\ln(Chl-a)]$	µg/L	60.90	Eutrophic
Total Phosphorus (TP)	$TSI (TP) = 4.15 + 14.42[\ln(TP)]$	µg/L	66.02	Eutrophic
Secchi Depth (SD)	$TSI (SD) = 60 - 14.41[\ln(SD)]$	meters	45.01	Mesotrophic
Total Nitrogen (TN)	$TSI (TN) = 54.45 + 14.43[\ln(TN)]$	mg/L	59.31	Eutrophic

TSI < 30 - Oligotrophic (least productive)

TSI 30-50 Mesotrophic

TSI 50-65 Eutrophic

TSI > 65 - Hypereutrophic (most productive)

2.5.3 Beneficial Use Assessment

Aquatic Life Use

Nutrients

Eutrophication is defined as the increase in primary productivity resulting from excessive nutrient inputs into rivers and lakes. Sources of excess nutrients include; internal cycling, failed septic systems, runoff from cropland, improper nutrient management and livestock operations. The negative impacts from eutrophication may include the reduction of dissolved oxygen due to algal growth and subsequent decomposition by microbial activity and also alteration of the algal community. The alteration of the algal community can lead to a decrease in food resource quality for aquatic insects and fish and an alteration of the aquatic insect and fish communities to include less intolerant species (e.g., stonecats, mayflies, stoneflies). Concentrations of TN or TP at which lakes are considered eutrophic can be influenced by spatial and temporal variations in a variety of factors and is still an area of significant research. A combination of studies suggests that the TN and TP levels defining the boundary between mesotrophic (moderate nutrient levels) and eutrophic conditions were 1.5 mg/L and 0.075 mg/L, respectively (U.S. EPA, 2001).

3.0 PROJECT DESCRIPTION

3.1 Goal

The primary goal is to restore and protect the beneficial use of fish and other aquatic biota to fully supporting for Spiritwood Lake and its tributaries.

3.2 Objectives

Objective 1: Maintain nitrogen and phosphorus concentrations at baseline levels determined from the water quality assessment. The primary water quality target is to protect, the aquatic life uses by improving the dissolved oxygen from the surface of the lake to a 13 meter depth, to the state guideline of 5mg/L. A secondary target is to achieve the state guideline for chlorophyll-a of an average 20ug/L during the growing season.

Task 1 – Cooperate with the local SCD to hire/contract a watershed coordinator to cooperate with other organizations and agencies in providing technical assistance to producers, monitoring water quality, and providing educational materials to the public.

Product – One part time watershed employee, including salary, benefits, travel, training, office, and equipment.

Cost – \$72,297

Objective 2: Address near lake septic systems and fertilization practices.

Task 2 – Conduct an education campaign to limit the use of lawn fertilizers near the lake and eliminate the use of phosphorus.

Product – Educational materials distributed each spring.

Cost – Included in Task 9.

Task 3 – Conduct an intensive septic system inventory building on the existing survey. Prioritize systems based on condition and potential to pollute.

Product – Prioritized list of septic systems to renovate.

Cost – \$3,500

Task 4 – Renovate failing septic systems.

Product – Renovate a potential 10 systems.

Cost – \$120,000

Objective 3: Assessment of the existing hypolimnetic drawdown system.

Task 5 – Inspect the existing hypolimnetic drawdown system to determine functionality and renovate as required.

Product – 1 inspection report and renovations
Cost – \$44,000

Task 6 – Explore the options for the discharge of the hypolimnetic drawdown. Presently, the three options being considered are:

- 1) Restart the existing system and discharge to Shock Lake.
- 2) Restart the existing system and discharge to Seven Mile Coulee.
- 3) Install a portable pump on the north shore boat ramp and pump the water from the hypolimnion and cycled through the existing ND Game & Fish rearing ponds.

Product – 1 report on hypolimnetic drawdown discharge options as outlined in the Appendix E.
Cost – \$1,500

Objective 4: Increase the public's understanding and awareness of the impacts of and solutions to NPS pollution.

Task 7 – Coordinate with the soil conservation district to organize and conduct informational/educational events focusing on NPS pollution control.

Product – 3 – Public informational meetings addressing fertilizer use and project progress (pre and post project).
Cost – \$1,500

Task 8 – Prepare newsletters, direct mailings, radio spots and other outreach to local land users, the general public, and media to promote the project and disseminate information on water quality and NPS pollution control.

Product – A) 2 – Pre and Post project watershed surveys
B) 10 – Project updates/newsletters
C) 30 – Monthly news releases highlighting a resource concern, project success or current water quality topic
Cost – \$1500

Objective 5: Conduct monitoring to determine project success.

Task 9 – Assist the NDDoH in developing a Quality Assurance Project Plan (QAPP) prior to monitoring.

Product – Completed QAPP.
Cost – Included in Task 1

Task 10 – Conduct water sampling as identified in the QAPP.

Product – Seventy-two water quality samples.

Cost – Included in task 1

Objective 6: Complete necessary project reports.

