

**MAPLE RIVER
WATERSHED PROJECT**

1.0 PROJECT SUMMARY SHEET

LEAD PROJECT SPONSORS/SUBGRANTEES:

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STATE CONTACT PERSON: Greg Sandness **TITLE:** Environmental Scientist

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STATE: North Dakota **WATERSHED:** Maple River

HYDROLOGIC UNIT CODE: 09020205 **HIGH PRIORITY WATERSHED:** No

PROJECT TYPES

WATERBODY TYPES

NPS CATEGORY

☒ STAFFING & SUPPORT
☒ WATERSHED
RUNOFF
☐ GROUNDWATER
☒ I & E
CONSTRUCTION

☐ GROUNDWATER
☐ LAKES/RESERVOIR
☒ RIVERS
☒ STREAMS
☐ WETLANDS
☐ OTHER

☒ AGRICULTURE
☐ URBAN
☐ SILVICULTURE
☐
☐ RESOURCE

EXTRACTION ☐ STORAGE/LAND DISPOSAL
☐ HYDRO MODIFICATION
☐ OTHER

PROJECT: LATITUDE 46 **MIN.** 45 **LONGITUDE** -97 **MIN.** 33

Maple River Watershed Project

GOAL FOR THE PROJECT: During the course of the project period, Cass Soil Conservation District will use promotion and implementation of agricultural Best Management Practices to improve of the designated uses of the Maple River, which includes fish and other aquatic biota, and recreation, while creating measurable reductions in the concentrations of known pollutants (nitrates, phosphorus, and E. Coli bacteria) throughout the Maple River watershed.

PROJECT DESCRIPTION:

The Maple River Watershed Project will implement comprehensive conservation planning, BMP implementation, monitoring/assessment, and information/education programs on the highest priority ranked sub-watersheds in terms of non-point source pollution (NPS) contribution to the Maple River. To better monitor water quality improvements and focus 319 project funds, this project will use several different prioritization measures as well as extensive outreach to ensure long term success.

The main objectives are:

- 1) Achieve reductions in E. Coli bacterial levels in the 303(d) listed reaches of the Maple River Watershed through the implementation of BMPs
- 2) Document long term and short term water quality trends and improvements (i.e. reductions in E. Coli bacteria) in the Maple River Watershed
- 3) Utilize the Prioritize, Target, and Measure Application (PTMApp) and AnnAGNPS maps to identify priority areas for BMP implementation to achieve reduction in nutrients (N&P) and sediment loads within the Maple River Watershed.
- 4) Inform and Educate local producers on land management practices to improve soil conditions and water quality.
- 5) Project administration, management, and support

FY 2018 319 Fund Requested \$299,844 Match \$199,896

Other Federal Funds \$3,000,000 Total Project Cost \$3,499,740

2.0 Statement of Need

2.1 Project Reference

The Cass Co. Soil Conservation District (CCSCD) has long recognized the natural, economic, and recreational value of the many water bodies in the county and will provide financial and technical assistance to develop, coordinate, and implement tasks to reduce the cumulative effects of the long term delivery of excess nitrogen, phosphorus, sediment and E. Coli bacteria to the Maple River and its tributaries. The Maple River Watershed is a large watershed that spans throughout Cass, Steele, Barnes, Ransom and Richland Counties. Although the watershed covers a large area of many counties, Cass County holds the majority of the land area and works as a great central location for watershed project administration.

According to the 2016 Maple River TMDL report the North Dakota Department of Health has identified 6 reaches within the watershed as not supporting for fish and other aquatic biota due to fishes bioassessments and dissolved oxygen levels, and fully supporting but threatened for recreation due to Escherichia coli (E. coli) bacteria.

In light of what is known about water quality impairments in the Maple River watershed, the Cass County Soil Conservation District is proposing a Best Management Practice (BMP) Implementation Project to address the water quality concerns evident in the watershed. The result of these BMP will be improvements in the quality of the water in the Maple River and progress toward the removal of this watershed from the North Dakota Section 303(d) list of impaired waters.

To better monitor water quality improvements and focus 319 project funds, this project will use AnnAGNPS maps and the PTMAApp prioritization tool as well as extensive outreach to ensure long term success. These prioritization measures will focus project efforts on specific areas to minimize the overall size of targeted project area. In addition, due to the large size of the watershed, Cass County SCD is committed to a long term plan for the Maple River Watershed to work towards the ultimate goal of delisting impaired waters.

2.2 Watershed Description

The Maple River watershed is a 1,008,912 acre watershed located in Cass, Barnes, Steele, Ransom, and Richland Counties in southeastern North Dakota (Map 1 Appendix A). The Maple River watershed lies within the Level III Northern Glaciated Plains (46) and Lake Agassiz Plain (48) Ecoregions (Map 3 Appendix A)

Based on the 2016 Section 303(d) List of Impaired Waters Needing TMDLs (NDDoH, 2016), the North Dakota Department of Health (NDDoH) has identified the following impaired waterbodies in the Maple River Watershed:

A 28.28 mile segment (ND-09020205-024-S_00) of the Maple River downstream to its confluence with a tributary near the Steele, Cass, and Barnes county line (ND-09020205-023-S_00) as not supporting for fish and other aquatic biota due to fishes bioassessments and dissolved oxygen.

A 40.06 mile segment (ND-09020205-015-S_00) of the Maple River from its confluence with a tributary watershed near Buffalo, ND (ND-09020205-019-S_00) downstream to its confluence with the South Branch Maple as fully supporting, but threatened for fish and other aquatic biota due to fishes bioassessment, dissolved oxygen and benthic-macroinvertebrate bioassessment.

A 26.15 mile segment (ND-09020205-012-S_00) of the Maple River from its confluence with the South Branch Maple River downstream to its confluence with a tributary near Leonard, ND as fully supporting, but threatened for fish and other aquatic biota due to dissolved oxygen and fishes bioassessments.

A 28.56 mile segment (ND-09020205-001-S_00) of the Maple River from its confluence with Buffalo Creek downstream to its confluence with the Sheyenne River as not supporting fish and other aquatic biota due to sedimentation/siltation, combination benthic/fishes bioassessments and fully supporting.

A 48.33 mile segment (ND-09020205-010-S_00) of the Maple River from its confluence with a tributary near Leonard, ND (ND-09020205-011-S_00) downstream to its confluence with Buffalo Creek as fully supporting, but threatened for fish and other aquatic biota due to fishes and benthic macroinvertebrate bioassessments and sedimentation/siltation.

