Square Butte Creek Watershed Project

IMPLEMENTATION PLAN

JD Hanson - District Manager

Oliver Soil Conservation District

Oliver Soil Conservation District – 304 Lignite Ave S. Center ND 58530

Project Contact Information

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Oliver Soil Conservation District

304 Lignite Ave S, P.O. Box 87, Center, North Dakota 58530

State Contact Information

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Project Information

State: North Dakota
Watershed: Square Butte Creek Watershed
Hydrologic Unit Code; 1013010108

High Priority Watershed: Yes

Project Type: Watershed

Waterbody Type: Rivers, Streams

NPS Category: Agriculture

Project Location: Oliver and Morton Counties North Dakota

The goal of this implementation plan will be to improve the overall water quality of the Square Butte Creek watershed system with benefits to land owners, agricultural needs, aquatic life, and recreational uses. This will be accomplished by providing technical, educational, and financial assistance to landowners within the watershed to help implement Best Management Practices (BMP's) on the land that will assist with improving water quality. A secondary goal will be the educational opportunities to create awareness about the benefit of water quality practices

Project Description:

To achieve the overall Non-Point Source (NPS) water quality goals within the Square Butte Creek Watershed. The Oliver Soil Conservation District (OSCD), Natural Resource Conservation Service (NRCS), Farm Service Agency (FSA), and other State Conservation Partners will provide technical, educational, and financial assistance to implement BMPs that improve water quality. The plan to address the project goals is as follows.

1). Efficient targeting of BMPs: To achieve the highest impact when implementing these BMPs in the project area, outreach will be targeted on land units that are within the NRCS minimum planning distance for practices that trap non-point pollution to improve water quality. These practices include Riparian Herbaceous Cover (391), Riparian Forest Buffer (391), Filter Strip (393), Vegetative Buffer (601), Access Control (472), Pasture & Hayland Planting (512), Prescribed Grazing (528), and Fencing (382). Other approved practices outlined in the Non-Point Source Management Program's (NPS Program) BMP Guidelines which support NPS mitigation adjacent to the waterbody will also be considered.

2). Conservation Community: The project's water quality goals are too immense for Oliver Soil Conservation District (OSCD) to address and remediate alone. However, as part of the project, OSCD will continue to build relationships with other conservation partners in the district while also broadening the type of partners to help promote BMPs. The hope is to continue relationship building and finding partners who are able to contribute technical and financial resources, thus potentially driving down the costs on the BMPs that will have the greatest impact.

3). Landowner and Community Education: To achieve long-term water quality goals the project will provide informational and educational programing opportunities with the objective of increasing public awareness to the causes, effects, and solutions to non-point source pollution. These opportunities would come in the form of landowner field days highlighting BMP projects within the watershed, educational workshops with conservation partner organizations focused on treating resource problems with BMP solutions, and informational mailings such as newsletters and postcards.

4). Measure and Monitor Quality of Water: To assess the impact of the implemented BMPs OSCD will continue to collect water samples and track the trends of the water quality in the Square Butte Creek Watershed. It will be critical to monitor the benefits of the proposed practices so efforts resulting in positive impacts can be expanded or changes can be made and alternative BMPs implemented, if improvements are seen. OSCD will also be monitoring the changes in land management practices and how implemented BMPs reward wildlife, landowner's resources, and water quality alike. Data can also be used to promote the practices to other landowners in the watershed.

Square Butte Creek Funding Allocation:

FY 26 Section 319 Funds Requested – $447,750 Match – $298,500

Other Federal Funds Requested - $ 650,000

Total Project Costs Requested - $1,097,75

Project Need

The Oliver Soil Conservation District's mission is the conservation of soil and water resources of the county and state, for the control and prevention of soil erosion, and to preserve the natural resources, control floods, prevent impairment of streams, dams and reservoirs, assist in the navigability of rivers, preserve wildlife, protect tax base, protect public lands, and protect and promote the health, safety, and general welfare of the people of the county and state.
In keeping with this mission, the district monitored water quality in the Square Butte Creek during the 2024 and 2025 seasons which was supported by two section 319 grants (EQ3750, and EQ3751) with funding administered by the North Dakota Department of Environmental Quality (NDDEQ). The Square Butte Creek is one of many watersheds in our district and empties into the Missouri River. The parameters that were sampled and analyzed include Nutrients Complete (i.e., total nitrogen, total phosphorus), Total Suspended Solids (TSS), and E. coli bacteria (recreation season only).

Waterbody Description – Square Butte Creek Watershed

The Square Butte Creek Watershed project area is 190,068 acres located in Oliver and Morton Counties, it consists of four sub watersheds, Upper Square Butte Creek Watershed (above Nelson Dam) Lower Square Butte Creek Watershed (below Nelson Dam) Hagel Creek Watershed and Otter Creek Watershed. Flow is eventually directed into the Missouri River via a diversion north east of Harmon Lake and at the confluence of the Otter Creek and the Missouri River south east of Harmon Lake. Square Butte Creek flows through Nelson Dam and Otter Creek flows through Harmon Lake, which are two heavily recreated waterbodies in the Watershed. The quality of water shall allow for recreational use, irrigation, livestock watering, and wildlife use. The creek is used primarily for agricultural purposes including the watering of livestock and wildlife. No local cities obtain drinking water from the creek. There are limited opportunities for recreation on the creek.