Task 11 – Complete annual and final project reports on progress and completion, to be provided to NDDoH, EPA, sponsors, and other interested parties.

Product – Annual and final project reports.

Cost – Included in Task 1.

3.3 Milestones

See Appendix C

3.4 Permits

All necessary permits, such as; 404/401 certification, NDDH approval to operate "permits" for manure management systems and cultural resource inventories will be acquired. Project personnel will work with NDDoH to determine if permits are needed.

3.5 Lead sponsor

The City of Spiritwood Lake is sponsoring this water quality project. The City's vision for the lake will help to prioritize and provide guidance to the field service staff. The city has legal authority to employ personnel and receive and expend funds. The City of Spiritwood Lake has credible experience in personnel management.

3.6 Operation and Maintenance

All BMPs cost-shared with 319 funds will be contracted and tracked through the NPS program BMP tracking database. BMPs must be applied according to NRCS standards and specifications or specifications approved by the NPS program. In addition, the project coordinator will inspect the BMP before cost share is issued and periodically during the project period to ensure proper operation and maintenance.

4.0 COORDINATION PLAN

4.1 Cooperating Organizations –

- 1) The City of Spiritwood Lake will be the signer of the 319 contract and will be the lead agency responsible for project administration. They will provide vehicles, clerical assistance, equipment and supplies, as well as financial support. The city commission will oversee implementation of the scheduled project activities and provide staff to complete the project. The commission will be the primary supervisor of the watershed coordinator and all Section 319 funded activities.
- 2) The Spiritwood Lake Association, Inc. will provide assistance in implementing portions of the project and helping to organize and conduct educational events.
- 3) The Stutsman Soil Conservation District may assist with sign-up and implementation of BMPs and educational events.
- 4) Natural Resource Conservation Service (NRCS) will provide assistance in conservation planning, plan writing, and technical/engineering assistance for construction and installation of planned BMPs. Many of the standards and specifications for approved BMPs are provided by NRCS personnel from the NRCS Field Office Technical Guide. Funds may also be available to landowners through programs such as the Environmental Quality Incentives Program (EQIP). NRCS will also participate in educational outreach activities.
- 5) North Dakota Department of Health (NDDoH) will oversee 319 funding as well as develop the Quality Assurance Project Plan (QAPP) for this project. The NDDoH will provide oversight on sample collection, preservation, and transportation to ensure reliable data is obtained. NDDoH will provide laboratory analysis of water samples as well as data storage. NDDoH will assist project staff in development and implementation of the project's I/E activities. NDDoH will provide sponsor oversight to ensure proper management and expenditures of Section 319 funds.

- They will assist NRCS and City of Spiritwood Lake personnel in the review of Operation and Maintenance requirements for Section 319 funded BMPs.
- 6) North Dakota Game & Fish Department may assist with in-lake project features.
 - 7) Farm Service Agency (FSA) will serve as a local resource and may provide assistance to landowners when Conservation Reserve Program (CRP) practices can be applied.
 - 8) Local NDSU Agricultural Extension staff may assist with information and education activities.
 - 9) Stutsman County Water Resource Board may assist with hypolimnetic activities.
 - 10) NDSU Nutrient Management Educational Support Program may provide technical assistance for educational events addressing manure management as well as technical assistance to producers to plan and develop nutrient management plans involving manure management.
 - 11) NPS BMP Team may provide engineering assistance for designing/implementing manure management systems and riparian restoration projects.

4.2 Local Project Support

Appendix F contains letters of support from the City of Spiritwood Lake, the Spiritwood Lake Association, Inc. and the Stutsman Soil Conservation District

4.3 Funding Coordination

The funding of best management practices in the Spiritwood Lake Watershed project area will be coordinated with funding from programs such as EQIP through NRCS and CRP through FSA when those programs offer related practices that enhance or complement practices available through 319 funding. Additional funds will be applied for through the Outdoor Heritage Fund and Save Our Lakes Program.

4.4 Other Watershed Activities

No other watershed activities have been conducted in the Spiritwood Lake watershed. Currently, the Stutsman Soil Conservation District sponsors watershed projects in the Seven Mile Coulee and Beaver Creek Watersheds and the Stutsman County Manure Management Program.

5.0 EVALUATION AND MONITORING PLAN

The QAPP will be completed by the NDDoH after the project is fully approved.

6.0 BUDGET

6.1 Project Budget

See Appendix D.