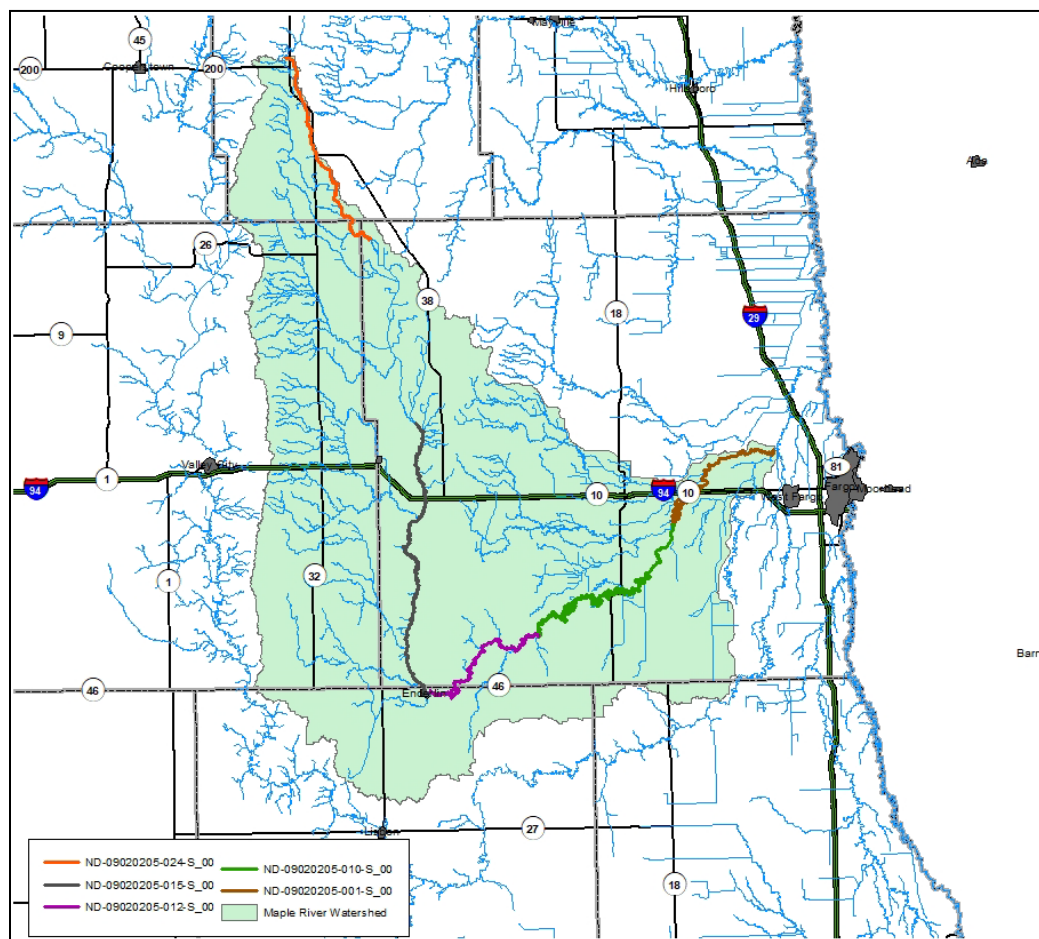


Figure 1. Maple River TMDL Listed Segments

Maple River E. coli Bacteria TMDL Report

In 2016 an E. coli Bacteria TMDL was approved by EPA addressing the Maple River segments (ND-09020205-024-S_00, ND-09020205-015-S_00, ND-09020205-012-S_00 and ND-09020205-001-S_00). In these TMDLs load reduction goals were set to improve E. coli bacteria concentrations to levels that comply with State water quality standards (126 CFU/100 mL and 10 percent exceedance of 409 CFU/100 mL).

The Maple River segments were listed as fully supporting, but threatened to not supporting recreational beneficial uses due to E. coli bacteria. The TMDL identified that E. coli bacteria exceedances of the State water quality standards occurred during high, moist and dry condition and low flows. Possible nonpoint sources cited in the TMDL include unpermitted AFOs, livestock grazing and watering along the river or failing septic systems.

Nonpoint source and point source pollution load allocations were calculated as it pertains to each segment. The point source allocations were given to the towns of Buffalo, Enderlin and Mapleton, ND.

2.3 Maps

AnnAGNPS

An Annualized Agricultural Nonpoint Source Pollution (AnnAGNPS) model was developed for the Maple River Watershed. The AnnAGNPS model uses soils, fertilization rates, cropping systems, elevation, land use, precipitation data, etc. to 1) characterize the size and shape of the watershed and 2) identify “high priority areas” that are potentially the most significant sources of nutrients (N & P) and sediment in the Maple River watershed. The results of the AnnAGNPS model will be used to target technical and financial assistance for the implementation of BMPs in the watershed. See **Appendix A** for AnnAGNPS map.

PTMApp

The Prioritize, Target, and Measure Application (PTMApp) is a web application that can be used to interactively and in real-time, prioritize resources and the issues impacting them, target specific fields to place BMPs, and measure water quality improvement by tracking the expected nutrient and sediment load reductions delivered to priority resources.

PTMApp will:

- Rank subwatersheds (and therefore priority) for BMP placement, based on the amount of sediment and nutrient loads (N&P)
- Target specific areas to refine BMP placement based on the amount of pollutant load within priority and non-priority subwatersheds. Load reduction from each specific area reaching a specific stream, river, or lake is estimated through the

application of delivery ratios to the sediment, TP, and TN loads leaving the landscape. The load leaving the landscape, reaching the flowline, reaching the catchment outlet, reaching the subwatershed outlet, and reaching the Maple River is quantified by PTMApp.

- Locate Specific BMPs based on actual pollutant delivery to the affected water body.
- Estimate the cumulative reduction of and the interaction between multiple BMPs within a watershed in reducing downstream loads. The use of these standards/metrics ensures the ability to place BMPs that will maximize load reduction.

See **Appendix A (page vi & vii)** for more information on the PTMApp tool.

2.4 General Watershed Information

The Maple River watershed is 1,008,912 acres in size. The topography and elevation within Cass County is predominately flat. The climate is semi-arid with an average of 21" of precipitation annually, with a majority (14.3") falling during the growing season of May through September. The monthly average high temperatures range from a max of 83⁰ F in July to a low of 17⁰ F in January. Monthly lows range from -3⁰ F in January to 57⁰ F in July. The annual average temperature is 41⁰ F.

The Maple River watershed is divided into two main geologic units. The eastern portion of the watershed encompasses the glacial Lake Agassiz offshore sediments and river sediments, while the extreme western portion of the watershed is glacial till material. The soils of the watershed are strongly influenced by the geology of the region. Most of the area of the watershed is described as level and nearly level fine textured soils that formed on glacial lacustrine sediment and on glacial lake plains. A small area of the western portion of the watershed is level to moderately steep, medium and moderately fine textured soils that formed in glacial till and in alluvium over glacial till (UDSA Soil Survey General Soil Map, 1983). Common soils include the Fargo and Bearden series, which are deep, poorly drained and slowly permeable soils. The natural drainage pattern of these soils is poorly defined. The Barnes series, more common in the western portion of the watershed, is deep, well drained, and moderately slowly permeable.

Primary land use throughout the watershed is intensive row crop agriculture. Corn, beans (soy & dry edible), sunflowers, wheat, and sugarbeets are the primary crops produced. In 2017, 52% of the acres planted in Cass County were soybeans, 29% of the acres were planted to corn, while 9% was planted to wheat. Sugar beets, dry edible beans, sunflowers, and barley each constituted about 1 to 2% each of the total acres.

Livestock plays a moderate roll in the agriculture of the watershed, mostly in the west and southwest portions. There are approximately 17,000 head of cattle throughout Cass County, or 1% of all production in North Dakota. Livestock producers in this area are generally small animal feeding operations (AFO) with less than 300 cattle. However, those that do produce livestock are more likely to live near the river or a tributary to the river where the land is less tillable or frequently flooded; therefore it is used as pasture for the animals.

2.5

With intensive agricultural practices dominating the majority of the land use throughout Cass County, agricultural runoff is a major contributor to nonpoint source pollution in the Maple River Watershed. Significant rain events and spring flooding carry nutrients and sediment to the Maple River and its tributaries. Understanding hydrologic and nutrient data help us identify the extent of nutrient impairments and the threats to recreational uses throughout the watershed.

Hydrology

Hydrology describes the way water flows through a watershed. The water discharge measurement (volume of water) is an important complement to the concentration data collected during water quality analysis, as it allows the determination of what quantity (load) of a pollutant flows through the system over a given time. A concentration value of ten milligrams per liter (mg/L) has a very different effect on the river depending on whether there are three or three thousand liters of water that flow through a system in a day.

Daily stream discharge values were collected at one stream location within the Maple River watershed. This location was at the United States Geological Survey (USGS) gauging station 05060100 (Maple River below Mapleton, ND). The USGS station has operated continuously from 1945 to 1958 and then was reestablished in 1996. USGS gauge station 05060100 is collocated with the NDDoH monitoring location 384155. For the purposes of this report, the last three years (2013 to 2015) of historical discharge records will be used to describe the hydrology of the Maple River watershed.

The mean annual discharge record from 1945 through 1958 and 1996 to present is shown in Figure 2. It is interesting to note that during the early operation of the gauge station discharge is relatively normal to low, this is most likely due to the weather patterns during those years of normal to below normal precipitation. Likewise, when the gauge station is reestablished in 1996 the flows have increase exponentially, again weather was a driving factor since a “wet cycle” began around this time; also land management is playing a role in these exceptionally high flows.

The mean annual discharge for 2010 through 2011 indicated a period of high flows, while 2012 indicated a low annual mean flow. The flows present in 2009-2011 are historical large flows since the period of record began for this gauge station, while 2012 flows appear to be more “normal” for this river it is still relatively high for the last period of record (1945-1958).

Looking at the period of 2013 to 2015 flows on the Maple River seem relatively static with little variation in flow. This is in part due to the drought conditions that were present in 2012. The precipitation amounts in 2013 to 2015 ranged from 25 inches to 15 inches. Typical normal precipitation amounts for Cass County average out to be 19 inches of annual rainfall. This indicates that through the period of 2013 to 2015 precipitation amounts were roughly normal for Cass County.

