SECTION 319 NONPOINT SOURCE POLLUTION CONTROL PROGRAM

WATERSHED PROJECT FINAL REPORT

Maple River Watershed Project

By

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

Grant # C9-00863318

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EXECUTIVE SUMMARY

PROJECT TITLE: Maple River Watershed Project

PROJECT START DATE: 8-1-2018 PROJECT COMPLETION DATE: 12-31-2022

FUNDING:	ORIGINAL PROJECT BUDGET	$ 499,740
	ORIGINAL FY 18 SECTION 319 GRANT	$ 299,844
	FY18 SECTION 319 BUDGET REVISIONS	($139.00)
	ADJUSTED FY18 SECTION 319 GRANT	$299,705
	ACTUAL 319 EXPENDITURES	$ 299,705
	TOTAL NON FEDERAL MATCH USED	$ 199,804
	ACTUAL PROJECT BUDGET	$ 499,509

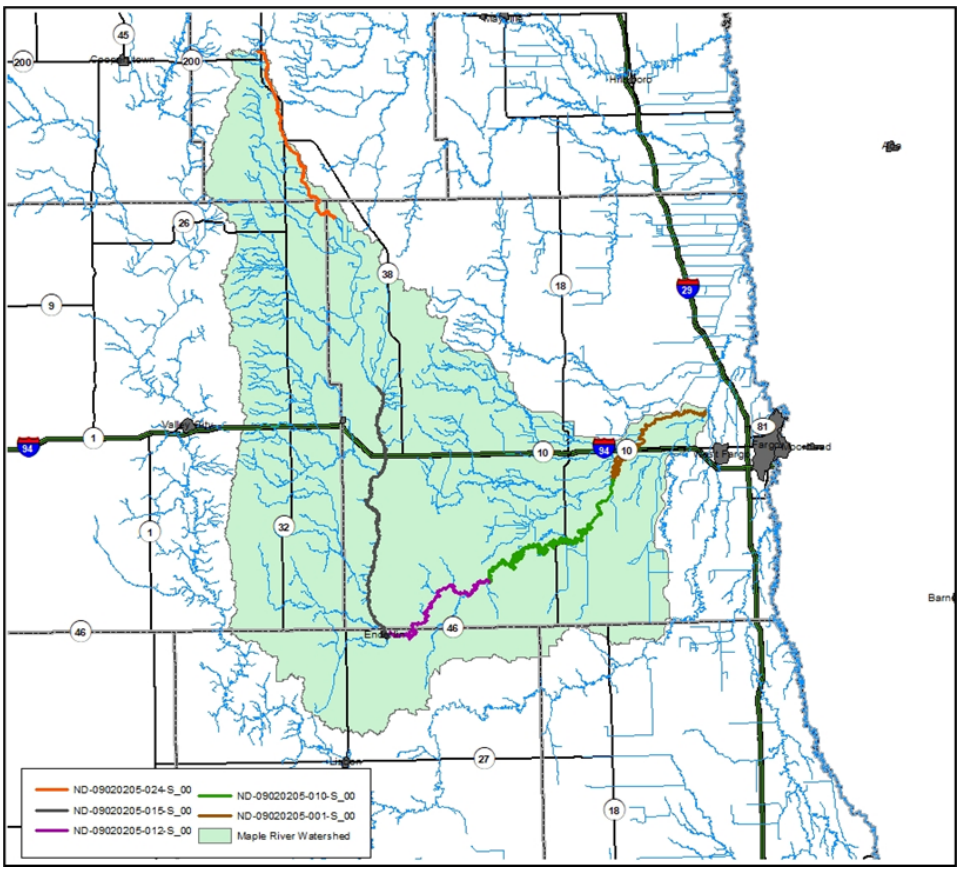
SUMMARY ACCOMPLISHMENTS

The project implementation plan for the Maple River Watershed Project was designed to 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. With limited funds for implementation, different prioritization measures as well as extensive outreach were a focus for this project. We held field demonstrations and winter workshops that helped inform local producers about cost share opportunities and led to implementation of practices including cover crop, rotational grazing, forage and biomass plantings, livestock manure management plans and more.

1.0 INTRODUCTION

The Maple River is located primarily in Cass County, ND, with portions in Steele, Barnes, and Ransom Counties. The Maple River watershed is 1,008,912 acres in size and is located within the Red River Valley (HUC: 09020205), formerly Glacial Lake Agassiz, a rich and fertile agricultural area found in eastern North Dakota and northwestern Minnesota. Based on the 2016 Section 303(d) List of Impaired Waters Needing TMDLs (NDDEQ, 2016), the North Dakota Department of Environmental Quality (NDDEQ) has identified the following impaired

waterbodies in the Maple River Watershed: A 28.28 mile segment (ND-09020205-024-S_00), A 40.06 mile segment (ND-09020205-015-S_00), A 40.06 mile segment (ND-09020205-015-S_00), A 28.56 mile segment (ND-09020205-001-S_00), A 48.33 mile segment (ND-09020205-010-S_00) of the Maple River. See TMDL reaches in the picture below.



Soybeans, wheat, sugar beets, corn, sunflowers, and other crops are grown intensely in this area to take advantage of the prime soils and growing conditions here.
Producers throughout the area employ intense tillage practices to promote early warm up of the soils and increase the drying time, while reducing the amount of crop residue on the surface. The lack of vegetative buffers between agriculture lands and waterways contributes to nutrient runoff and sedimentation. These combined practices have had a negative effect on the water quality of the region's rivers and streams, including the Maple River. Excessive nutrients loads and harmful E.coli bacteria levels have been detected in the Maple River. Reducing E.coli bacteria along with reducing nutrient and sediment loads from cropland acres were the primary target for project implementation.

2.0 PROJECT GOALS, OBJECTIVES, AND ACTIVITIES

Goals for the Project: During 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.

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.

Outcome: Cass County Soil Conservation District is active in promotion of watershed project and provides project administration and staffing of Watershed Coordinator. The SCD works side by side with NRCS to deliver technical assistance to landowners in the watershed.

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.

Outcome: Project progress was well documented using the BMP tracker and Funding manager databases. Annual project reports helped track milestones and implementation schedules.

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.

Outcome: Two failing septic systems were replaced during the project period. Both systems were located within direct proximity to the Maple River and its tributaries and posed a water quality threat. There continues to be lots of interest in septic system replacements but due to the scope of the project many were too far from the waterbodies to pose an immediate threat.

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.

Outcome: This task fell short of meeting its original goals. In total 4,225 linear feet of fencing were installed. Although no grazing management plans were completed, 2,411 acres of cover crops we implemented that were mostly planned to be grazed in the fall. This practice limits the amount of time animals spend in confinement and are a good step towards our water quality goals. In 2022, we partnered with the ND Stockman's Association and helped cost share a hoop barn for an animal feeding operation. The Maple River Project put $105,000 of cost share towards that manure management project.

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 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 Environmental Quality 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.

Outcome: AnnAGNPS maps were generated for the project area. PTMApp training was attended summer 2019. In 2020 training for the PTMApp tool was delayed due to Covid-19. Online workshop for PTMApp was completed in January and February of 2021. In spring of 2022 PTMApp was used to run source assessment for the Maple River Watershed and provided valuable data for sub-watershed prioritization. This tool will be used more in Phase II of the watershed project.

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.

Outcome: Maps were generated to help highlight priority points for implementation. Contacts with producers were made throughout the project period at various education and outreach events, local meetings, and crop demonstrations.

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.

Outcome: 2,411 acres of cover crop were implemented during the project period. Cover crops were primarily used as a soil health tool and to provide supplemental grazing for livestock. 603 acres of pasture/ hay-land were established in the Maple River throughout the project. These acres were crop land converted to

grass or forage with a project lifespan of 5 years. These plantings help in reducing erosion and building soil organic matter and improve water infiltration. No nutrient management plans were completed during the project. Cropland BMPs and soil health management continue to be a major part of our education and outreach programs as well as day to day talking points while interacting with producers.

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.

Outcome: One management demo was in the planning process but never came into fruition. Drought conditions prevented the producer from seeding cover crop. The producer never followed up on signing up for the program again. However, it is often stressed when making talking points and conversation with producers, that running on field trials in small acreages are a great way to try new things and implement soil health practices.

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: QAPP

Outcome: Water sampling was conducted April-September of 2020. Water sampling continued in summer of 2022 once we came up with a long-term monitoring strategy to work with Phase II of the Maple River Watershed Project. See attached NDDEQ water quality report on page **xxxi** in the **Appendix**.

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

Outcome: Soil health workshop was held April 4th, 2019, at Hagge's in Mapleton. Roughly 50 people were in attendance including many producers from around the area. Paul Jasa, Jay Furher, and Scott Davis were the guest speakers at this event. The workshop focused on the principals of soil health and no-till planting. The workshop was very well received. 2020 Soil Health Workshop was held March 3rd, 2020, at Hagge's in Mapleton. Presenters shared their expertise on soil health and conservation farming techniques. Speakers included Justin Zahradka, Kelly Cooper, and Hal Weiser. There were approximately 50 people in attendance. Feedback from these events has been positive, it shows signs that the interest is there to adopt soil health practices. Farm tours were not completed in 2020 due to Covid-19 restrictions. There was a small field tour gathering held by a local soil health producer and I was invited to attend and interact with a dozen local farmers who have interest in soil health. Outreach for 2021 was limited due to ongoing covid-19 closures and obstacles. We had a booth set up at Peterson Farm seed field day on September 2nd, 2021. Several hundred people attended the tour. We also were set up all 3 days at the Red River Valley Fair Grounds for the Big Iron Farm show September 14th, 15th, 16th. Several thousand people from all over the country attend the show. In 2022 we hosted an on-farm soil health demonstration with 2 local producers who are advanced in the principles of soil health. We performed the rainfall simulator to show the performance of health soils ability to infiltrate more water and reduce erosion. We also had soil pits and field talking points to highlight the soil improvements from no-till farming and diverse crop rotations and cover crops. Cass County SCD had a booth at the Big Iron Farm Show at the Red River Valley Fair Grounds where we had interactions with several local and non-local growers.

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

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

Outcome: Project was promoted through our quarterly newsletter throughout the project period. Our newsletter is distributed to roughly 1,700 local residents, businesses and institutions. Direct mailings were sent ahead of each workshop and

field day. We also started posting fliers and brochures throughout the watershed at various gas stations, cafes, elevators, and community centers. Sample newsletter and mailers can be found starting on **page xxiv** in the **appendix**.