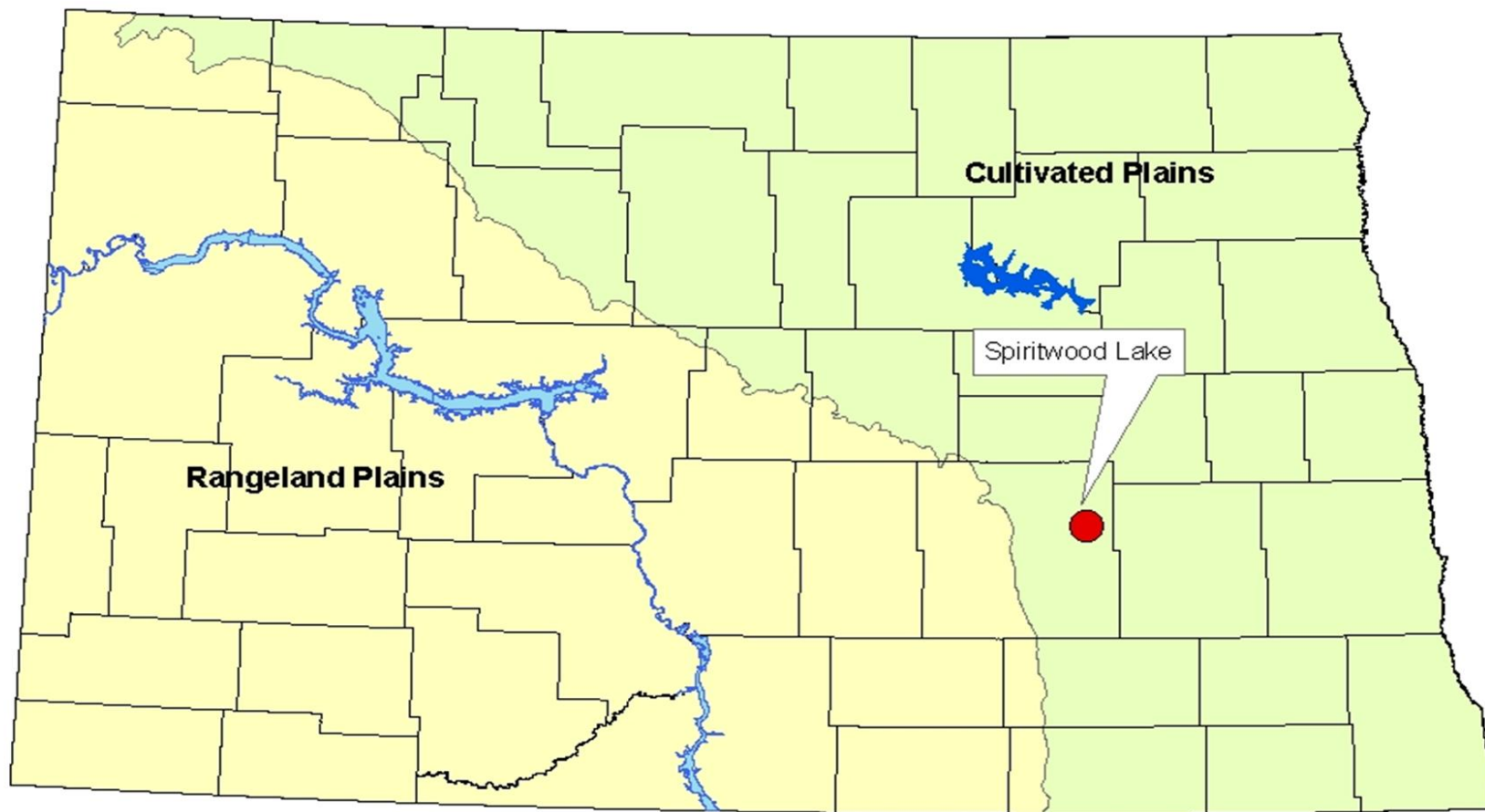
7.0 PUBLIC INVOLVEMENT

As listed in Objective 5, an important component of this project will be educational efforts and public involvement, including public meetings and tours/workshops. Watershed newsletters will also be used to provide project information to the public, as well as direct mailings and the use of public media.




Appendix A. Water Quality Summary

The water quality report has not been included due to the size of the document. A full copy of the project proposal that includes the water quality report can be obtained from Greg Sandness at gsandnes@nd.gov.

Appendix B. Maps and Figures.



Map Features

- | | |
|--|---|
|  Devils Lake 2004 |  County Boundaries |
|  Missouri River |  Rangeland_Plains |
|  Waterbody |  Cultivated_Plains |



0 15 30 60 Miles

Figure 1. General Location of Spiritwood Lake.