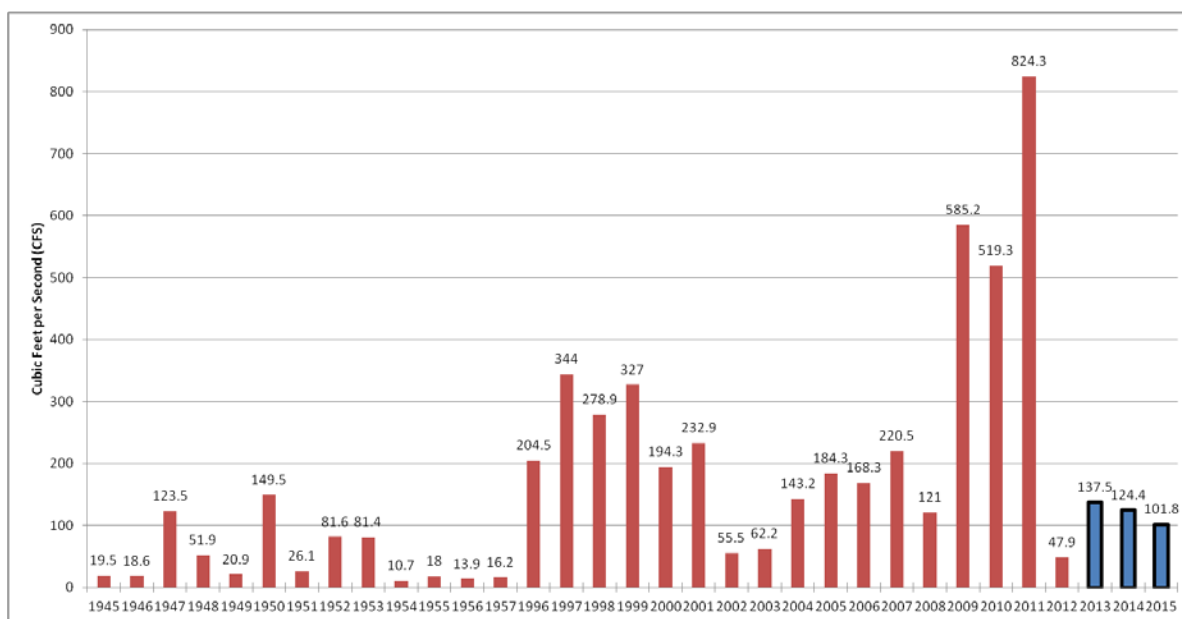


Figure 2. Mean Annual Discharge at the USGS Gauging Station (05060100) on the Maple River below Mapleton, ND (1945-2015).

The following section highlights nutrient data for Nitrogen and Phosphorus at a sampling site 384155 located near Mapleton. This section helps point out the extent and the potential causes of nutrient impairments within the watershed.

Nutrients (Nitrogen and Phosphorus)

According to the draft report *An Ecological Assessment of Perennial, Wadeable Streams in the Red River Basin* (Larsen, 2012), Ecoregion 48, Lake Agassiz, had total nitrogen and phosphorus reference values of 0.883 and 0.148 mg/L, respectively. These values were derived from nutrient data collected at a set of “least disturbed” reference sites located in the Lake Agassiz ecoregion of North Dakota. These values are not a water quality standard, as nutrient criteria or standards have not yet been developed, but is provided as a point of reference or goal when evaluating the data collected within the watershed.

Table 1. Nutrient Results for Monitoring Site 384155 (Data from 2011-2016)

	Ammonia	Nitrate-Nitrite	Total Kjeldahl Nitrogen	Total Nitrogen	Total Phosphorus
Mean	0.13	0.69	0.89	1.59	0.31
Min	0.02	0.01	0.46	0.49	0.05
Max	0.89	7.18	1.87	7.76	0.73
Non-Detects	16	22	0	0	0

Water quality samples gathered from site 384155 (2011 to 2016) and analyzed indicate that nutrients specifically total nitrogen and phosphorus are at significant high levels when compared to the reference values (Table 1). These results indicate the influence of conventional tillage, over fertilization and other nonpoint sources located within the watershed.

Pathogens

Excessive amounts of fecal bacteria in surface waters used for recreation have been known to indicate an increased risk of pathogen-induced illness to humans. Infections due to pathogen contaminated waters include gastrointestinal, respiratory, eye, ear, nose, throat, and skin disease (EPA, 1986). The fecal bacteria known to cause the most harm to humans is E. coli bacteria and is the parameter now used in NDDoH water quality standards.

Monitoring Site 384155

Monitoring site 384155 is a historical site within the Ambient Water Quality Monitoring network that the NDDoH samples. The data results indicate that during the month of June recreational uses are not supporting and fully supporting but threatened in August. May and July are fully supporting and September does not have sufficient data to calculate a recreational use assessment but would look to be trending towards fully supporting.

Table 2. Summary of E. coli Bacteria Data for Site 384155 (Collected 2014-2016).

	May		June		July		August		September	
	5/6/2014	10	6/3/2014	100	7/9/2014	70	8/5/2014	110	9/3/2014	140
	5/14/2014	30	6/16/2014	520	7/21/2014	20	8/12/2014	30	9/10/2014	140
	5/21/2014	20	6/25/2014	30	7/23/2014	40	8/20/2014	1600	9/17/2014	90
	5/21/2014	5	6/16/2015	270	7/30/2014	10	8/25/2014	120	9/23/2014	5
	5/27/2014	50	6/21/2016	230	7/21/2015	70	8/27/2014	50		
	5/20/2015	300			7/26/2016	60	8/29/2015	10		
	5/23/2016	40					8/31/2016	40		
Geo Mean	29		157		36		74		54	
% Exceeded 409 CFU/100 mL	0%		20%		0%		14%		0%	
Recreational Use Assessment	FS		NS		FS		FSbT		Insufficient Data	

Sources of Pollution

Typical sources of pollution within the Maple River Watershed can be linked to agricultural runoff. Overland flows across tilled cropland acres can contribute significant fertilizer and pesticide runoff causing nutrient impairments. Animal feeding operations and riparian grazing areas are also potential sources of nutrients, sediment and E. coli bacteria. Land use within the watershed consists of extensively tilled landscapes and expansive cropland acres that leave the land exposed and susceptible to wind and water erosion and contribute to sedimentation in waterways.

3.0 Project Description

3.1 Goals for the Project: During the course of the project, Cass County Soil Conservation District (SCD) will aim to restore recreational use within the Maple River Watershed through the implementation of Best Management Practices (BMP) targeted to reduce E. Coli bacteria. As a secondary goal the SCD will use education and promotion of water quality management and BMP implementation to improve land management, promote soil health, and reduce nutrient and sediment loads on cropland acres to restore water quality in the Maple River Watershed.

3.2 Objectives & Tasks

Objective 1: Provide local project administration and staffing to deliver technical assistance to landowners in the watershed and coordinate with conservation programs available through other state, federal, local and non-governmental organizations.

Task 1: Employ one full-time Watershed Coordinator for 5 years.

Product: Project coordinator to manage day-to-day project activities; provide technical assistance to landowners/producers; organize and conduct I&E events; and coordinate with NRCS Field office staff, Extension Service and other resource management entities to promote and install BMP.

Cost: \$210,690 (\$126,414 319 funds \$84,276 SCD match)

Task 2: Manage Section 319 funds and local match and oversee all aspects of project implementation to ensure all tasks are completed as scheduled.

Product: Monthly review of project activities and progress; annual evaluations of staff performance; ongoing project promotion; assist with outreach efforts; approve BMP cost share agreements; coordinate with project partners; provide support staff; and secure necessary matching funds.

Costs: SCD In-kind

Objective 2: Reduce E. coli bacteria levels to meet state standards for recreation uses in the TMDL listed reaches. State standard criteria for E. coli bacteria during the recreational season are a geometric mean of 126 CFU/100 ml with less than 10% of samples exceeding 409 CFU/100 ml.

Task 3: Identify and repair 5 failed septic systems located within the Maple River Watershed. Emphasis will be placed on addressing the failed systems located within one half mile of the TMDL listed reaches.

Product: Replace or repair 5 failed septic systems contributing to elevated E. coli levels.

Cost: \$35,000 (\$21,000 319 funds \$14,000 producer match)

Task 4: Minimize the length of time livestock are fed in confined areas or riparian areas by assisting producers to implement management systems that utilize fences, water developments, windbreaks, winter grazing management plans, cover crops and/or crop residues to better distribute feeding/grazing locations and move livestock away from riparian areas and confined feeding sites.

Product: 8 grazing management plans. See BMP budget table for details on associated practices.

Cost: \$76,750 (\$46,050 319 funds \$30,700 producer match)

Objective 3: Identify and achieve reduction of high priority nutrient (N&P) and sediment loads within the Maple River Watershed through the implementation of BMP. This objective will focus on reducing nutrient runoff through the use of reduced tillage, cover crops, field buffers, and riparian buffers.