2.1 PLANNED AND ACTUAL MILESTONES, PRODUCTS AND COMPLETION DATES

Maple River Watershed Project								
Milestone Table								
				Year 1	Year 2	Year 3	Year 4	Year 5
	Task/Responsible Organization	Output	Quantity	2018	2019	2020	2021	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	250ac	50ac	50ac	50ac	50ac	50ac
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	100ac	100 ac	100 ac	100 ac
Task 8	No-till demonstration trials	12 no-till demontration 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				

Above Table depicts project implementation goals over the course of the project.
Table below depicts practices as applied, per year.

Maple River Watershed Project								
Milestone Table								
				Year 1	Year 2	Year 3	Year 4	Year 5
	Task/Responsible Organization	Output	Quantity	2018	2019	2020	2021	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	2	0	0	1	1	0
Task 4	Livestock BMP	Grazing Management Plans	8	0	0	0	0	0
		Watering Facility	8	1	0	0	0	0
		Fencing	4224.9 ln ft	0	0	0	4,225	0
		Portable Windbreaks	0	0	0	0	0	0
		Pipelines	0	0	0	0	0	0
		Grazing Exclusion	0	0	0	0	0	0
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	2096ac	986 ac	986 ac	30 ac	94 ac	0 ac
		Pasture/haland planting	603.4 ac	17 ac	0 ac	399.5 ac	186.9 ac	0 ac
		Nutrient Management	0 ac					
Task 8	No-till demonstration trials	12 no-till demontration trials	0	0	0	0		
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		See task 10 for details.				
Task 11	SCD	Newsletters, Mailings, Brochures		Quarterly newsletter, 2 mailings				

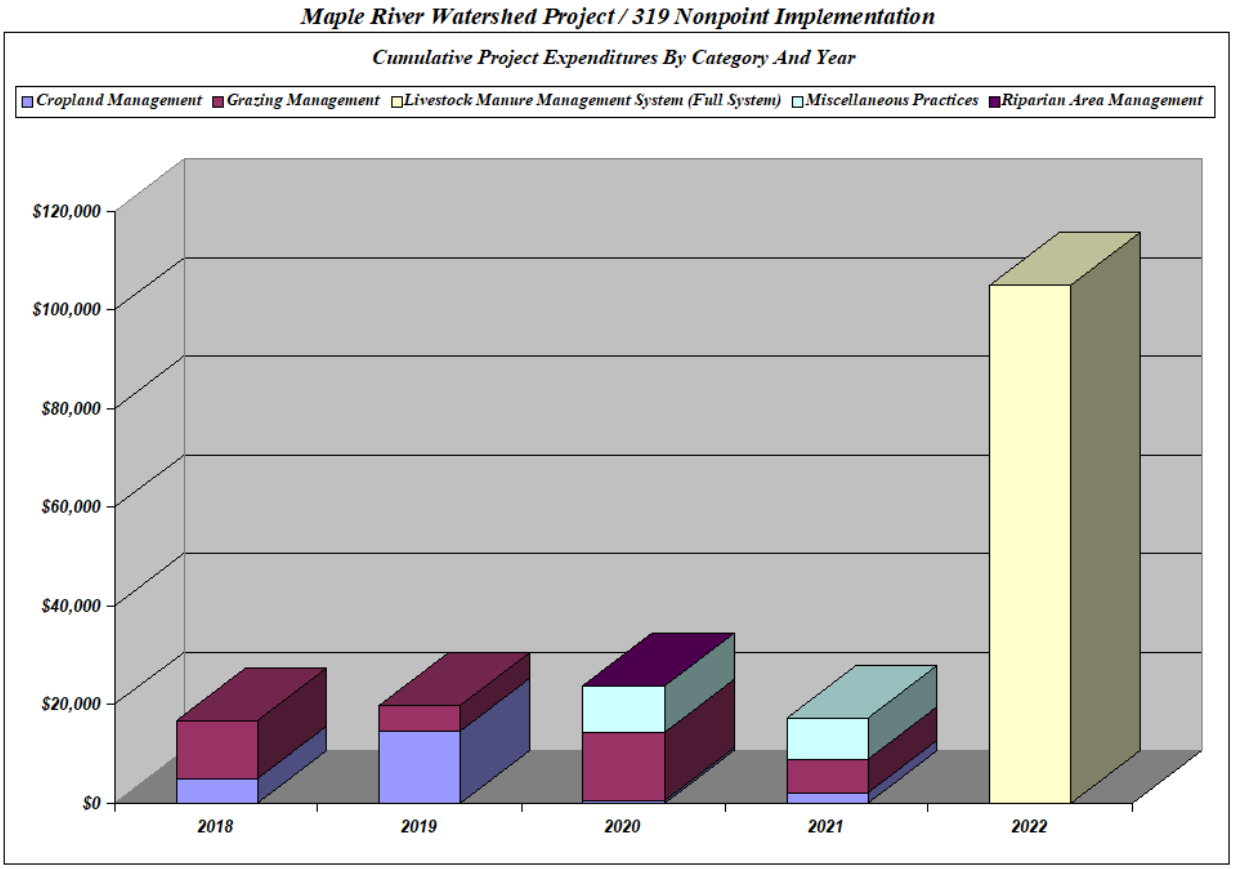
Interest in septic system renovations remained strong throughout the project. Many of those interested in doing septic system replacements did not qualify due to the distance requirement from the impaired waterbody. Grazing practices were not well implemented during this project. There could be a variety of factors from low commodity prices to shortage of contractors and covid-19. We did continue to see a lot of cover crop being utilized for fall and winter grazing. Though our original cover crop goals were not met, we have been seeing more and more being planted annually. Other local and federal offerings have continued to drive interest and we have seen many producers adopt the practice on their own. Another challenge we faced with this project was the pandemic. It halted a lot of the progress we had made with our education and outreach and greatly slowed to even stopped the foot traffic in our office. We are still seeing the lingering affects of the pandemic on producer interactions as many have gone to more virtual communications.

2.2 EVALUATION OF GOAL ACHIEVEMENT AND RELATIONSHIP TO THE STATE NPS MANAGEMENT PLAN

The North Dakota NPS Program mission is to protect or restore the chemical, physical, and biological integrity of the waters of the state by promoting locally sponsored, incentive based,

voluntary programs where those waters are threatened or impaired due to nonpoint sources of pollution. The project implementation plan for the Maple River Watershed Project was designed to 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. With limited funds for BMP implementation, it is difficult to rely on these specific standalone practices to provide a measurable impact in the short term. The PTMApp tool has helped us recognize the importance of priority specific implementation as well as promoting a change in land use towards regenerative agriculture to have a lasting impact on these waterbodies. Education and outreach with an emphasis on reducing NPS pollution by promoting soil health practices was a major priority of this project. Several tours and workshops were held throughout the project, and we were able to see interest in these practices grow year to year. This extensive outreach effort combined with BMP implementation in the watershed provides a solid framework for reducing the effects of NPS pollution to the Maple River.

2.3 SUPPLEMENTAL INFORMATION



The table above shows the cumulative project expenditures by year. In 2022 we had the opportunity to partner with ND Stockman's Association on a large manure management facility. This project used up the remainder of the BMP dollars for the project so there were no cropland BMPs implemented in 2022. Staffing costs and other BMPs planned and applied in 2022 were supported with Maple River Phase II funding.

3.0 BEST MANAGEMENT PRACTICES DEVELOPED AND/OR REVISED

A detailed summary of applied BMPs can be found on **page xvi** in the **appendix**, along with a map showing where BMPs were implemented throughout the watershed, **page xv**.

4.0 MONITORING RESULTS

A detailed final water quality report for the Maple River Watershed Project can be found starting on **page xxx of the Appendix.**

5.0 COORDINATION EFFORTS

5.1 Coordination from other State Agencies

The Cass County Soil Conservation District works closely with NDSU extension service with project coordination efforts. They play a significant role in relaying information to people throughout Cass County. They are active in attending SCD meetings and keeping up to date with what is happening with our watershed projects. NDSU extension also plays a valuable role in helping with educational events and public outreach. Other direct coordination efforts are supported by local neighboring Soil Conservation Districts including, Richland, Ransom, and Barns County SCD's. North Dakota Game and Fish Department has also recently partnered with the ND DEQ and acquired state grant funding through the North Dakota Outdoor Heritage Fund for a wildlife and water quality project. The Cass County Soil Conservation district handles the delivery of this project to the landowners. So far, this project has implemented 66 acres of grass in 5 year management agreements.

5.2 Other State and Environmental Coordination

Maple River Water Resource Board and Cass County Water Resource Boards coordinate to provide technical assistance and project promotion.

5.3 Federal Coordination

USDA Natural Resources Conservation Service (NRCS). The NRCS provides day to day assistance in conservation planning, plan writing, contract writing, and technical assistance for construction and installation of planned BMP. NRCS personnel aids with quality review and compliance checks of BMP that are designed by NRCS personnel. Local NRCS staff provided approved BMP standards and specifications from the NRCS technical guide. NRCS provides assistance by facilitating local involvement and participating in educational outreach programs.

5.4 USDA Programs

USDA programs such as EQIP, CSP, and CRP have funds that support practices that are beneficial towards achieving water quality goals. These programs contribute significant funding every year towards practices to help improve agricultural lands, habitat, and water quality. NRCS program implementation in the Maple River Watershed can be found on **page xvii** – **xxi** of the **appendix**. This report contains implemented practices in the Cass County Field office through EQIP and CSP. We were unable to have the report reflect practices

implemented on the HUC scale. For Reference the Maple River Watershed comprises roughly 60% of the land area in Cass County. Not noted are the NRCS funds that were implemented in the watershed in the counties of Steele, Barnes, and Ransom Counties.

5.5 Accomplishments of Agency Coordination Meetings

The Cass County Soil Conservation District and the Natural Resource Conservation Service meet often to discuss agency coordination. Once a month we formally meet with our board of supervisors and NRCS agency staff is present at those meetings. We also meet as needed to discuss local projects. NRCS was involved through the course of the project with educational events.

5.6 Resources/Coordination from Federal Land Management Agencies

There was no resource coordination from Federal Land Management Agencies towards implementation on this project.

5.7 Other Sources of Funds

NDGF Save our Lakes program helped complete a project on the Maple River for riparian forest buffer establishment. The Cass County Soil Conservation District also has several sources of self-funded projects for grass and pollinators, trees, and urban conservation practices. The CCSCD also has held several Outdoor Heritage Fund Grants for trees, grass, and cover crop establishment. Cass County cover crop project through OHF implemented 5,765 acres of cover crop in Cass County in 2018-2019. In 2019 and 2020 The Cass County Windbreak & Wildlife Planting Initiative successfully planted 142,710 linear feet of trees creating roughly 46 acres of wildlife habitat totaling 21,786 trees planted.