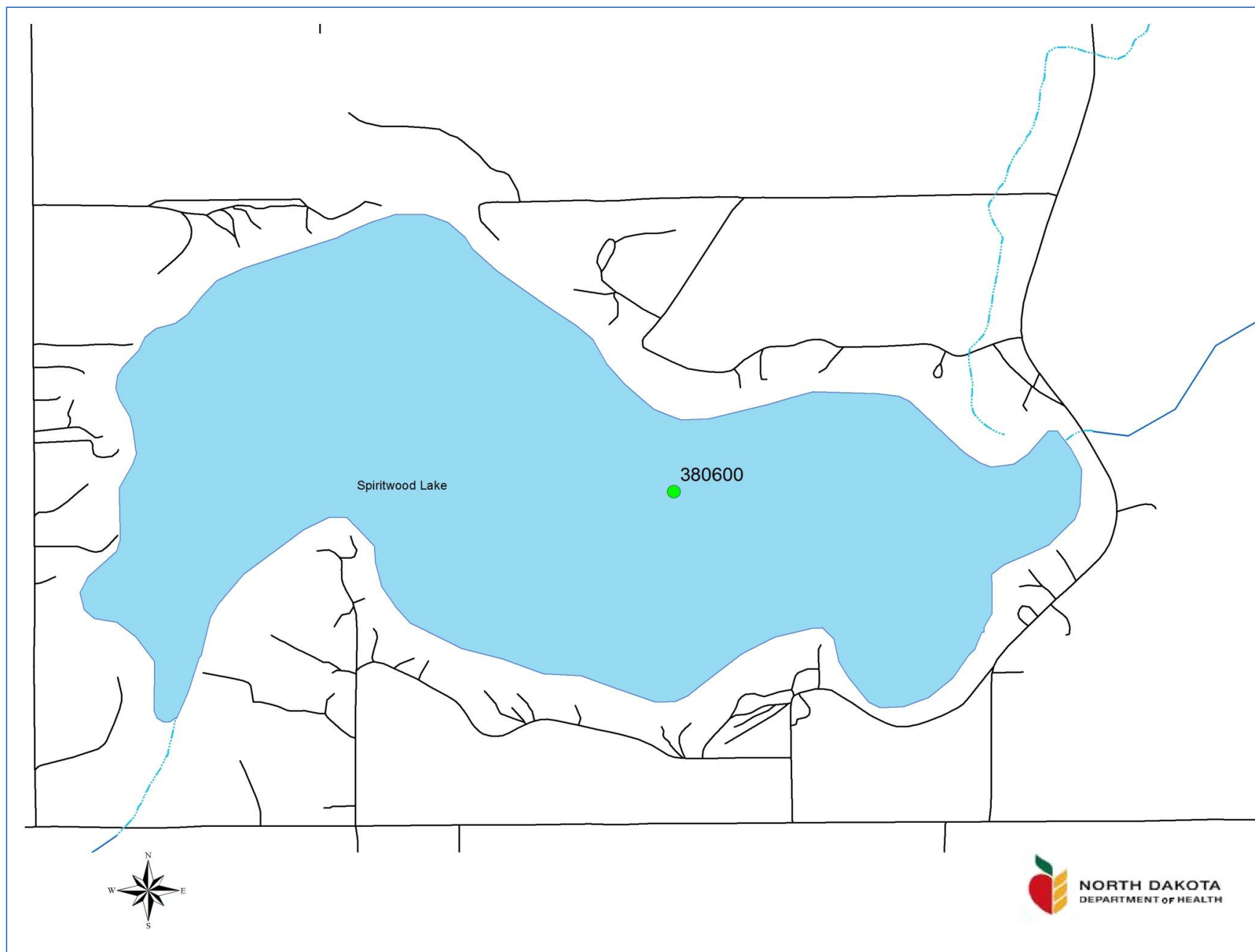


Figure 2. Spiritwood Lake Watershed and Water Quality Sampling Site Location.