PTMApp prioritization tool will aid in identifying high priority areas for implementation.

Task 5: Work with the North Dakota Department of Health to complete an AnnAGNPS model and PTMApp prioritization tool to more clearly define priority areas for targeting BMP implementation.

Product: AnnAGNPS model and PTMApp web based prioritization tool.

Cost: \$0

Task 6: Using AnnAGNPS and/or the PTMApp prioritization tool, work with area producers to identify target areas for conservation planning aimed to reduce nutrient and sediment loads. Financial support for planned BMP will be solicited from several sources, including proposed Maple River Watershed Project (section 319 funds), NRCS programs (e.g. EQIP & CSP), CRP, ND Outdoor Heritage Fund, and Save our Lakes Program.

Product: Make contacts with producers located within high priority target areas for implementation highlighted by AnnAGNPS and PTMApp tool.

Cost: Section 319 funding and estimated funding from other sources for BMP is provided under task 7.

Task 7: Support the implementation of cropland practices scheduled in producer agreements to reduce surface runoff, improve water infiltration, and improve nutrient management. BMPs that may be cost shared include cover crops, pasture/hayland plantings, vegetative buffers, nutrient management, etc. No-till and other forms of residue management will not be cost shared using section 319 funds, but will be actively promoted.

Product: 4,000 acres of cover crop, 500 acres of pasture/ hay-land, and 500 acres of nutrient management.

Cost: \$119,500 (\$71,700 319 funds \$47,800 producer match)

\$3,000,000 USDA funds (estimate of NRCS' EQIP & CSP funds to be expended within project area)

Task 8: Implement soil health management practices on 200 acres to establish working field demonstration sites throughout the watershed. Producers will be eligible to enroll up to 40 acres into a 3 year trial soil health management demonstration program. Cost-share payments will be

based on the costs associated with the implementation of no-till, cover crops, and nutrient management on the enrolled acres.

Product: 5, 40 acre soil health management trials.

Cost: \$50/acre for 3 years \$30,000 (\$18,000 319 funds \$12,000 producer match)

Objective 4: Monitor the effectiveness of BMP implementation through water quality sampling as BMP are installed.

Task 9: Collect samples, as outlined in the QAPP, to document changes in water quality trends as BMP are installed.

Product: See section 5.0, Evaluation and Monitoring Plan & QAPP.

Cost: NDDoH Division of Water Quality will provide transport, analysis, and supplies for water sampling.

Objective 5: Increase public awareness on NPS pollution issues and promote the use of effective best management practices to improve soil and water quality.

Task 10: Conduct annual educational events at various locations throughout the county to allow area producers to see and learn about soil health practices. Bus tours, field days, and educational workshops will be put on to increase public awareness on NPS issues and effective BMPs. When possible, these events will be coordinated with ongoing state and/or federal I/E programs in the area.

Product: 1 Farm tour/year, 5 Educational workshops

Cost: \$10,000 (\$6,000 319 funds \$4,000 local match) * In kind match will be used where applicable*

Task 11: Prepare brochures, quarterly newsletter articles, and direct mailings, to local land users and the general public to promote the project and disseminate information on water quality and NPS pollution management.

Product: 5 Quarterly newsletters, one brochure, 2 direct mailings

Cost: \$1,250 (\$750 319 funds, \$500 SCD Match)

3.2 PROJECT MILESTONES:

See Milestone Table, **Appendix B**.

3.4 PERMITS:

All necessary permits will be acquired. These may include CWA Section 404 permits and NDPDES permits. Project sponsors will work with NDDH to determine if National Pollution Elimination System permits are needed for the proposed livestock systems. The State Historic Preservation Officer will be consulted regarding potential cultural resource affects.

3.5 LEAD PROJECT SPONSOR:

Cass County Soil Conservation District (CCSCD) is sponsoring this water quality project. The CCSCD's annual and long range plans help to prioritize and guide the field service staff. The CCSCD has legal authorization to employ personnel and receive and expend funds. They have a track record for personnel management and addressing conservation issues for the constituency. The MRWRB is responsible for the management of water resources in the Maple River watershed. They will provide technical support for the project.

3.6 BMP OPERATION AND MAINTENANCE:

Proper operation and maintenance will be assured utilizing the NRCS O&M guidance as listed under the standard and specification for the associated BMP applied or other standard approved by the NDDoH.

COORDINATION PLAN

4.1 The project sponsor for the Maple River Watershed project is the Cass County Soil Conservation District (CCSCD). Major partners include the Natural Resources Conservation Service (NRCS), ND County Extension Service (Cass), Farm Service Agency (FSA), Barnes County SCD, Ransom County SCD, and the Lake Agassiz Resource Conservation & Development Council. The CCSCD will be the lead project sponsor.

1. The lead project sponsor is the Cass County Soil Conservation District (CCSCD). The ND Department Health (NDDoH) will hold a contract with the district. Land use assessment, BMP implementation (demonstration sites), project administration, computer entry, landowner contacts, water sampling, and water quality education will be the responsibility of the district.
2. Ransom County SCD and Barnes County SCD have both expressed support for the project. Cass County SCD will work directly with the staff to address resource concerns in these areas and potentially work on projects within the Maple River Watershed.
3. USDA Natural Resources Conservation Service (NRCS) – The NRCS will provide day to day assistance in conservation planning, plan writing, contract writing, and technical assistance for construction and installation of planned BMP. NRCS personnel will conduct quality review

and compliance checks of BMP that are designed by NRCS personnel. Local NRCS personnel will provide approved BMP standards and specifications from the NRCS technical guide. Conservation planning assistance will be provided to the Resource Management System (RMS) level. Environment Quality Incentive Program funds will also be available in limited amounts. (NRCS will provide assistance by facilitating local involvement and participating in educational outreach programs during the project period. Regional Conservation Partnership Program (RCPP) may also be pursued as an additional source of funding for the project. An annual review will be conducted with ASTC (FO), DC, and the SCD to reconfirm and acknowledge NRCS's ability to commit to the project).

4. North Dakota Department of Health – The NDDoH will oversee 319 funding as well as provide training for proper water quality sample collection, preservation, and transportation to ensure reliable data is obtained. The NDDoH will provide the sponsor oversight to ensure proper management and expenditures of Section 319 funds. They will assist NRCS and the Cass SCD personnel in review of O & M requirements for Section 319 funded BMP.
5. North Dakota State Extension Service (EXT) – To complement the project's information and education activities, local and state Extension personnel will be asked contribute in-kind assistance. This will entail workshops and field tours. The specific role of Extension will be dependent on the type of information/education activity being implemented and availability of staff and materials.
6. Maple River Water Resource Board (WRB) – Maple River Water Resource Board will be involved in the project by acting as advisors. Maple River WRB will contribute Technical assistance for the project and also promote the project in Cass County.
7. North Dakota Game & Fish Department (NDG&F) – Will be asked to provide technical and financial assistance to the project when applicable.
8. Farm Services Agency (FSA) – Programs available through FSA will be pursued for cost share assistance.
9. US Fish and Wildlife (USF&W) – Programs and technical assistance available through USF&W will be pursued for project assistance.
10. International Water Institute (IWI) - Will provide technical assistance with the use of the PTMApp tool.
11. BMP Team- Will be used if any projects require engineering support.
12. ND Industrial Commission- Outdoor Heritage fund could be a potential financial contributor if grant money is applied for and granted.

- 4.2 Members of the Cass SCD board, some of whom live in the watershed, express their support for this project. In addition, other government and private entities have stake in the watershed

including: NRCS, Farm Service Agency, ND G&F, Red River Basin Commission, NDSU Ext., Maple River WRB, Ransom Co. SCD, Lake Agassiz RC&D and US F&W.

- 4.3** The Maple River Watershed Project will be working closely to coordinate activities with the NRCS, NDG&F Department, and the Maple River Water Resource Board. In addition, the International Red River Board (IRRB) has set a phosphorus load reduction goal for Lake Winnipeg. The proposed cropland and nutrient management improvement efforts of the Maple River Watershed project should have a secondary benefit of helping the IRRB move toward their phosphorus reduction goal. The Red River Basin Commission has also established the Red River Basin Natural Resources Framework Plan, a basin-wide plan to provide a unified voice for the Red River Basin.

Barnes County Soil Conservation District (BCSCD) is currently working on staffing a full time watershed coordinator. If a coordinator is on staff, coordinators for each district will keep communication open between the projects. As a general guideline, projects that are located within Barnes County will be coordinated by the BCSCD Watershed Coordinator.