6.0 SUMMARY OF PUBLIC PARTICIPATION

Public participation in the project was less than expected during this project. We had a unique set of challenges with excessive wetness in the fall of 2019 and in 2020 we were hit by the covid-19 closures. Then in 2021 we experienced a major drought. Our project outreach in 2018 and 2019 were very successful. Most of our events were very well attended and well received. Other participation came from the local level, board members did a good job letting neighbors within the watershed know about project funds and events. Local grain elevators and other common areas in the watershed played a key role in project exposure as we were able to make appearances to share programs with customers and were able reach a lot of local farmers and ranchers. We hope to keep building public involvement by working with our partners to keep expanding on our outreach programs.

7.0 ASPECTS OF PROJECT THAT DID NOT WORK WELL

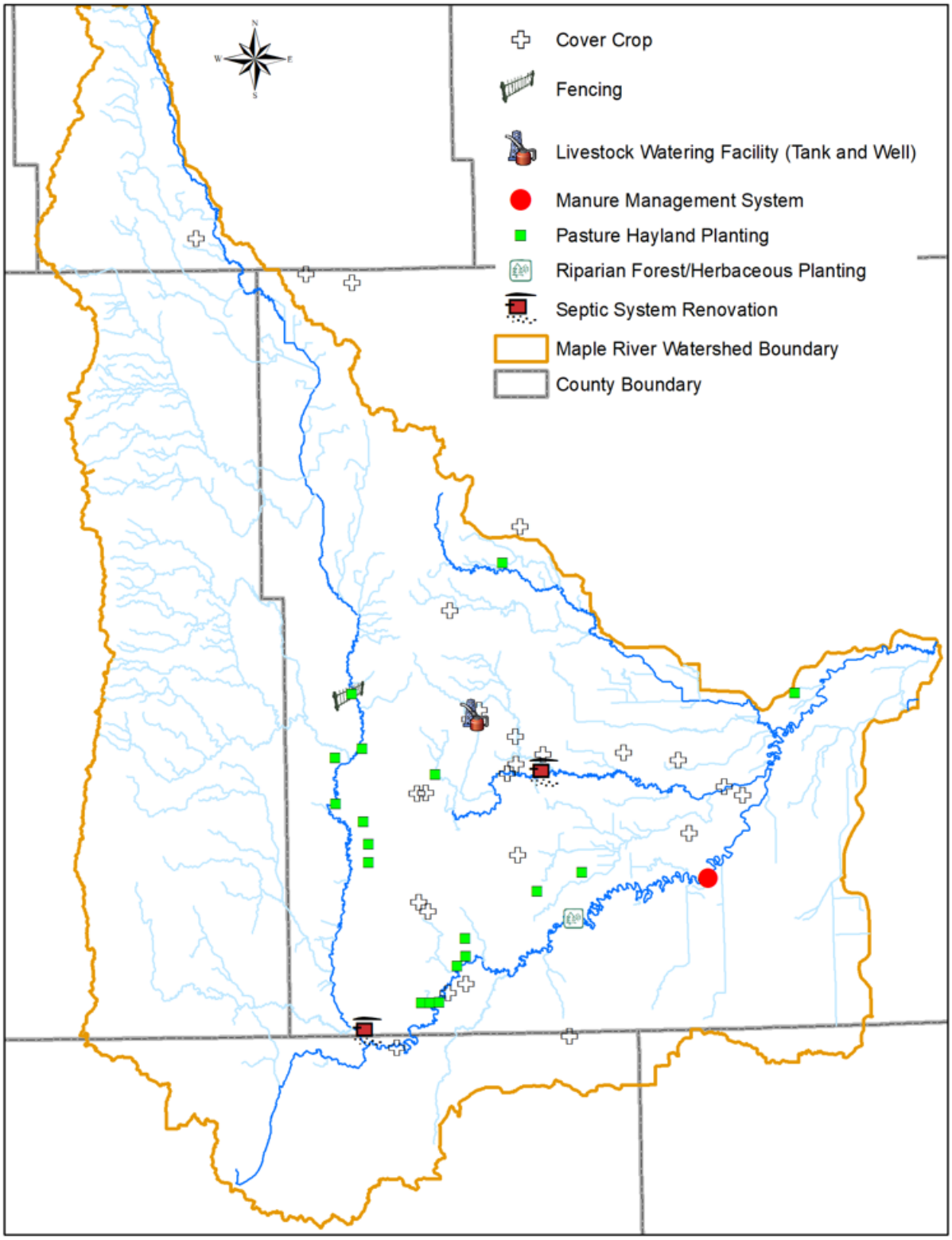
Producer involvement in programs was less than desired during the Maple River Implementation project. Producer involvement is affected by climatic, social, and economical variables that are out of our control. The project saw everything from strong community involvement in the beginning to very poor interaction during the covid-19 closures and thereafter. Climate and environmental conditions were very different from 2019 where excessive wetness kept many out of the fields, to excessive dryness in 2021 where crops struggled due to lack of moisture. We continued to work on establishing cropland BMPs where applicable and continue to try and grow our outreach program to educate the public on the importance of soil health and water quality.

8.0 FUTURE ACTIVITY RECOMMENDATIONS

Education and outreach will continue to be a crucial component in watershed project success. Educating the public on the impacts of NPS pollution and the benefits of best management practices as well as offering financial assistance to implement these practices should continue to be a priority. BMPs should be targeted towards large scale agricultural practices that can reduce the impacts of NPS pollution. Chemical inputs, extensive tillage practices, surface drainage, and tile drainage continue to have an impact on water quality in the region. Future project goas should be aimed towards educating landowners on how to manage their lands to improve soil health function and water quality. No till farming and the soil health initiative are at the forefront. By reducing tillage, managing residue, and diversifying the crop rotations, farmers can improve water infiltration and in turn improve nutrient cycling in their rotation. The result is lower input costs, improved water quality, and healthier soil. Another valuable resource will be utilizing prioritization tools like the PTMApp that help prioritize track and measure water quality. This tool will help us scale down priority areas for BMP implementation on the sub-watershed and field scale.

Appendix

BMP Implementation Map Maple River Watershed Project



Cumulative BMP Expenditures and In-Kind Earned

Project: Maple River Watershed Project / 319 Nonpoint Implementation ***Time Period: 1/1/2000 To 11/1/2022***

NOTE: For multiple year practices where the practice amount may differ from year to year, the largest applied value entered for that multiple year practice will be used in the cumulative amount field.

Cropland Management	Cumulative Amount	Units	Total Donations	Total 319 Cost Share	Total Producer Match	Total BMP Costs	Total BMP In-Kind Earned
Practice: Cover Crop	2411	Acres	$0.00	$22,211.61	$14,807.73	$37,019.34	$0.00
Cropland Management Category Totals:				**$22,211.61**	**$14,807.73**	**$37,019.34**	**$0.00**

Grazing Management	Cumulative Amount	Units	Total Donations	Total 319 Cost Share	Total Producer Match	Total BMP Costs	Total BMP In-Kind Earned
Practice: Fencing (Barbed)	4224.9	Linear Feet	$0.00	$4,816.39	$3,210.92	$8,027.31	$0.00
Practice: Pasture Hayland Planting	47.5	Acres	$0.00	$1,292.47	$861.65	$2,154.13	$0.00
Practice: Pasture/Hayland Planting	555.9	Acres	$0.00	$19,426.39	$12,950.94	$32,377.37	$0.00
Practice: Trough and Tank	1	Number	$0.00	$1,378.45	$918.96	$2,297.41	$0.00
Practice: Well (Livestock Only)	1	Number	$0.00	$10,727.43	$7,151.62	$17,879.05	$0.00
Grazing Management Category Totals:				**$37,641.13**	**$25,094.09**	**$62,735.27**	**$0.00**

Livestock Manure Management System (Full System)	Cumulative Amount	Units	Total Donations	Total 319 Cost Share	Total Producer Match	Total BMP Costs	Total BMP In-Kind Earned
Practice: Phase I Waste Management System	1	System(s)	$0.00	$105,000.00	$70,000.00	$175,000.00	$0.00
Livestock Manure Management System (Full System) Category Totals:				**$105,000.00**	**$70,000.00**	**$175,000.00**	**$0.00**

Miscellaneous Practices	Cumulative Amount	Units	Total Donations	Total 319 Cost Share	Total Producer Match	Total BMP Costs	Total BMP In-Kind Earned
Practice: Septic System Renovation	2	Number	$0.00	$17,705.26	$11,803.51	$29,508.77	$0.00
Miscellaneous Practices Category Totals:				**$17,705.26**	**$11,803.51**	**$29,508.77**	**$0.00**

Maple River Watershed Project / 319 Nonpoint Implementation Totals:				**$182,558.00**	**$121,705.33**	**$304,263.38**	**$0.00**

2018

Summary Conservation Practices	Planned	Applied	Planned Count	Applied Count
Apply enhanced efficiency fertilizer products (WQL24) (ac)		303		1
Apply phosphorus fertilizer below soil surface (WQL09) (ac)		157		1
Conservation Cover (327) (ac)	198	861	58	37
Conservation Crop Rotation (328) (ac)	11,387	4,137	133	37
Cover Crop (340) (ac)	12,983	4,258	153	77
Cover crop to minimize soil compaction (E340107Z) (ac)	943	1,550	11	15
Fence (382) (ft)	15,450	12,994	20	9
Filter Strip (393) (ac)		3		1
Forage and Biomass Planting (512) (ac)		1		1
Forage Harvest Management (511) (ac)	76	86	6	3
Improving nutrient uptake efficiency and reducing risk of nutrient losses to surface water (E590118Z) (ac)	1,693	1,353	16	12
Integrated Pest Management (IPM) (595) (ac)	29,713	6,213	260	96
Intensive cover cropping to increase soil health and soil organic matter content (E340106Z1) (ac)	1,246	2,013	11	18
Livestock Pipeline (516) (ft)	9,101	1,247	10	2
Livestock Shelter Structure (576) (no)		1		1
Nitrification inhibitors or urease inhibitors (AIR08) (ac)		90		1
Nutrient Management (590) (ac)	28,885	3,235	250	31
Plant Tissue Testsing and Analysis to Improve Nitrogen Management (WQL04) (ac)		303		1
Precision application technology to apply nutrients (WQL11) (ac)		148		1
Prescribed Grazing (528) (ac)	660	549	19	14
Pumping Plant (533) (no)	2		2	
Reduce risk of pesticides in surface water by utilizing precision pesticide application techniques (E595116X) (ac)	18,362	2,371	114	27
Reduce risks of nutrient losses to surface water by utilizing precision ag technologies (E590118X) (ac)		1,012		10
Residue and Tillage Management, No-Till (329) (ac)	473		3	
Residue and Tillage Management, Reduced Till (345) (ac)	15,410	2,009	185	26
Residue Management, Seasonal (344) (ac)		442		3
Resource conserving crop rotation for soil organic matter improvement (E328106R) (ac)		780		13
Salinity and Sodic Soil Management (610) (ac)		120		9
Split nitrogen applications 50% after crop/pasture emergence/green up (WQL07) (ac)		303		1
Tree/Shrub Establishment (612) (ac)		6		4
Tree/Shrub Site Preparation (490) (ac)	6	12	2	6
Upland Wildlife Habitat Management (645) (ac)	3	981	1	29
Use drift reducing nozzles, low pressures, lower boom height and adjuvants to reduce pesticide drift (AIR04) (ac)		542		1
Use of multi-species cover crops to improve soil health and increase soil organic matter (E340106Z2) (ac)		152		1
Water Well (642) (no)	2		2	
Watering Facility (614) (no)	5	1	6	1
Wetland Restoration (657) (ac)	19	72	18	19
Wetland Wildlife Habitat Management (644) (ac)	22	241	19	47
Windbreak/Shelterbelt Establishment (380) (ft)	13,200	31,269	2	14
Windbreak/Shelterbelt Renovation (650) (ft)	6,600	4,160	2	1