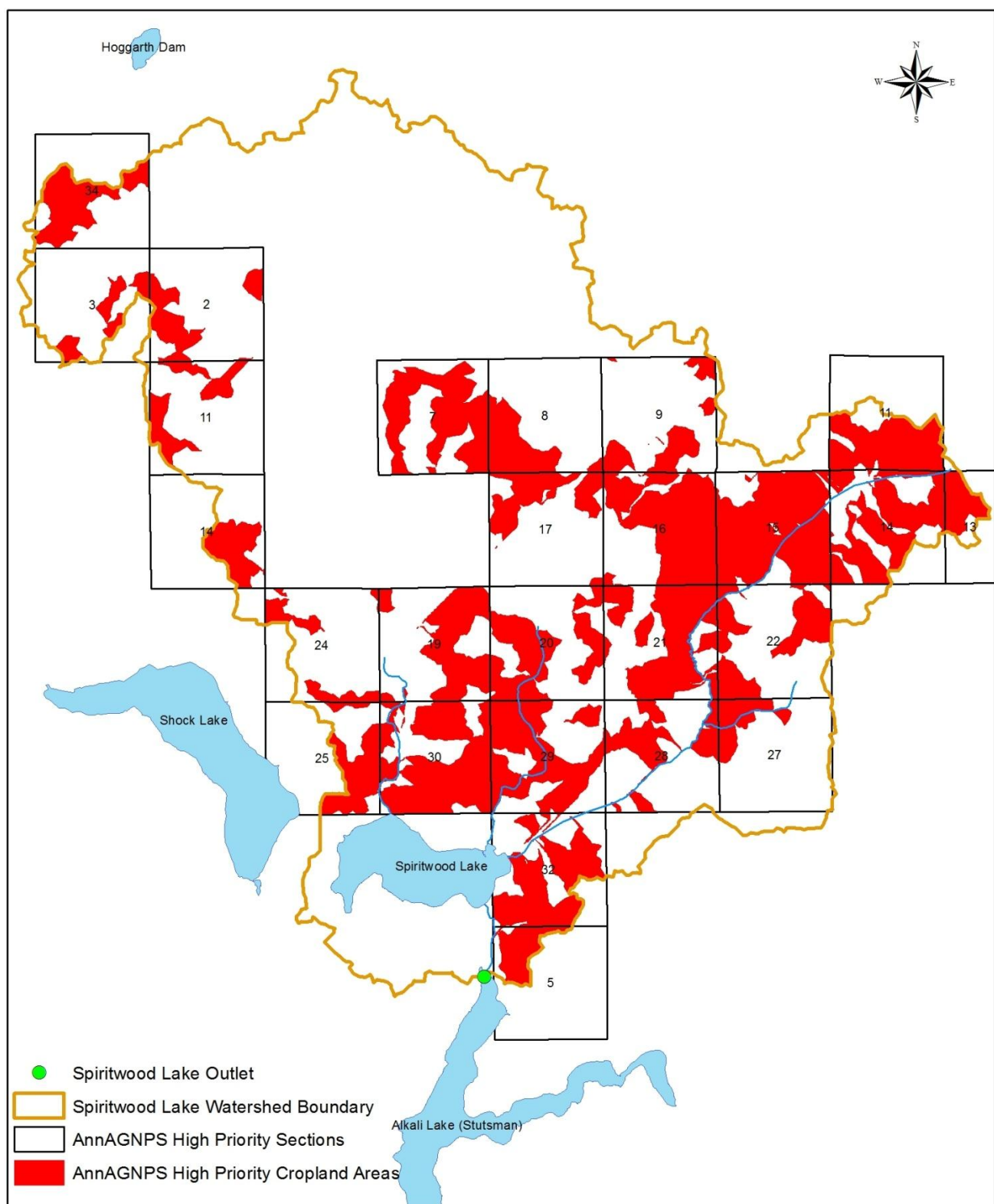


Figure 3. High Priority Cropland Acres Identified by the AnnAGNPS Model.