Ransom County has a significant amount of cattle operations that may fall within Maple River's project area. CCSCD will work with the staff and board members of Ransom County Soil Conservation District (RCSCD) when necessary to implement BMPs in high priority areas.

- 4.4** There are currently no other similar non-point source pollution projects being undertaken in the watershed. Past and current projects, most of which are associated with USDA programs, which have or do occur, are planned as a part of county-wide efforts to address conservation issues in the area.

4.0 EVALUATION AND MONITORING PLAN

The project sponsors are currently coordinating with the ND Department of Health to develop the Quality Assurance Project Plan (QAPP). The QAPP will be included in the final PIP when it is fully approved.

6.0 BUDGET

- 6.1** See **Appendix B**.

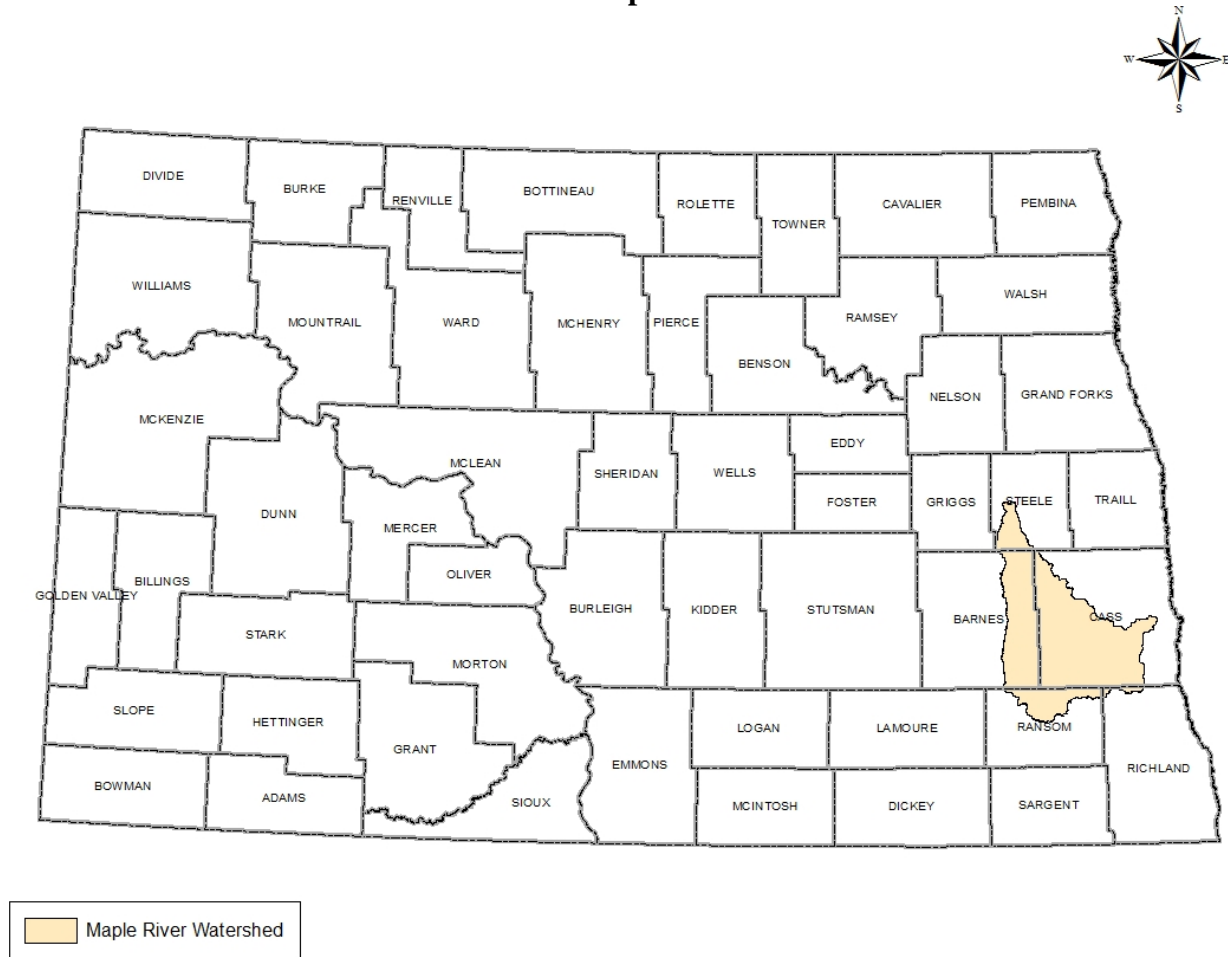
7.0 PUBLIC INVOLVEMENT

- 7.1** Information and education meetings will be held to keep the community informed. Community leaders, commissioners, water resource board members, and district supervisors will be involved in decision-making processes involving the implementation of the Maple River Watershed Project.