2019

Practice	Planned	Applied	Planned Count	Applied Count
Conservation Cover (327) (Ac)	120	72	5	6
Conservation Crop Rotation (328) (Ac)	17,570	1,006	160	9
Cover Crop (340) (Ac)	9,646	1,473	71	22
Critical Area Planting (342) (Ac)	133	0	1	0
Filter Strip (393) (Ac)	3	0	2	0
Grade Stabilization Structure (410) (No)	1	0	1	0
Grassed Waterway (412) (Ac)	133	0	1	0
Improving nutrient uptake efficiency and reducing risk of nutrient losses to surface water (E590118Z) (Ac)	786	420	4	8
Intensive cover cropping to increase soil health and soil organic matter content (E340106Z1) (Ac)	0	209	0	5
Irrigation Water Management (449) (Ac)	0	141	0	1
Livestock Pipeline (516) (Ft)	0	4,903	0	6
Nutrient Management (590) (Ac)	17,409	288	153	4
Pest Management Conservation System (595) (Ac)	17,638	507	155	13
Prescribed Grazing (528) (Ac)	0	161	0	6
Pumping Plant (533) (No)	0	2	0	2
Reduce risk of pesticides in surface water by utilizing precision pesticide application techniques (E595116X) (Ac)	0	1,311	0	18
Reduce risks of nutrient losses to surface water by utilizing precision ag technologies (E590118X) (Ac)	0	241	0	3
Residue and Tillage Management, No Till (329) (Ac)	9,780	0	72	0
Residue and Tillage Management, Reduced Till (345) (Ac)	9,437	1,023	100	14
Resource conserving crop rotation for soil organic matter improvement (E328106R) (Ac)	0	780	0	13
Soil health crop rotation (E328106Z1) (Ac)	3,929	0	20	0
Structure for Water Control (587) (No)	0	16	0	2

2020

Practice	Planned	Applied	Planned Count	Applied Count
Comprehensive Nutrient Management Plan - Written (102) (No)	1	0	1	0
Conservation Cover (327) (Ac)	2,017	2,331	167	154
Conservation Crop Rotation (328) (Ac)	4,271	7,297	37	78
Cover Crop (340) (Ac)	0	2,486	4	25
Critical Area Planting (342) (Ac)	2	0	2	0
Dike (356) (Ft)	1,478	0	2	0
Early Successional Habitat Development-Mgt (647) (Ac)	1,948	919	157	172
Existing Activity Payment-Land Use (E300EAP1) (Ac)	3,929	0	24	0
Existing Activity Payment-Resource Concern (E300EAP2) (No)	35	0	5	0
Filter Strip (393) (Ac)	0	13	0	7
Herbaceous Weed Treatment (315) (Ac)	17	0	12	0
High Tunnel System (325) (SqFt)	3,141	0	1	0
Improving nutrient uptake efficiency and reducing risk of nutrient losses (E590A) (Ac)	786	0	4	0
Intensive cover cropping to increase soil health and soil organic matter content (E340B) (Ac)	0	0	4	0
Irrigation Water Management (449) (Ac)	0	543	0	4
Livestock Pipeline (516) (Ft)	0	1,984	0	2
Nutrient Management (590) (Ac)	1,913	9,189	25	89
Pest Management Conservation System (595) (Ac)	1,128	9,890	21	156
Prescribed Burning (338) (Ac)	69	0	8	0
Prescribed Grazing (528) (Ac)	0	156	0	2
Reduce risk of pesticides in surface water by utilizing precision pesticide application techniques (E595116X) (Ac)	0	146	0	3
Reduce risks of nutrient losses to surface water by utilizing precision ag technologies (E590118X) (Ac)	0	242	0	3

2021

Practice	Planned	Applied	Planned Count	Applied Count
Acquisition Process - Appraisal (LTAPA) (Ac)	140	0	15	0
Acquisition Process - Appraisal Update (LTAPAU) (Ac)	140	0	15	0
Acquisition Process - Boundary Survey (LTAPBS) (Ac)	140	0	15	0
Acquisition Process - Environmental Database Records Search (LTAPERS) (Ac)	140	0	15	0
Acquisition Process - Full Phase I (LTAPFP1) (Ac)	140	0	15	0
Comprehensive Nutrient Management Plan (102) (No)	0	1	0	1
Conservation Cover (327) (Ac)	1,379	856	108	53
Conservation Crop Rotation (328) (Ac)	4,485	924	34	15
Cover Crop (340) (Ac)	0	629	0	6
Critical Area Planting (342) (Ac)	8	0	1	0
Early Successional Habitat Development-Mgt (647) (Ac)	1,372	84	105	19
Existing Activity Payment-Land Use (E300EAP1) (Ac)	0	786	1	4
Existing Activity Payment-Resource Concern (E300EAP2) (No)	0	7	0	1
Fence (382) (Ft)	8,700	9,018	2	17
Grassed Waterway (412) (Ac)	4	0	1	0
Herbaceous Weed Treatment (315) (Ac)	17	0	8	0
Improving nutrient uptake efficiency and reducing risk of nutrient losses to surface water (E590118Z) (Ac)	0	350	0	8
Intensive cover cropping to increase soil health and soil organic matter content (E340106Z1) (Ac)	0	447	0	9
Livestock Pipeline (516) (Ft)	2,401	0	3	0
Long-Term Protection of Land - 30-Year Easement (LTP30YE) (Ac)	140	0	15	0
Mulching (484) (Ac)	0	3	0	2
Nutrient Management (590) (Ac)	4,485	321	34	10
Pest Management Conservation System (595) (Ac)	4,491	937	36	32

2022

Practice	Planned	Applied	Planned Count	Applied Count
Apply enhanced efficiency fertilizer products (WQL24) (Ac)	0	1	0	1
Conservation Cover (327) (Ac)	1,973	6,998	112	505
Conservation Crop Rotation (328) (Ac)	0	11,612	0	98
Cover Crop (340) (Ac)	1,911	2,374	19	76
Critical Area Planting (342) (Ac)	0	0	0	2
Dike and Levee (356) (Ft)	0	2	0	2
Early Successional Habitat Development-Mgt (647) (Ac)	1,992	1	114	61
Enhanced field borders to increase food for pollinators along the edge(s) of a field (E386D) (Ac)	7	0	5	0
Establish pollinator habitat (PLT01) (Ac)	0	0	0	1
Existing Activity Payment-Land Use (E300EAP1) (Ac)	25,663	5,914	275	59
Existing Activity Payment-Resource Concern (E300EAP2) (No)	60	19	10	3
Extending existing field borders for water quality protection and wildlife habitat (ANM07) (Ac)	0	0	0	1
Extending existing riparian herbaceous cover for water quality protection and wildlife habitat (ANM06) (Ac)	0	0	0	1
Fence (382) (Ft)	0	2	0	2
Field Border (386) (Ac)	7	0	5	0
Filter Strip (393) (Ac)	0	126	0	25
Forage plantings that help increase organic matter in depleted soils (E512D) (Ac)	55	0	5	0
GPS, targeted spray application (SmartSprayer), or other chemical application electronic control tec (AIR07) (Ac)	0	0	0	5
Grassed Waterway (412) (Ac)	0	0	0	1
Herbaceous Weed Treatment (315) (Ac)	4	17	4	12
High level Integrated Pest Management to reduce pesticide environmental risk (WQL13) (Ac)	0	0	0	2

Cass County Soil Conservation District
Conservation News

Summer 2020

In This Issue

http://cassscd.org

Check us out on Facebook!

2020 Tree Planting Program

The 2020 Tree Planting endeavor got off to a rocky start as winter-like conditions welcomed the Spring. Nursery's were behind with the wet Spring, and we didn't receive tree stock until the second week in May. We battled Mother Nature all planting season, but tenacity prevailed and we were successful in putting conservation on the ground. We planted over 150,000 linear feet of trees in Cass County. Weed barrier fabric was applied to 80% of the plantings. Trees were planted under a mix of cost-share programs, including CWPI and EQIP, as well as the producer paying the full cost of installation. We were fortunate to have a great crew of seasonal employees this year: Dan Iwen returned for his 17th year, Adam Breske for his 4th, and Mike Bush and Paula Comeaux for their first. If you were unable to get a tree planting done in 2020, and are interested in putting conservation on the ground, contact us to schedule an appointment to draw up an individualized conservation plan. Depending on the project, cost-share may be available. The Cass Windbreak Planting Initiative (CWPI) will again be available next year for field windbreaks, wildlife and riparian plantings. It's never to early to start planning your project!

Tree of the Quarter

Peachleaf Willow (*Salix amygdaloides)* is a medium-sized native deciduous tree. On the prairie, it is the second-largest tree, following only the cottonwood. Like all willow, the peachleaf is fond of riparian areas and wetlands. The leaves are up to 5 inches long and 1 1/2 inches wide, and bear a resemblance to peach tree leaves. Yellow catkins are produced in the Spring, maturing in the early Summer. Like all willows, the dense matrix of roots does a wonderful job of filtering shallow groundwater and stabilizing the soil, preventing erosion. As a native tree, it is a great addition to any site that can have water at some point during the year. The graceful arching branches add a touch of beauty as well. Conservation-grade stock can be purchased through the online Tree Store.