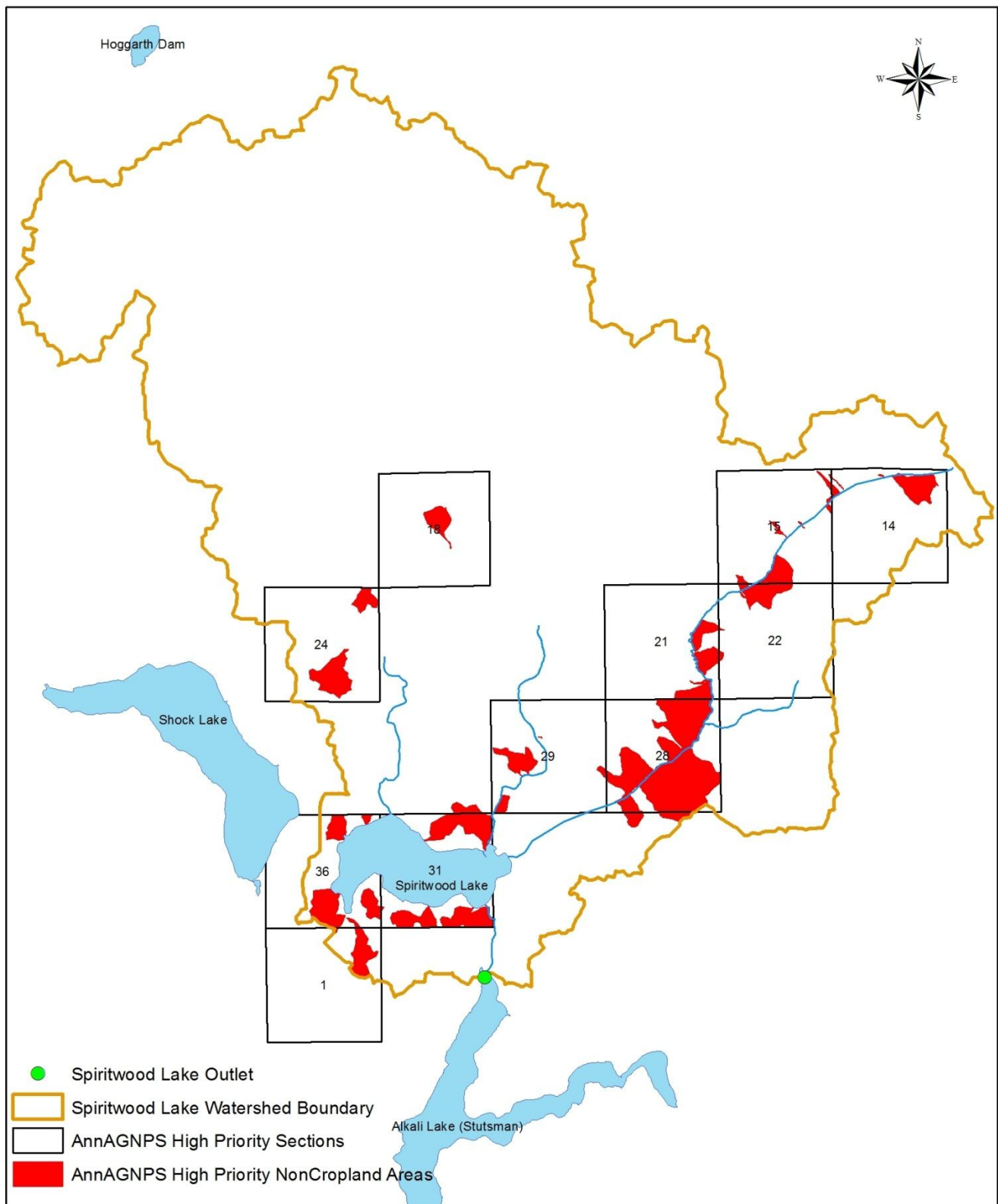


Figure 4. High Priority Non-Cropland Acres Identified by the AnnAGNPS Model.

Appendix C. Milestone Table

Milestone Table for the Spiritwood Lake Watershed Project

Task/Responsible Organizations		Output	Qty.	Year 1 2016	Year 2 2017	Year 3 2018	Year 4 2019	Year 5 2020
Objective 1:								
Task 1: Group 1,5	Hire watershed coordinator	Part-time Watershed Coordinator	1	1	1	1	1	1
Objective 2:								
Task 2: Group 1, 2, 5	Conduct fertilizing education	Educational materials in spring	5	1	1	1	1	1
Task 3: Group 1, 2, 5	Conduct intensive septic survey	Report with prioritization list.	1					
Task 4: Group 1, 5	Renovate failing systems	Completed renovations	12	2	2	2	3	3
Objective 3:								
Task 5: Group 1, 4	Hypolimnetic drawdown	Completed inspection report	1	1				
Task 6: Group 1, 4	Conduct discharge option study	Completed study report	1		1			
Objective 4:								
Task 7: Group 1,5	Informational Events	3 – Public informational meetings addressing fertilizer use and project progress.	3	1		1		1
Task 8: Group 1,5	Newsletters and other media	A) 2 – Pre and Post project watershed surveys B) 10 – Project updates or newsletters C) 30 – Monthly news releases highlighting a resource concern, project success or current water quality topic	42	9	8	8	8	9
Objective 5:								
Task 9: Group 1, 4	Establish a Quality Assurance Project Plan	Approved QAPP	1		1			
Task 10: Group 1,5	Conduct Sampling	72 water samples	72			24	24	24
Objective 6:								
Task 11: Group 1,5	Complete annual and final project reports	Project reports	6	1	1	1	1	2

Group 1 – Spiritwood Lake - Local project manager and sponsor, including responsibilities for project coordination, reimbursement payments, match tracking, and progress reporting to the NDDoH. Also provides technical assistance to plan, design, and implement BMPs.

Group 2 - Landowners in the Spiritwood Lake watershed - Make land management decisions and provide cash and in-kind match for BMPs.

Group 3 - Natural Resource Conservation Service - Provides technical assistance to plan, design, and implement BMPs. Also provides financial assistance for BMPs to landowners through the EQIP program.

Group 4 - ND Department of Health - Statewide section 319 program management including oversight of local 319 planning and expenditures. Also provides technical assistance for water quality analysis and documentation.

Group 5 - Stutsman Soil Conservation District - Provides technical assistance to plan, design, and implement BMPs. Also provides financial assistance for the watershed coordinator and BMPs to landowners through the existing programs.

Appendix D. Budget.

Part 1: Funding Sources						
	2016	2017	2018	2019	2020	Total
EPA SECTION 319 FUNDS						
1)FY 2016 Funds (FA)	\$18,016	\$58,377	\$32,929	\$32,991	\$33,065	\$175,377
STATE/LOCAL MATCH						
1) City of Spiritwood Lake (TA & FA)	\$12,010	\$26,918	\$9,952	\$9,994	\$10,043	\$68,918
2) Landowners (FA)		\$12,000	\$12,000	\$12,000	\$12,000	\$48,000
Subtotals	\$12,010	\$38,918	\$21,952	\$21,994	\$22,043	\$116,918
TOTAL BUDGET						
	\$30,026	\$97,295	\$54,881	\$54,985	\$55,108	\$292,295
OTHER FEDERAL FUNDS						
1) NRCS (TA, EQIP, and other programs)	\$0	\$25,000	\$25,000	\$25,000	\$25,000	\$100,000
2) NDDoH	\$0	\$0	\$6,500	\$6,500	\$6,500	\$19,500
TOTAL FEDERAL FUNDS	\$0	\$25,000	\$31,500	\$31,500	\$31,500	\$119,500
TOTAL PROJECT COST						\$411,795