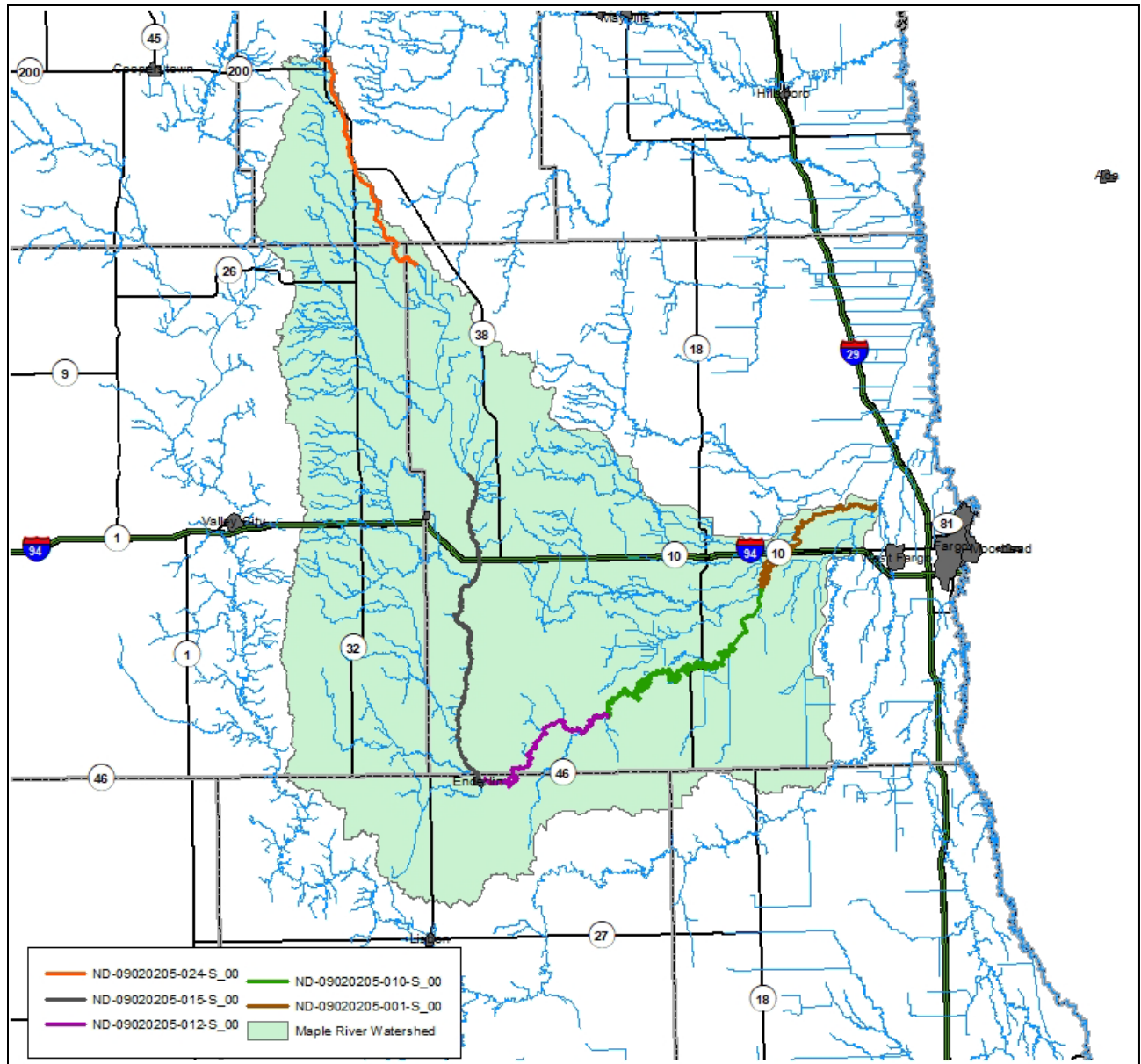
Appendix A

Maps

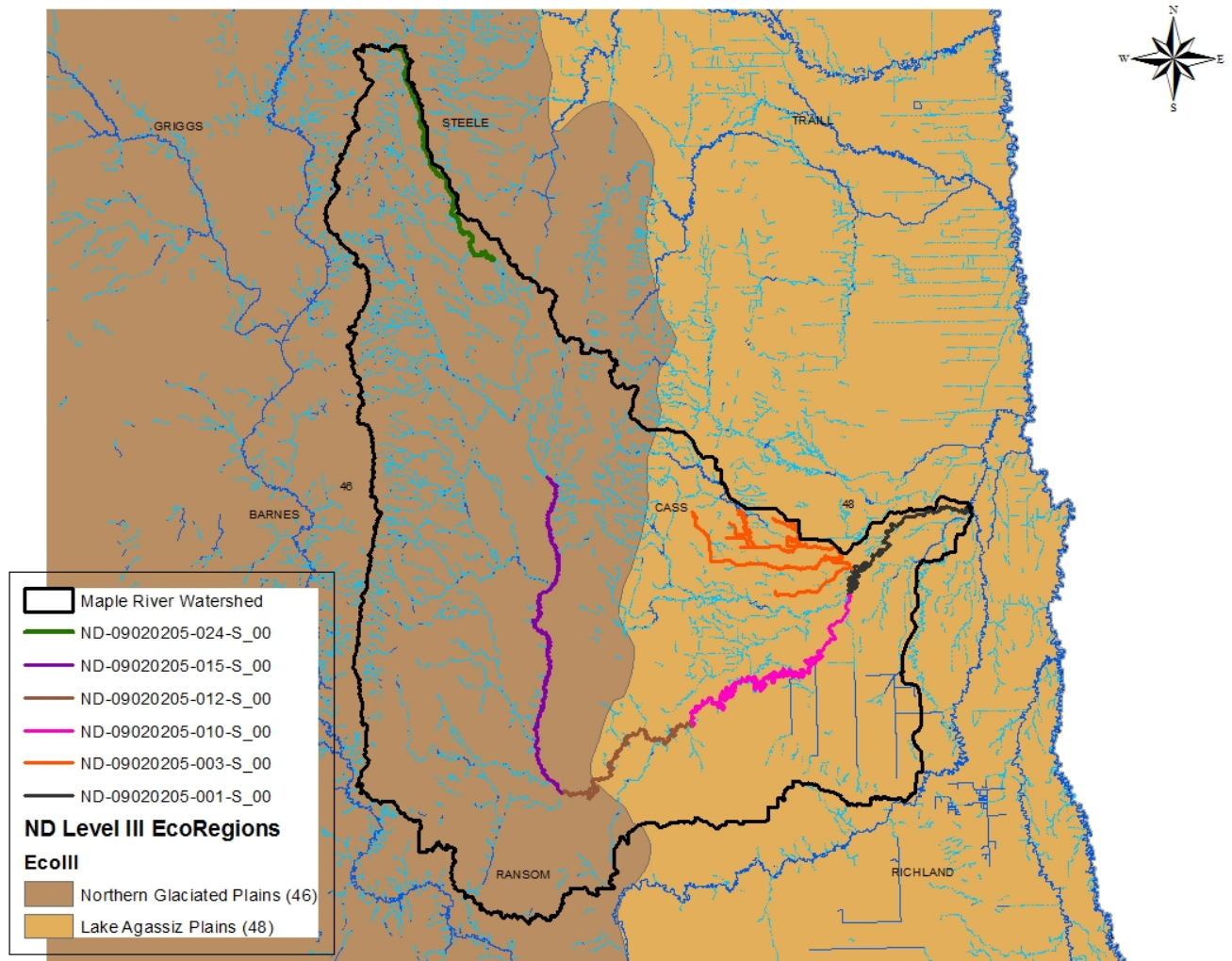
Map 1



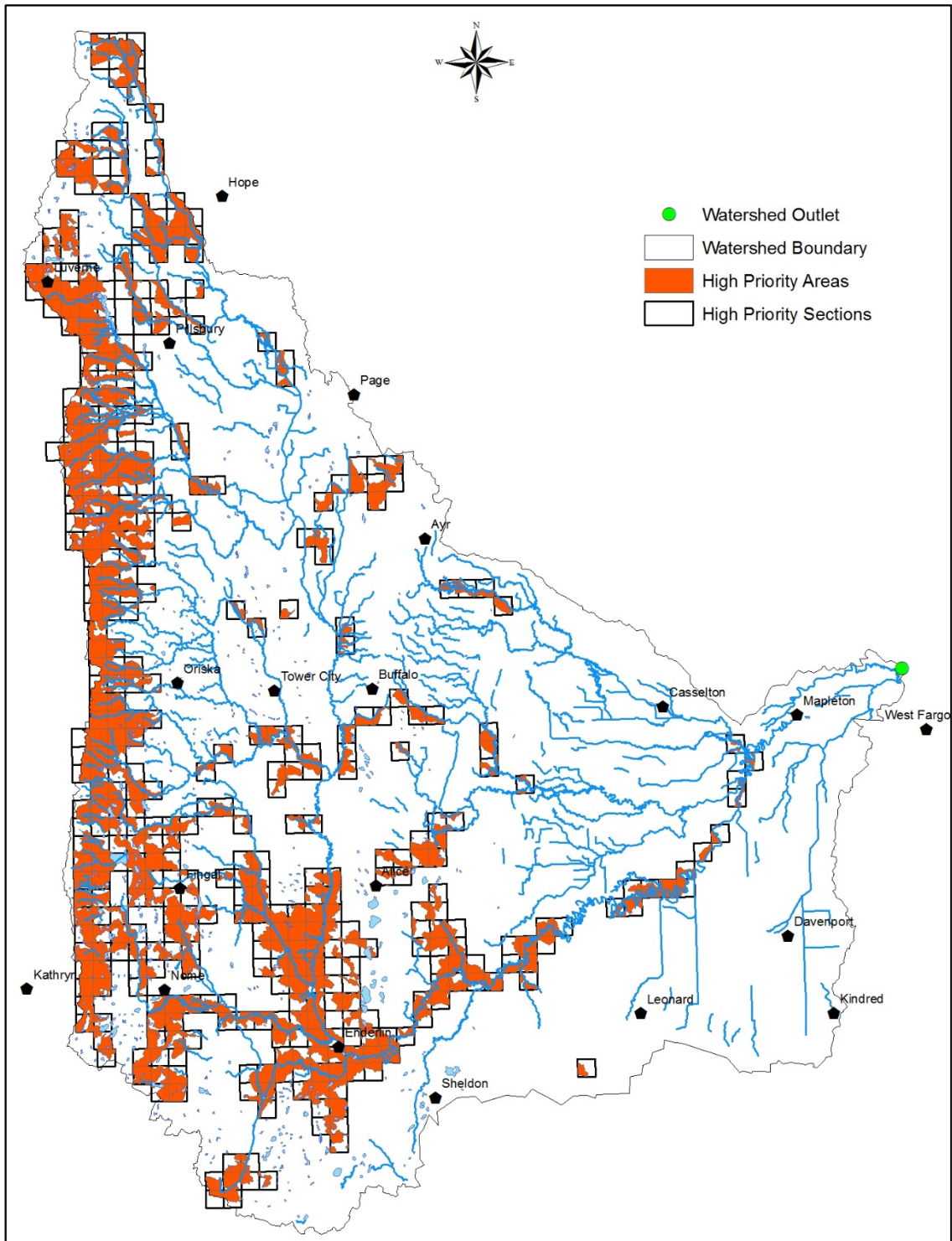
Map 2



Map 3



AnnAGNPS



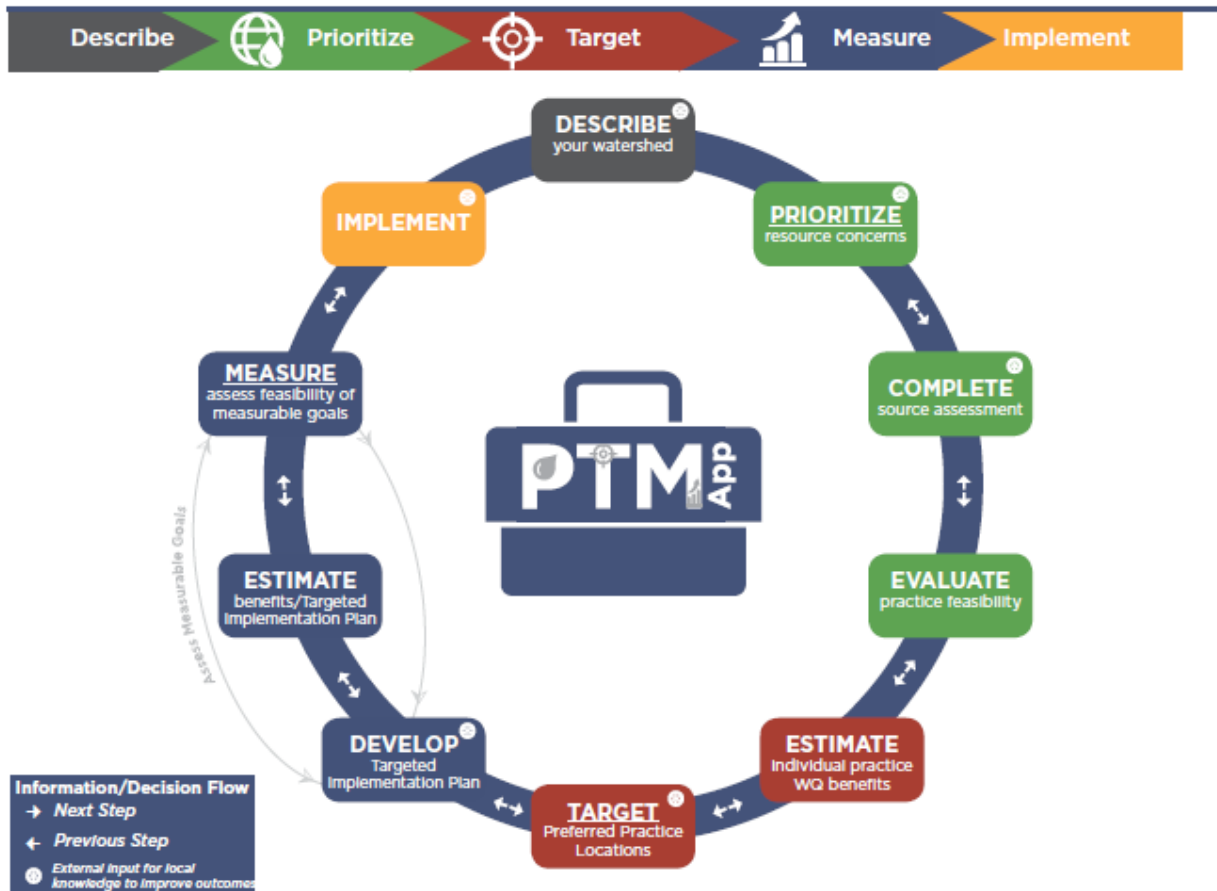
PTMApp

PTMApp Products and Business Workflow

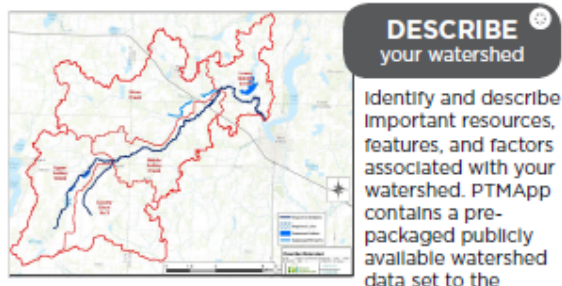
The Prioritize, Target, Measure Application (PTMApp) is an innovative new tool that will help users with aspects of surface water quality planning from describing the watershed to developing implementation plans. Learn more about how you can use the application to improve every day decisions for more accurate results.



Available for free download: www.rrbdin.org/prioritize-target-measure-application-ptmapp



The following examples were completed as a pilot case study in the Sauk River Watershed District:

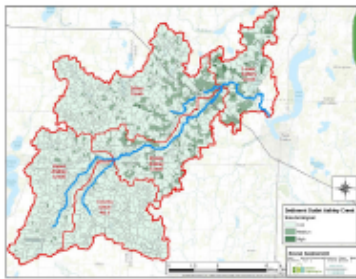


boundary of your watershed. This simplifies the process of gathering and summarizing GIS and resource data needed for your watershed. Data from PTMApp can help visualize and summarize the number of impaired waters and assessed waters in the study area.



processes. Use PTMApp products in conjunction with other models and Zonation to help prioritize resource concerns. PTMApp can help select resources that are a priority and locations where management actions should be taken.

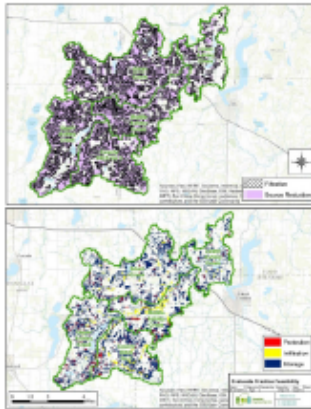
Continued ►



COMPLETE source assessment

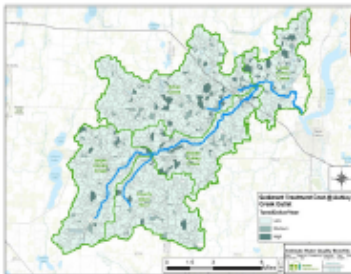
Identify the magnitude and spatial distribution of potential pollution sources across the landscape. Understand how various parts of the watershed contribute sediment, total phosphorus, and total nitrogen loads to

downstream locations including impaired waters. Use PTMApp to identify the highest areas of sediment loading and show the best areas for practices.



EVALUATE practice feasibility

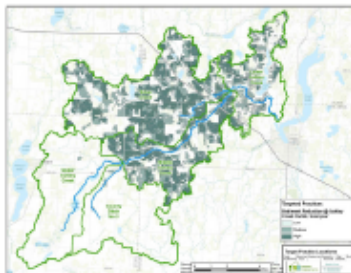
The feasibility of placing best management practices (BMPs) on the landscape depends on several factors: the size of contributing drainage area, land slope, and flow regime. Feasibility is often based on technical factors and excludes societal factors. PTMApp creates products to facilitate these conversations: BMP opportunities can be combined with the source assessment data to estimate the “measurable” water quality benefits for implementing the practices.



ESTIMATE Individual practice WQ benefits

Selecting specific practices to implement is based on their probable benefits, ranging from pollutants removed or the related cost. PTMApp can help estimate benefits at the location of the practice or resource. Outputs from PTMApp can show