District Staff

Jeffrey Miller—*Director*
Amy Cole-*Office Manager*
Eric Dahl—*Soil and Water Resources Mgr*
Tony Peterson-*Programs Manager*

NRCS Staff

Josh Monson-*District Conservationist*
Matt Shappell-*Soil Conservationist*
Matt Waclawik—*Wetlands Specialist*
Blake Johnson– *Agriculture Engineer*
Paul Flahave– *Designated Conservationist*
Tim Cogger-*Program Assistant*
Amy Bauroth-*Heartland Secretary*

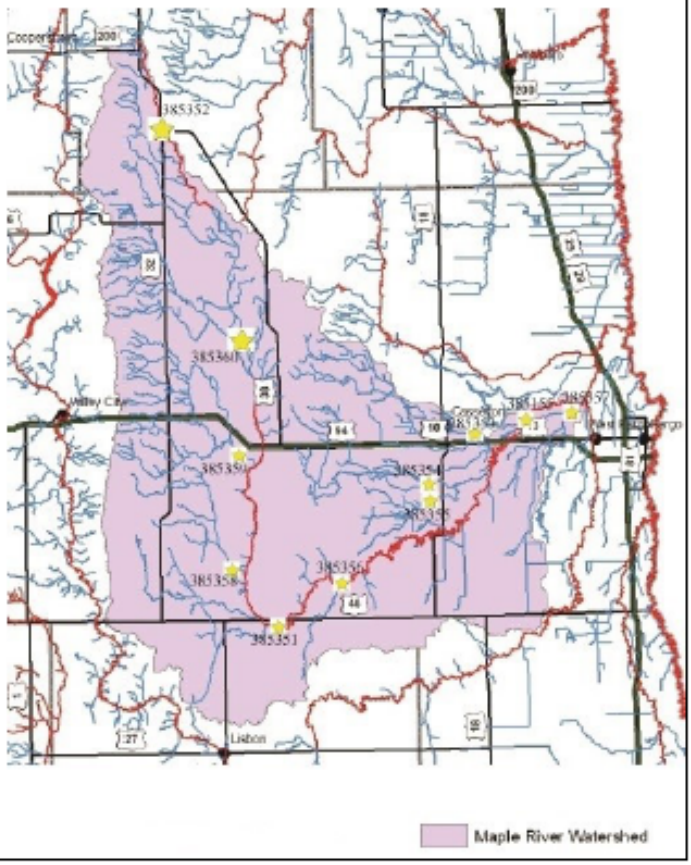
District Supervisors

Terry Hoffmann—*Wheatland*
Brad Kellerman—*West Fargo*
Curt Knutson—*Page*
Brooks Whitmore—*Page*
Warren Solberg—*Horace*

319 Watershed 2018 Update

Cass County Soil Conservation District has been awarded a grant for the **Maple River Watershed**. The Maple River Watershed Project is a continuation of the former Buffalo Creek Watershed Project in Cass County. The new Maple River Watershed Project will cover a much larger area for implementation of best management practices (BMP). The project will continue to have a strong emphasis on cropland and pastureland BMPs that focus on improving soil health. Soil health practices are proven to improve water infiltration, soil organic matter and soil fertility, while reducing sedimentation and nutrient runoff. These are all critical factors in improving surface water quality and sustainable agriculture. If you reside within the Maple River Watershed you may be eligible for cost-share used for Implementation of Best Management Practices. Cost-share assistance will be provided at a sixty percent (60%) Federal and forty percent (40%) landowner matching ratio. Cost-share opportunities include: no-till, cover crop, nutrient management, manure management, fencing, watering facilities for livestock, tree planting, grass seeding and more. Contact Eric Dahl at **eric.dahl@nd.nacdnet.net** or 701-282-2157 ext. 3 for more information today!

Maple River Watershed Project Area



District Staff

Jeff Miller—*Operations Coordinator*
Tony Peterson—*District Technician*
Eric Dahl—319 *Watershed Coordinator*
Amy Cole—*District Clerk*
Ashley Fisk—*Urban Conservationist*

NRCS Staff

Josh Monson-*District Conservationist*
Matt Shappell-*Soil Conservationist*
Lucas Schmiesing-*Soil Conservationist*
Matt Waclawik—*Wetlands Specialist*
Blake Johnson– *Agriculture Engineer*

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Brooks Whitmore—*Page*
Warren Solberg—*Horace*

Welcome our newest Board Members!

Jodi Meisch, is a life-long resident of Cass County, residing in Mapleton. Jodi works by day as the Office Manager for Dakota Audubon, with a deep and abiding interest in land conservation and stewardship of natural resources. Jodi installed a Pocket Prairie at her home last year, and will be adding to it this year!

Kelli Bowen lives in Casselton. She works for Peterson Farm Seed as well as writing a lively blog that can be found on the NDFB *On Your Table* blog. Kelli has an active interest in conservation, land stewardship, and the environment around us.

Red River Basin Wildlife and Water Quality Enhancement Pilot Program

The Cass County SCD has partnered with the North Dakota Game and Fish Department and the North Dakota Department of Environmental Quality to bring a new program for establishing perennial grasslands in the Red River Valley. The program, funded through a grant from the Outdoor Heritage Fund, is intended to increase wildlife habitat and reduce potential nonpoint sources of pollutants impairing water quality in the Red River Basin. Marginal cropland acres or land that is often affected by excess moisture are a prime target for the program. Participating producers will receive land rental payments on acres converted to perennial grass under a 5-year producer management agreement. Participants will also receive cost-share for grass seed associated practice implementation. For more information on the project please contact the office for more information.

NORTH DAKOTA GAME AND FISH

NORTH Dakota Be Legendary. | Environmental Quality

NORTH DAKOTA Outdoor HERITAGE FUND

JOIN US

Field Tour, Nick Vinje Farm

Thursday September 6th, 2018
10:00am - 1:00pm
County Hwy 26, 1/2 mile east of Northern Cass School

9:30 - WELCOME COFFEE & DONUTS
10:00 - FIELD TOUR
NOON - LUNCH PROVIDED (PLEASE RSVP)
12:30 - CATTLE TOUR

Highlights: No till cropping systems, soil health demonstrations, rainfall simulator, machinery overview, cattle and cover crop plot tour!

Please RSVP to Cass County Soil Conservation
Phone 701-282-2157 ext 3
amy.cole@nd.nacdnet.net

RSVP NOW!

County Soil Conservation District
Stewardship for Today and Tomorrow

Cass County SCD is an equal opportunity provider and employer. USDA -NRCS is and equal opportunity provider, employer, and lender If you need any accommodation, please contact the office 701-282-2157 ext 3

NRCS
Natural Resources Conservation Service

CONSERVATION FARMING WORKSHOP

Tuesday March 3rd, 2020
9:30am - 3:00pm

RSVP NOW!

Hagge's Bar
Mapleton
650 Carl Olson St Mapleton, ND

9:30 - WELCOME COFFEE & DONUTS

10:00 - KELLY COOPER– 60 INCH CORN TRIAL

11:00 - JUSTIN ZAHRADKA– WHY REGENERATIVE AG?

NOON - LUNCH PROVIDED (PLEASE RSVP)

1:00 - HAL WEISER– IN FIELD & LAB SOIL HEALTH

2:00 - AGASSIZ SEED & SUPPLY– INDUSTRY TALK

DOOR PRIZES!

Please RSVP to Cass County SCD by March 1st
Phone 701-282-2157 ext 3
amy.cole@nd.nacdnet.net

CASS COUNTY SOIL CONSERVATION DISTRICT 701.282.2157

NRCS Natural Resources Conservation Service

SPEAKERS

JUSTIN ZAHRADKA
Farmer, Walsh County ND
- Regenerative Ag.
- Rotational no-till
- Cover crops
- Grazing covers

KELLY COOPER
Research Agronomist, Oakes ND
- Soil health principles
- 60 inch corn trial

HAL WEISER
Soil Health Specialist, NRCS
- In field soil assessment
- Lab assessment
- Soil health indicators

AGASSIZ SEED & SUPPLY

AGASSIZ SEED & SUPPLY

Cass County SCD is an equal opportunity provider and employer. USDA-NRCS is and equal opportunity provider, employer, and lender

If you need any accommodation, please contact the office 701-282-2157 ext 3


CATERPILLAR


Cass County Soil Conservation District
Our Services
Handplant Sales
Machine Tree Planting
(for windbreaks, shelterbelts, living snow fences)
Weed Barrier Fabric Installation
Grass Planting by Acre
Chemical Application for Tree Care
Mowing Services for Tree Plantings
Weed Badgering Service for Tree Plantings
Retail Sales of tree Care Products
Well Sealing Programs
Our trained staff and professional Technician are also available to provide assistance with various services including
Cass County Soil Conservation District's
Urban Conservation Program
Pocket Prairie Initiative
Pollinator Plantings
Rain Gardens
Xeriscapes
Cost-share & Grant Opportunities
Practices
Cost-Share
Cass County Soil Conservation District
Stewardship for Today and Tomorrow
701.282.2157 www.casscd.org

Maple River Watershed Project

Water Quality Summary

2018-2022

Completed: November 2022

Prepared for:
Cass County Soil Conservation District
1665 43rd St S
Fargo, ND 58103

Prepared by:
Emily Joynt
ND Dept. of Environmental Quality
Division of Water Quality
Normandy Building, 3rd Floor
4201 Normandy Street
Bismarck, ND 58503-1324


NORTH
Dakota
Be Legendary.
Environmental Quality

The overall goal of the Maple River Watershed Project was to restore recreational use and aquatic life uses of the impaired reaches of the Maple River Watershed. This goal was supported in part by documenting long term and short term water quality trends and improvements. The following is a summary report of the water quality data collected under Phase I of the project, from 2018 to 2022. Phase II of the project began in August of 2021 and will continue through 2025. Water quality monitoring data was conducted throughout the Maple River HUC 8 (8-digit hydrologic unit code), including four sites on the Maple River main stem as detailed in Figure 1 and Table 1.

The Maple River Watershed project included sampling and analysis of Total Suspended Solids (TSS), Nutrients Complete (i.e. total nitrogen, total Kjeldahl nitrogen, nitrate-nitrite, ammonia, total phosphorus), and Eschericia coli (E. coli) bacteria. Samples were collected from April through October as conditions allowed. E. coli samples were collected during the recreation season, May through September. Project samples were collected in 2020 and 2022. Water quality monitoring site 384155 is an ambient station routinely monitored by the North Dakota Department of Environmental Quality; data from this station was used to supplement project data from 2018 through 2022.

Water quality trends are a reflection of many variables, including sample size and number of monitoring years; due to sampling constraints within and across monitoring years, water quality trend interpretations for this project are limited. For each parameter, box plots were used to display the distribution of sample results, organized by sampling year, including the number of samples collected each year (n). Additionally, E. coli bacteria concentration tables were used to summarize and display data, including recreational use assessments for each water quality monitoring site.