FA: Financial Assistance

TA: Technical Assistance

SCD: Soil Conservation District

NRCS: Natural Resource Conservation Service

FSA: Farm Service Agency

NDDoH: North Dakota Department of Health

Part 2: Detailed Budget (Section 319/Non-Federal)

	2016	2017	2018	2019	2020	Total Costs	Cash and In-kind Match	319 Funds
PERSONNEL/SUPPORT/ADMIN								
Salary/Fringe	\$18,976	\$19,545	\$20,131	\$20,735	\$20,358	\$99,745	\$39,898	\$59,847
Travel	\$500	\$500	\$500	\$500	\$500	\$2,500	\$1,000	\$1,500
Office Space	\$950	\$950	\$950	\$950	\$950	\$4,750	\$1,900	\$2,850
Equipment/Supplies	\$1,000	\$200	\$200	\$200	\$200	\$1,800	\$720	\$1,080
Training	\$500	\$500	\$500	\$500	\$500	\$2,500	\$1,000	\$1,500
SCD meetings	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$9,000	\$3,600	\$5,400
Subtotals	\$23,726	\$23,495	\$24,081	\$24,685	\$24,308	\$120,295	\$48,118	\$72,177
Objective 2: Septic System Inventory/Renovation								
Fertilizing education campaign						\$0	\$0	\$0
Treatment system inventory	\$3,500					\$3,500	\$1,400	\$2,100
Treatment system renovations		\$30,000	\$30,000	\$30,000	\$30,000	\$120,000	\$48,000	\$72,000
Subtotals	\$3,500	\$30,000	\$30,000	\$30,000	\$30,000	\$123,500	\$49,400	\$74,100
Objective 3: Hypolimnetic Drawdown Inspection/Renovation								
Inspection of pipes and pump.	\$2,000	\$42,000				\$44,000	\$17,600	\$26,400
Discharge study		\$1,500				\$1,500	\$600	\$900
Subtotals	\$2,000	\$43,500	\$0	\$0	\$0	\$45,500	\$18,200	\$27,300
Objective 4: Public Information Campaign								
Public informational meetings	\$500		\$500		\$500	\$1,500	\$600	\$900
Surveys, Newsletters and News Releases	\$300	\$300	\$300	\$300	\$300	\$1,500	\$600	\$900
Subtotals	\$800	\$300	\$800	\$300	\$800	\$3,000	\$1,200	\$1,800
Objective 5: Public Information Campaign								
QAPP development						\$0	\$0	\$0
Project Monitoring						\$0	\$0	\$0

Subtotals	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Objective 6: Project Reporting								
Annual project report						\$0	\$0	\$0
Subtotals	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total for all Objectives/Tasks								
Total 319/Non-federal Budget	\$30,026	\$97,295	\$54,881	\$54,985	\$55,108	\$292,295	\$116,918	\$175,377

Appendix E. Hypolimnetic Discharge Plan.

Hypolimnetic Discharge Plan

One factor contributing to the decline of water quality in the lake is the extended residence time of the water. Residence time is the amount of time water spends in a lake before flowing out. There are two main reasons for the increased residence time of Spiritwood Lake: first, the outlet of the lake is in close proximity to the inlet, allowing for no exchange of “fresher” water. The historical outlet, according to documentation is located in the southwest corner of the lake. Secondly, the operation of the hypolimnetic drawdown was suspended due to high water in the receiving waterbody (Shock Lake). This has resulted in nutrient-rich water remaining in the lake and available for plant growth throughout the water column when the lake turns over. During the recreational season, stratification occurs between four and eleven meters. Results indicate there is less than 5 mg/L dissolved oxygen below these levels, limiting aquatic life habitat. If a functioning hypolimnetic system was employed, it would need to remove 9,537 acre feet of water when the lake stratifies at the four meter level to 1,607 acre feet at the eleven meter level. In the past, the hypolimnetic drawdown system would have removed this pool of water in the fall, allowing spring snowmelt runoff to “freshen” the lake. Without the removal of the nutrient-rich water, the nutrients are constantly being recycled.

Prior to any possible start up, the system must be inspected to insure the integrity of the pipe and the pump.

Options

Option 1: This would be the most preferred option, primarily, because of the minimal cost to initiate the system. Downstream landowners would need to be contacted to receive permission to move water. It is anticipated that if discharges were made during early June and late September, Shock Lake levels would be affected by a minimum of 1.5 feet. A recommendation would be that once the elevation of Shock Lake rises 1.5 during the discharge period, pumping would cease. This could be due to the discharge, natural precipitation events or a combination.

Calculated volumes of water would be between 9,537 acre feet of water when the lake stratifies at the four meter level to 1,607 acre feet at the eleven meter level. The target would be 1,607 acre feet for logistical

Option 2: This would involve the redirecting of the outlet pipe from Shock Lake to Seven Mile Coulee. Most likely this would require the largest expenditure of funds because of the installation of new pipe and other equipment. Discharges would need to be monitored closely to ensure minimal adverse affect to the water quality of Seven Mile Coulee.