areas that provide the most bang for your buck and can help target practice locations to provide the most cost-effective ways to create measurable progress.



TARGET preferred practice locations

Once possible BMP locations are identified for feasibility, potential locations must be evaluated for their combined effectiveness. PTMApp can generate data to provide feasible locations for implementing practices that will provide measurable

water quality improvements for priority resources. There are a number of factors that might influence preferred practices, including existing practices in place and landowner participation.

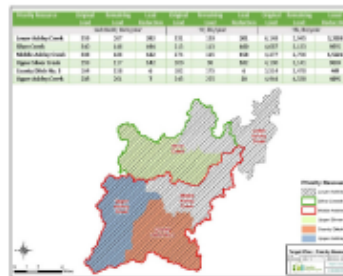
For more information, contact: Chuck Fritz, Administrator—International Water Institute, 701.388.0861, charles@iwnst.org



DEVELOP Targeted Implementation Plan

Specific locations to place practices must also be targeted based on practical and social factors. PTMApp data can incorporate additional information to refine the practices targeted. It is likely that many areas in the

watershed may already have numerous Best Management Practices implemented, lack willing landowners, or have benefits beyond water quality that would impact the targeted locations for practices. PTMApp can adjust scenarios to restrict targeting to certain areas.



ESTIMATE benefits/Targeted Implementation Plan

Combined benefits can be compared to a measurable goal. PTMApp can use the combined benefits of many practices to assess the effectiveness of the targeted implementation plan. Annual load reduction estimates can be calculated at

each priority resource point within a study area and used to assess progress toward a measurable water quality goal. This information can be used directly within a Targeted Implementation Plan.



MEASURE assess feasibility of measurable goals

A measurable goal may be the load reduction needed to restore a lake or river reach, or a maximum load to protect a resource. PTMApp can compare the estimated benefits of the Targeted Implementation Plan to water quality goals.

Results of this analysis can show the scenarios that will provide the reductions needed to reach your planning goals.



IMPLEMENT

By running various scenarios in PTMApp, managers can identify scenarios to implement the best, targeted solutions. PTMApp can analyze various practices and estimate the largest load reductions for specific areas within the watershed. This information helps users implement the best possible practices in the most effective locations.