In order to support beneficial uses (recreation, fish and other aquatic biota), Best Management Practices (BMPs) that address sources of E. coli bacteria, nutrients, and sediment, should continue to be implemented. Phase I water quality data showed average nutrient and TSS data decreased at each station between 2020 and 2022. E. coli data were highly variable at each site and in multiple samples resulted in concentrations orders of magnitude above state water quality standards. Additional E. coli data are needed to support recreational use assessments.

In addition to water quality sampling, biological sampling was planned in order to assess and restore beneficial use for fish and other aquatic biota. In September of 2020 macroinvertebrate and fish data were collected from one site, 551398, on the Maple River. Due to sampling constraints, additional biological assessments were not conducted during Phase I. Additional biological assessments are anticipated for Phase II of the project and will be addressed in the Phase II water qualtiy summary.

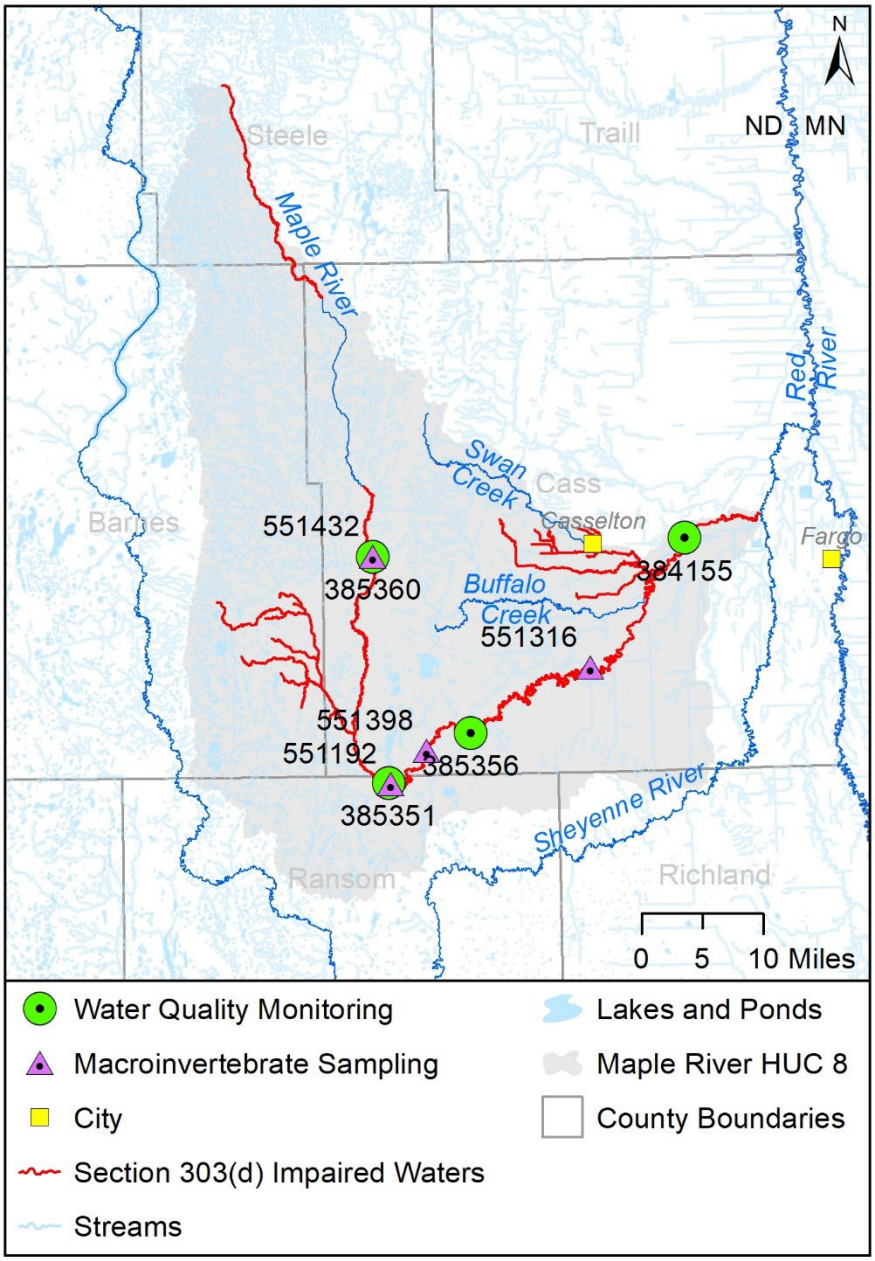

Figure 1. Water quality monitoring and macroinvertebrate sites for the Maple River Watershed.

Table 1. Sampling location descriptions in the Maple River HUC-8.

Monitoring Site ID	Sample Type	Coordinates	Site Description
385360	TSS, Nutrients, E. coli	Lat: 46.89068 Lon: -97.59492	Maple River 2 miles West and 2 miles South of Buffalo, ND at 36th Street SE bridge
385351	TSS, Nutrients, E. coli	Lat: 46.62174 Lon: -97.5738	Maple River 1 mile East of Engerlin, ND at 136th Ave SE bridge
385356	TSS, Nutrients, E. coli	Lat: 46.67938 Lon: -97.43009	Maple River 2 miles North and 9 miles West of Leonard, ND at County Road 7 bridge
384155*	TSS, Nutrients, E. coli	Lat: 46.9054 Lon: -97.05251	Maple River at Mapleton
551398	Macroinvertebrates	Lat: 46.65877 Lon: -97.50786	Maple River 2 miles North and 4.25 miles East of Enderlin
551316	Macroinvertebrates	Lat: 46.75399 Lon: -97.22124	Maple River 7.75 miles North of Leonard (bridge access)
551432	Macroinvertebrates	Lat: 46.89068 Lon: -97.59492	Maple River 2 miles West and 2 miles South of Buffalo at 36th St SE bridge (co-located at site 385360)
551192	Macroinvertebrates	Lat: 46.61966 Lon: -97.57083	Maple River 1 mile East of Enderlin (co-located at site 385351)
*ambient water quality monitoring site			

TOTAL SUSPENDED SOLIDS (TSS)

Average and median TSS concentrations decreased at three of the four monitoring sites from 2020 to 2022, increasing at site 385360 (site furthest upstream; Figure 2). The distribution, or spread, of data (including outliers) decreased at all four sites. TSS collected at station 384155 (furthest downstream) was highly variable and showed an overall decrease in average and median TSS concentrations between 2018 and 2022.

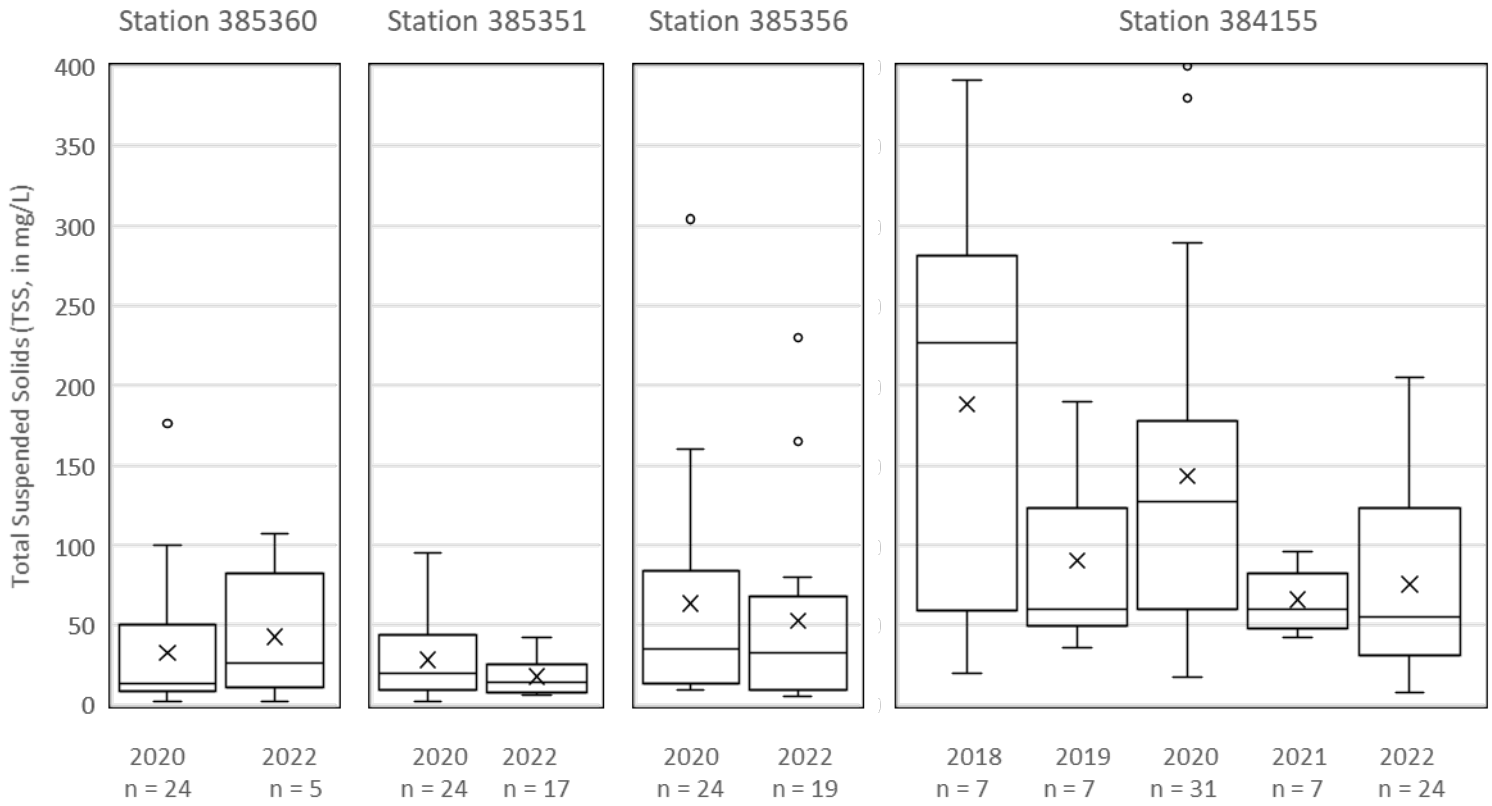

Figure 2: Summary statistics of Total Suspended Solids (mg/L) at water quality monitoring sites on the Maple River from furthest upstream (left, site 385360) to furthest downstream (right, 384155) from 2018-2020. Project data collected in 2020 and 2022; ambient monitoring data collected at site 384155 from 2018-2022. n = sample size.