Option 3: This would require the sighting of a portable pump on the north shore (old boat ramp) of the lake and laying pipe out to the deepest portion. Drawdown water would be pumped north into the abandoned rearing ponds owned by the North Dakota Game & Fish Department. This system would utilize natural methods to strip nutrients from the water prior to its re-entry. The quality of the return water would be monitored to adjust flow rates and residence time in the ponds to achieve the best result.

Appendix F. Letters of Support.



January 25, 2016

On behalf of the City of Spiritwood Lake Council members, I would like to express the Council's support for Phase III of the EPA 319 grant for the proposed Watershed Project for the City of Spiritwood Lake, located within Stutsman County.

Spiritwood Lake is a body of water that lies within the Northern Glaciated Plains Level III Ecoregion and as such is a natural lake that is defined as a warm water fishery, with waters capable of supporting natural reproduction and growth of warm water fishes and associated aquatic biota. Some cool water species may also be present.

We would like to work with all the agencies involved to decrease the nutrients coming into the Lake so that Spiritwood Lake can continue to be a body of water that is pleasant to live by as well as use for Fishing, boating and summer activities as well as Ice Fishing in the winter.

The City Council and the Citizens of Spiritwood Lake appreciates any help that is available with water quality efforts within the City of Spiritwood Lake, whether it is education of our residents or installing best management practice for water quality through the local EPA 319 project.

Sincerely

A handwritten signature in cursive script, reading "Shirley Krapp", written in black ink.

Shirly Krapp
City Auditor
City of Spiritwood Lake
Cslauditor2004@gmail.com



Mini-eskaya



Spiritwood Lake Association
PO Box 1402
Jamestown, ND 58402-1402

January 28, 2016

The Honorable Mark Jacobson, Mayor
City of Spiritwood Lake
PO Box 642
Jamestown, ND 58402-0642

Dear Mayor Jacobson,

As 2015 came to a close, I was remiss in not writing to you and thanking the city for their support in our efforts to reclaim Spiritwood Lake and restore it to its previous pristine condition. The members of the Spiritwood Lake Association and myself are grateful for your support of the next step (phase III) of the EPA 319 grant for this Watershed Project.

Spiritwood Lake is one of only two glaciated lakes in North Dakota and the water quality in the lake has been on a steady decline over the past several years. The proposed EPA 319 Watershed Project will go a long way in restoring the lake and improving fishing and the recreational use of the lake.

The Lake Association members and its Board of Directors stand ready to assist the various agencies in the implementation of the EP 319 Grant.

Sincerely,

Dave Glaspell, President
Spiritwood Lake Association, Inc.



Stutsman County Soil Conservation District

1301 Business Loop East - Jamestown, ND 58401 - Phone (701) 252-2521, Ext. 3 or 252-1920, Ext.3

Fax 701-252-9439

January 28, 2016

Shirley Krapp, Auditor
City of Spiritwood Lake
P.O. Box 642
Jamestown, ND 58402

Dear Shirley:

The Stutsman County Soil Conservation District is in full support the proposed Spiritwood Lake Water Quality Improvement Project. In Stutsman County, Spiritwood Lake is a shining gem of outdoor recreation as well as being of great economic importance to our area. Everyone in our area has as least one great experience of fun and recreation on Spiritwood Lake.

The past several years have produced a marked downturn in the water quality of Spiritwood Lake, as recent data has shown. We believe it is definitely time to put improvements in place to preserve Spiritwood Lake for our future and our children's future. We look forward to working with all involved entities to make this project a great success.

Sincerely,

Gloria Jones, Chairperson
Stutsman County Soil Conservation District



United States Department of Agriculture

Natural Resources
Conservation Svc.

January 29, 2016

Jamestown Field Office
1301 Business Loop E.
Jamestown ND 58401

Voice: 701-252-2521 X3
Fax: 855-561-7866

Shirley Krapp-Auditor
City of Spiritwood Lake
PO Box 642
Jamestown, ND 58402

Shirley,

I am writing you in regards to the proposed Spiritwood Lake watershed project. I have seen two presentations regarding the status of the lake. It appears that the lake is at a critical point right now in terms of health. Any further degradation will cause fish die-off and further degrade the value of the lake for wildlife and recreational use.


This has happened to the lake before in the past, and has also been successfully treated before with the use of conservation practices. I have seen from my work what benefits conservation can have to not just water quality, but also financial competitiveness to the ag producers. All nutrients and sediments that leave the land also impose a cost to farmers in having to replace the value of them artificially.

The 319 program in Stutsman county has a great track record of helping producers and making measureable differences in water quality. I recommend support for the project through whatever financial or non-financial means are available.

Spiritwood Lake is a unique and beautiful area, and provides a resource for many people in the area. Sound conservation practices are needed in part to not only restore the lake, but maintain it in the future.

If you have any further questions regarding the impact of conservation practices, feel free to give me a call at 701-252-2521 X 3.

Thank you,



AUSTIN S. LANG
District Conservationist