Appendix B

Budget & Milestones

Maple River Watershed Project						
BUDGET TABLE						
PART 1: FUNDING SOURCES	2018	2019	2020	2021	2022	TOTAL
EPA SECTION 319 FUNDS						
1) FY18 Section 319 Funds	\$ 59,969	\$ 59,969	\$ 59,969	\$ 59,969	\$ 59,969	\$ 299,844
Subtotals	\$ 59,969	\$ 59,969	\$ 59,969	\$ 59,969	\$ 59,969	\$ 299,844
OTHER FEDERAL FUNDS *						
1) NRCS EQIP & CSP (FA)	\$ 600,000	\$ 600,000	\$ 600,000	\$ 600,000	\$ 600,000	\$ 3,000,000
Subtotals	\$ 600,000	\$ 600,000	\$ 600,000	\$ 600,000	\$ 600,000	\$ 3,000,000
STATE/LOCAL MATCH						
1) Local SCD (TA, FA)	\$ 19,079	\$ 19,079	\$ 19,079	\$ 19,079	\$ 19,079	\$ 95,396
5) Cass County Participating Producers (cash/in-kind)	\$ 20,900	\$ 20,900	\$ 20,900	\$ 20,900	\$ 20,900	\$ 104,500
Subtotals	\$ 39,979	\$ 39,979	\$ 39,979	\$ 39,979	\$ 39,979	\$ 199,896
TOTAL BUDGET	\$ 699,948	\$ 699,948	\$ 699,948	\$ 699,948	\$ 699,948	\$ 3,499,740
319 BUDGET	\$ 99,948	\$ 99,948	\$ 99,948	\$ 99,948	\$ 99,948	\$ 499,740

Maple River Watershed Project									
BUDGET TABLE									
PART 2: Section 319 / Non-Federal Budget Funds		2018	2019	2020	2021	2022	TOTAL	In-Kind Match	319 Funds
OBJECTIVE 1: Personnel/Support									
	Task 1								
1)	Salary/Fringe - Watershed Coordinator (full-time: 2080 hrs/yr)	\$ 39,790	\$ 40,900	\$ 42,100	\$ 43,300	\$ 44,600	\$ 210,690	\$ 84,276	\$ 126,414
2)	Travel (5,000 miles/year at \$.53/mile)	\$ 2,650	\$ 2,650	\$ 2,650	\$ 2,650	\$ 2,650	\$ 13,250	\$ 5,300	\$ 7,950
3)	Training	\$ 300	\$ 300	\$ 300	\$ 300	\$ 300	\$ 1,500	\$ 600	\$ 900
4)	Cell phone (12/mo @ \$30/mo.)	\$ 360	\$ 360	\$ 360	\$ 360	\$ 360	\$ 1,800	\$ 720	\$ 1,080
	Subtotals	\$ 43,100	\$ 44,210	\$ 45,410	\$ 46,610	\$ 47,910	\$ 227,240	\$ 90,896	\$ 136,344
OBJECTIVE 2 - 3: BMP's									
	Tasks 3 - 8								
1)	Implement BMP Practices (see attached BMP priority list)	\$ 52,250	\$ 52,250	\$ 52,250	\$ 52,250	\$ 52,250	\$ 261,250	\$ 104,500	\$ 156,750
	Subtotals	\$ 52,250	\$ 52,250	\$ 52,250	\$ 52,250	\$ 52,250	\$ 261,250	\$ 104,500	\$ 156,750
OBJECTIVE 4: Water Quality Monitoring									
	Subtotals	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
OBJECTIVE 5: Information/Education									
1)	Information/Education Meetings	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 10,000	\$ 4,000	\$ 6,000
2)	Publications	\$ 250	\$ 250	\$ 250	\$ 250	\$ 250	\$ 1,250	\$ 500	\$ 750
	Subtotals	\$ 2,250	\$ 2,250	\$ 2,250	\$ 2,250	\$ 2,250	\$ 11,250	\$ 4,500	\$ 6,750
TOTAL 319/NON-FEDERAL BUDGET		\$ 97,600	\$ 98,710	\$ 99,910	\$ 101,110	\$ 102,410	\$ 499,740	\$ 199,896	\$ 299,844

Maple River Watershed Project PART 3: Priority Best Management Practices (BMPs)										
Objectives	NRCS Code	Practice**	No.*	Acres*	Linear Feet (LF)*	Rate	TOTAL	FUNDING		
								Cost-share Rate	Cash Costs	319 Match
Objective 2	19	Septic System Rennovation	5			\$ 7,000.00	\$ 35,000	60%	\$ 14,000	\$ 21,000
	472	Use Exclusion		250		\$ 20.00	\$ 5,000	60%	\$ 2,000	\$ 3,000
	614	Watering Facility	8			\$ 1,000.00	\$ 8,000	60%	\$ 3,200	\$ 4,800
	516	Pipelines			5,000	\$ 3.15	\$ 15,750	60%	\$ 6,300	\$ 9,450
	382	Fencing			10,000	\$ 1.80	\$ 18,000	60%	\$ 7,200	\$ 10,800
	576	Portable Windbreaks			1,000	\$ 30.00	\$ 30,000	60%	\$ 12,000	\$ 18,000
Objective 3	340	Cover Crop		4,000		\$ 20.00	\$ 80,000	60%	\$ 32,000	\$ 48,000
	329,340,590	Soil Health Management Demos		200		\$ 150.00	\$ 30,000	60%	\$ 12,000	\$ 18,000
	590	Nutrient Management		500		\$ 27.00	\$ 13,500	60%	\$ 5,400	\$ 8,100
	512	Pasture/Hayland Planting		500		\$ 52.00	\$ 26,000	60%	\$ 10,400	\$ 15,600
		SUBTOTALS	13	4,450	16,000		\$ 261,250		\$104,500	\$156,750

Maple River Watershed Project								
Milestone Table								
	Task/Responsible Organization	Output	Quantity	Year 1 2018	Year 2 2019	Year 3 2020	Year 4 2021	Year 5 2022
Objective 1:	Entity 1							
Task 2	Employ Watershed Coordinator		1	x	x	x	x	x
Objective 2:	Entity 1,2,3							
Task 3	Reduce E. Coli Bacteria	Septic System Renovations	5	1	1	1	1	1
Task 4	Livestock BMP	Grazing Management Plans	8	2	2	2	1	1
		Watering Facility	8	2	2	2	1	1
		Fencing	10,000 ft	2,000 ft	2,000 ft	2,000 ft	2,000 ft	2,000 ft
		Portable Windbreaks	1,000 ft	300 ft	300 ft	300 ft	300 ft	300 ft
		Pipelines	5,000 ft.	1,000 ft	1,000 ft	1,000 ft	1,000 ft	1,000 ft
		Grazing Exclusion	250 ac	50 ac	50 ac	50 ac	50 ac	50 ac
Objective 3:	Entity 1,2,3							
Task 5	AnnAGNPS & PTMApp	Maps & Web app for BMP prioritization	1	x	x	x	x	x
Task 6	Using prioritization tools	Make contacts with producers	x	x	x	x	x	x
Task 7	Cover Crop, soil improvement	Cover Crop, residue management	4,000 ac	800 ac	800 ac	800 ac	800 ac	800 ac
		Pasture/haland planting	500 ac	100 ac	100 ac	100 ac	100 ac	100 ac
		Nutrient Management	500 ac	100 ac	200 ac	200 ac	200 ac	200 ac
Task 8	No-till demonstration trials	12 no-till demonstration trials	5	2	2	1		
Objective 4:	Entity 1,4							
Task 9	Monitor BMP effectiveness	Water Sampling		See QAPP				
Objective 5:	Entity 1,3,5							
Task 10	SCD and Cooperating Agencies	Field Tours		Farm tour annually, 5 workshops				
Task 11	SCD	Newsletters, Mailings, Brochures		Quarterly newsletter, 2 mailings, 1 brochure				

Entity 1 - Cass County SCD - Local project sponsor, responsible for project coordination, reimbursement payments, match tracking, and progress reporting to the NDDoH. Also provides technical assistance to plan, design and implement BMP.

Entity 2 - Landowners in the Maple River Watershed in Cass County - Make land management decisions and provide cash and in-kind match for BMP.

Entity 3 - Natural Resource Conservation Service - Provides technical assistance to the Cass County SCD for implementation of BMP. Also provides financial assistance for BMP to landowners through the EQIP program.

Entity 4 - North Dakota 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.

Entity 5 – NDSU Extension Service. Assist with planning I/E events. Provide technical assistance and source of in-kind match.