NUTRIENTS (TOTAL PHOSPHORUS)

Average and median Total Phosphorus concentrations decreased at all four sites from 2020 to 2022 (Figure 3). The distribution, or spread, of data also decreased from 2020 to 2022. Station 384155 (furthest downstream) showed an overall decrease in average and median Total Phorphorus concentration between 2018 and 2022.

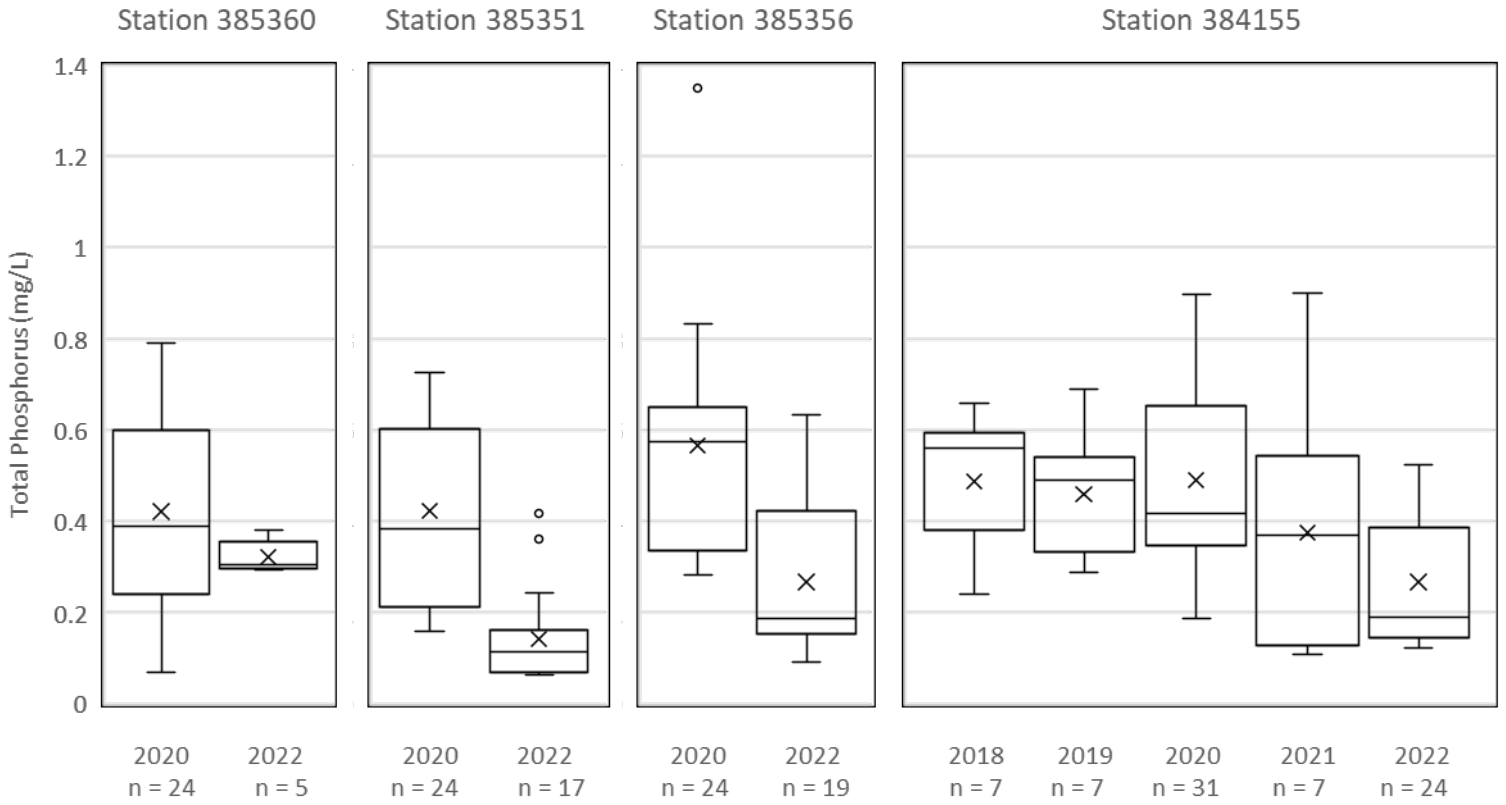

Figure 3: Summary statistics of Total Phosphorus (mg/L) at water quality monitoring sites on the Maple River from furthest upstream (left, site 385360) to furthest downstream (right, 384155) from 2018-2020. Project data collected in 2020 and 2022; ambient monitoring data collected at site 384155 from 2018-2022. n = sample size.

NUTRIENTS (TOTAL NITROGEN)

Average and median Total Nitrogen concentrations decreased at all four sites from 2020 to 2022 (Figure 4). The distribution, or spread, of data decreased (including outliers) at three of the four stations from 2020 to 2022, increasing slightly at site 384155.

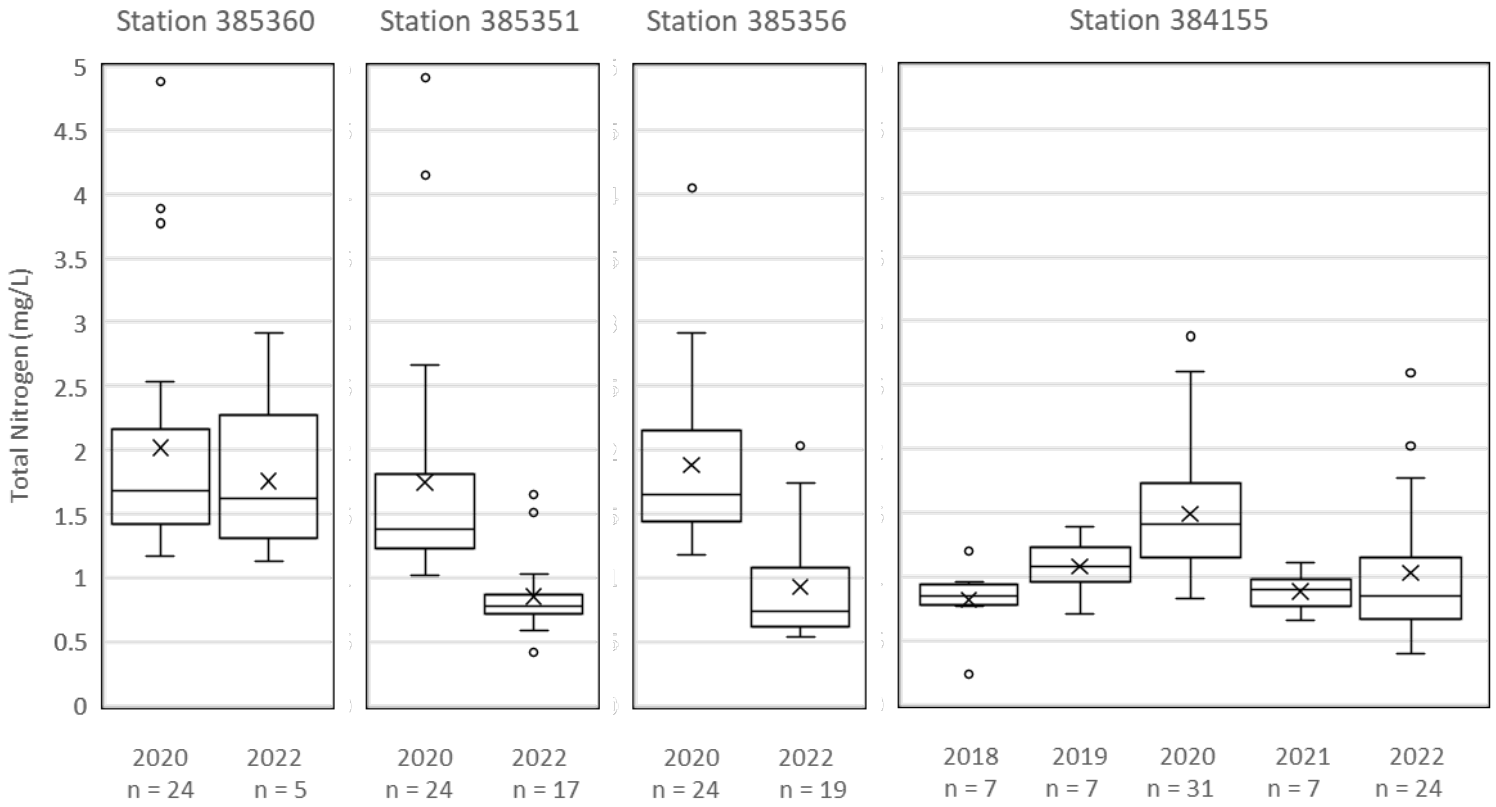

Figure 4: Summary statistics of Total Nitrogen (mg/L) at water quality monitoring sites on the Maple River from furthest upstream (left, site 385360) to furthest downstream (right, 384155) from 2018-2020. Project data collected in 2020 and 2022; ambient monitoring data collected at site 384155 from 2018-2022. n = sample size.

E. COLI BACTERIA

Average E. coli concentration decreased from 2020 to 2022, however, concentrations were highly variable between sampling sites and across sampling years (Figure 5). All four sites had E. coli concentrations greater than 1,000 CFU/100mL and two sites, 385351 and 384155, measured E. coli greater than 24,000 CFU/100mL (laboratory method reporting limit; Tables 2-5). Figure 5 displays E. coli concentrations up to 1,000 CFU/mL; sites and sampling years with additional results > 1,000 CFU/mL are in bold and colored red.

Data for each site was compared to North Dakota water quality standards to determine if bacteria concentrations support recreational use. North Dakota water quality standards for E. coli in the Maple River include:

1. A monthly geometric mean concentration of 126 CFU/100mL or less, and
2. No more than 10 percent of samples collected in a month being above 409 CFU/100mL.

These criteria apply to samples collected during the recreation season, May-September, and require a minimum of five samples for each month to calculate geometric mean. The two criteria are applied using the following:

- Fully Supporting: Both 1 and 2 are met
- Fullly Supporting, but Threatened: 1 is met, but 2 is not.
- Not Supporting: 1 is not met; 2 may or may not be met.

Tables 2-5 detail calculations for use assessment; where less than five samples (n < 5) were collected for an associated month a preliminary use assessment was listed. All four sites showed data Not Supporting or Fully Supporting but Threatened for at least two of the five months during the recreation season. Stations 384155 (furthest downstream) had sufficient monthly data (n > 5) for a use asssessment and showed E. coli bacteria concentrations Fully Supporting in four out of five months; although June is Not Supporting, criteria are close to meeting water quality standards for this site.

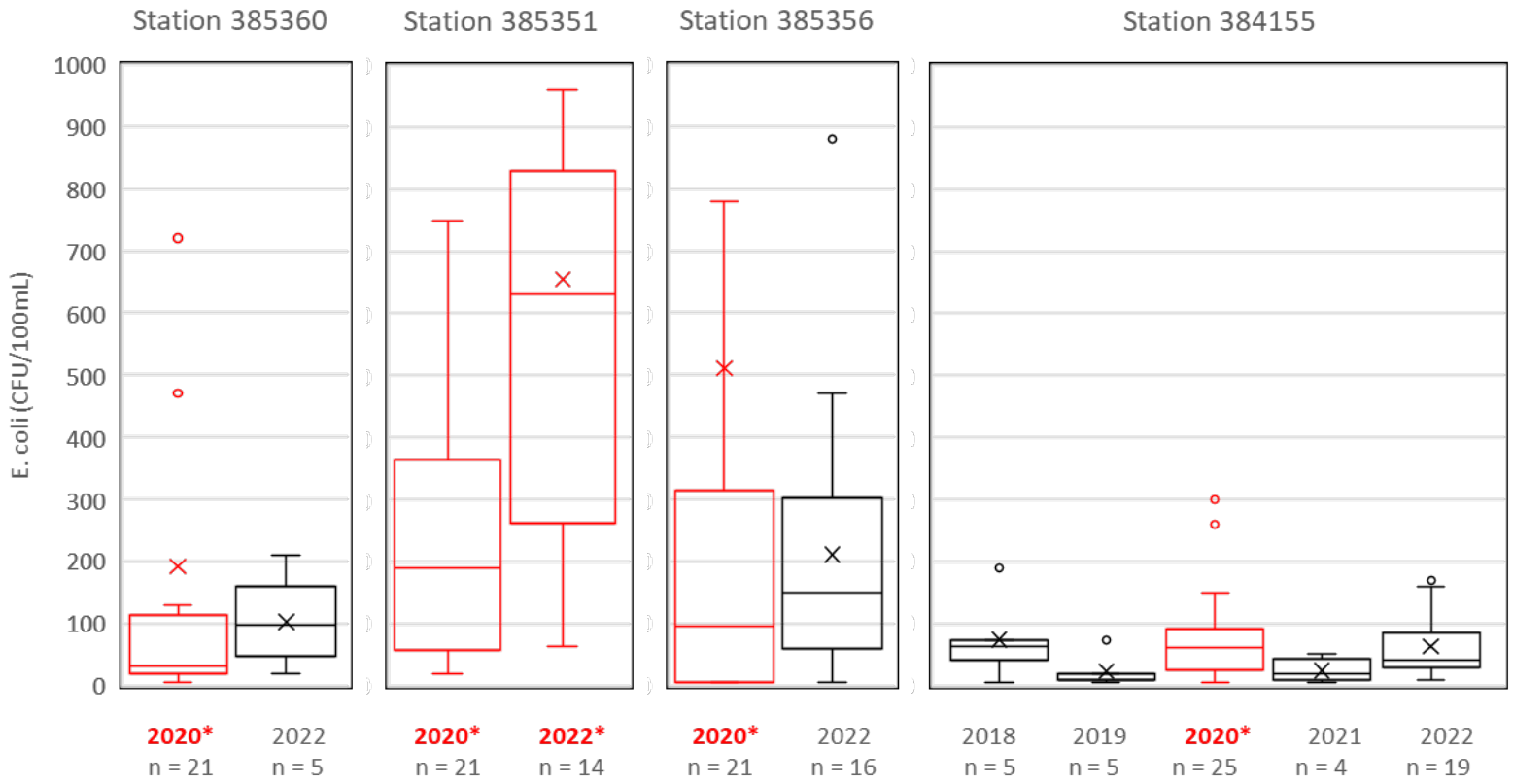

Figure 5: Summary statistics of Escherichia coli (E. coli), measured in Colony Forming Units (CFU) per 100 mL, at water quality monitoring sites on the Maple River from furthest upstream (left, site 385360) to furthest downstream (right, 384155) from 2018-2020. Project data collected in 2020 and 2022; ambient monitoring data collected at site 384155 from 2018-2022. Box plots in red (*) include additional data points > 1,000 CFU/100 mL and are not visible in charts (see Tables 2-5). Average E. coli concentration for station 385351 in 2020 = 1,690 CFU/100 mL; average E. coli concentration for station 384155 in 2020 = 1,466 CFU/100 mL. n = sample size.

Table 2: Summary of E. coli bacteria data collected at site 385360 on the Maple River.

Site 385360 E. coli Concentrations by Month 2020 & 2022									
May	CFU/ 100mL	June	CFU/ 100mL	July	CFU/ 100mL	August	CFU/ 100mL	September	CFU/ 100mL
5/4/20	5*	6/2/20	20	7/8/20	1700	8/5/20	20	9/2/20	480
5/13/20	31	6/9/20	10	7/15/20	30	8/11/20	41	9/9/20	470
5/18/20	31	6/17/20	10	7/22/20	720	8/19/20	98	9/16/20	74
5/27/20	31	6/23/20	74	7/29/20	20	8/26/20	130	9/23/20	31
				7/11/22	98			9/29/20	10
				7/13/22	210				
				7/18/22	75				
				7/20/22	110				
				7/26/22	20				

Site 385360 E. coli Summary					
	May	June	July	August	September
Number of samples (n)	4	4	9	4	5
Geometric Mean (CFU/100mL)	20	20	111	57	88
% > 409 CFU/100mL	0	0	22	0	40
Recreational Use Assessment	*Fully Supporting***	*Fully Supporting***	Fully Supporting but Threatened	*Fully Supporting***	Fully Supporting but Threatened

*Non-detect, result represents half of laboratory detection level

**Insufficient data (n < 5), preliminary use assessment

Table 3: Summary of E. coli bacteria data collected at site 385351 on the Maple River.

Site 385351 E. coli Concentrations by Month 2020 & 2022									
May	CFU/ 100mL	June	CFU/ 100mL	July	CFU/ 100mL	August	CFU/ 100mL	September	CFU/ 100mL
5/4/20	52	6/2/20	85	7/8/20	7700	8/5/20	41	9/2/20	230
5/13/20	20	6/9/20	24000***	7/15/20	84	8/11/20	63	9/9/20	310
5/18/20	20	6/17/20	300	7/22/20	750	8/19/20	190	9/16/20	260
5/27/20	95	6/23/20	420	7/29/20	30	8/26/20	470	9/23/20	150
				7/11/22	2200	8/1/22	210	9/29/20	220
				7/13/22	370	8/9/22	130	9/6/22	580
				7/18/22	280	8/15/22	730	9/12/22	820
				7/26/22	63	8/22/22	960	9/19/22	780
						8/24/22	860	9/26/22	510
								9/28/22	680

Site 385351 E. coli Summary					
	May	June	July	August	September
Number of samples (n)	4	4	8	9	10
Geometric Mean (CFU/100mL)	37	712	347	250	389
% > 409 CFU/100mL	25	50	38	44	50
Recreational Use Assessment	*Not Supporting***	*Not Supporting***	Not Supporting	Not Supporting	Not Supporting

*Non-detect, result represents half of laboratory detection level

**Insufficient data (n < 5), preliminary use assessment

***Result great than detection limit, reported as laboratory detection limit

Table 4: Summary of E. coli bacteria data collected at site 385356 on the Maple River.

Site 385356 E. coli Concentrations by Month 2020 & 2022									
May	CFU/ 100mL	June	CFU/ 100mL	July	CFU/ 100mL	August	CFU/ 100mL	September	CFU/ 100mL
5/4/20	5*	6/2/20	5*	7/8/20	6100	8/5/20	5*	9/2/20	84
5/13/20	5*	6/9/20	1800	7/15/20	63	8/11/20	30	9/9/20	95
5/18/20	5*	6/17/20	200	7/22/20	430	8/19/20	120	9/16/20	410
5/27/20	5*	6/23/20	780	7/29/20	150	8/26/20	74	9/23/20	220
				7/11/22	51	8/1/22	170	9/29/20	130
				7/13/22	20	8/9/22	360	9/6/22	140
				7/18/22	51	8/15/22	470	9/12/22	160
				7/20/22	120	8/22/22	98	9/19/22	880
				7/20/22	5	8/24/22	310	9/26/22	280
				7/26/22	86			9/28/22	170

Site 385356 E. coli Summary					
	May	June	July	August	September
Number of samples (n)	4	4	10	9	10
Geometric Mean (CFU/100mL)	5*	194	96	102	197
% > 409 CFU/100mL	0	50	20	11	20
Recreational Use Assessment	*Fully Supporting***	*Not Supporting***	Fully Supporting but Threatened	Fully Supporting but Threatened	Not Supporting

*Non-detect, result represents half of laboratory detection level

**Insufficient data (n < 5), preliminary use assessment

Table 5: Summary of E. coli bacteria data collected at site 384155 on the Maple River.

Site 384155 E. coli Concentrations by Month 2018 - 2022									
May	CFU/ 100mL	June	CFU/ 100mL	July	CFU/ 100mL	August	CFU/ 100mL	September	CFU/ 100mL
5/7/18	5*	6/13/18	190	7/9/18	74	8/14/18	63	9/4/19	5*
5/21/18	41	6/19/19	74	7/16/19	20	8/5/20	5*	9/2/20	96
5/6/19	10	6/2/20	30	7/8/20	260	8/10/20	11000	9/9/20	20
5/29/19	10	6/9/20	24000***	7/15/20	61	8/11/20	30	9/16/20	74
5/4/20	74	6/17/20	62	7/20/20	20	8/19/20	150	9/23/20	86
5/4/20	10	6/22/20	52	7/22/20	300	8/26/20	10	9/29/20	41
5/13/20	41	6/23/20	74	7/29/20	84	8/3/21	20	9/6/22	30
5/18/20	10	6/15/21	52	7/6/21	20	8/1/22	10	9/12/22	10
5/27/20	63	6/27/22	170	7/11/22	41	8/1/22	20	9/19/22	130
5/11/21	5*			7/11/22	160	8/9/22	20	9/26/22	85
5/23/22	31			7/13/22	52	8/15/22	41	9/28/22	52
				7/18/22	41	8/22/22	85		
				7/20/22	31	8/24/22	110		
				7/26/22	85				

Site 384155 E. coli Summary					
	May	June	July	August	September
Number of samples (n)	11	9	14	13	11
Geometric Mean (CFU/100mL)	18	141	60	47	40
% > 409 CFU/100mL	0	11	0	8	0
Recreational Use Assessment	Fully Supporting	Not Supporting	Fully Supporting	Fully Supporting	Fully Supporting

*Non-detect, result represents half of laboratory detection level

***Result great than detection limit, reported as laboratory detection limit