Maps – See Appendix A

Water Quality Problem Definition

Eleven different sites on the Square Butte Creek were monitored with having historical data prior to the two year assessments. The parameters that were sampled and analyzed include Nutrients Complete (i.e., total nitrogen, total phosphorus), Total Suspended Solids (TSS), and E. coli bacteria (recreation season only).

Between May 2023 and October 2025 water quality samples were collected and analyzed to specifically support future implementation work. The 2025 data was not available at the time the water quality summary was completed (see appendix c) and may shift overall trends described below. Sites with insufficient data were added to the sampling schedule in 2024 and have no other datasets to compare against.

E. Coli

E. coli levels were highly variable across the sites, with some watersheds (Otter Creek, Hagel Creek and parts of Square Butte Creek) showing increase across some months, while others had decreases in E.coli concentrations. Several sites did have insufficient data, but most locations did periodically exceed the recreational standard of 126 CFU/100ml.

Total Suspended Solids (TSS)

Similar to E. coli, TSS concentrations in rivers and streams can be highly variable. TSS samples are collected from April-October. Note that reduced flow and limited datasets can affect analysis.

TSS results showed wide fluctuations by site, with some watersheds (particularly Hagel and Lower Square Butte) frequently above the guideline of 85 mg/L. Variability was influenced by stream flow characteristics, isolated runoff events, and limited datasets.

Total Phosphorus (TP)

TP samples are collected from April-October. Nearly all monitored sites in every watershed exceeded the guideline target of 0.1 mg/L for phosphorus. Elevated phosphorus was consistent throughout the April–October sampling seasons.

Total Nitrogen (TN)

TN samples are collected from April-October. Nitrogen concentrations rarely exceeded the 2.5 mg/L guideline at most sites across all watersheds. This indicates persistent nutrient enrichment during the sampling period was not present.

Project Goal

The project's overall environmental goal is to restore the water quality by reducing the overall non-point source pollutants from entering the Square Butte Creek System. These pollutants include total nitrogen, total phosphorus, and E. coli bacteria. The goal of .866mg/L for total nitrogen (TN) and 0.07mg/L for total phosphorus (TP) will be used. These values are often used as targets or limits in water quality management. High levels of nitrogen and phosphorus in water bodies can lead to nutrient pollution, which can cause problems like algal blooms and low oxygen levels in the water. The target concentrations will follow the ND Water Quality Standards, E. Coli Bacteria are 126 organisms/ 100mL with less than 10% of the samples exceeding 409 CFU/100mL. This goal will be achieved with the environmental objective of implementing BMPs in the project area. BMP technical assistance and implementation of practices will be targeted throughout the watershed.

During the course of the project, Oliver Soil Conservation District will also work towards achieving our programmatic goal of promoting grazing best management practices to reduce the amount of nutrients, e. coli, and sediment entering the Square Butte Creek. These grassland BMPs include prescribed grazing, exclusion fencing, and alternative watering systems. This goal will also include educating the public about project success stories and general water quality benefits of the 319 programs. The project's programmatic objectives include newsletters, field days, youth education, and producer educational programs.

Given the ambitious TMDL (total maximum daily load) target goals, this project has a long-term view of the overall project and understanding that these goals will take multiple phases of watershed projects. Over the long term of educating, implementing, and promoting the water quality management practices the OSCD will help landowners adopt water quality management practices that reduce E. Coli Bacteria, sediment, and nutrient loads from land within the project area.

In summary, the overall objectives would be: 1). provide educational, technical, and financial resources to landowners to help with conservation plans for landowners and implement best management practices on the land, 2). Increase public awareness of the causes, effects, and solutions to NPS pollution.

Objectives, Tasks, Product, Costs

Objective 1: *Install BMPS to reduce pollutants.* - The project's overall environmental goal is to restore the water quality by reducing the non-point source pollutants from agriculture entering the Square Butte Creek. The project will benefit recreational uses and aquatic life in the Square Butte Creek Watershed. The project goals will be accomplished by reducing E. coli bacteria, Total Nitrogen, Total Phosphorus, and Total Suspended Solids.

- Task 1: Employ one full time watershed coordinator
    - Product: Project coordinator to manage day-to-day project activities; provide technical assistance to landowners/producers; organize and conduct informational and educational events; and coordinate with NRCS Field office staff, Extension Service, and other resource management entities to promote and install BMP
    - Cost: $375,300
- Task 2: Improve vegetative conditions along riparian corridors
    - Product: Provide technical and financial support to landowners to install practices on cropland and grasslands within the watershed. In instances where the land intersects directly with the creek buffer practices will be utilized to trap the pollutants before they enter the creek. On grassland acres promoted practices will include cross fencing, prescribed grazing, and water development. Cropland practices will be limited to cover crop and nutrient management in tandem and conversion of marginal cropland to hay land or pasture plantings.
    - Cost: $351,950

Objective 2: *Secure additional cost share opportunities for Square Butte Creek Watershed producers to improve water quality and riparian areas.*

- Task 1: Coordinate with organizations/agencies, such as NRCS, FSA, NDSU Extension, Ducks Unlimited, Pheasants Forever, and Audubon Dakota to find additional technical and financial resources to implement BMPs
    - Product: Included in Objective 1
    - Cost: Included Objective 1- Task 1

Objective 3: Increase Landowner awareness of the problems and solutions to NPS pollution.

- Task 1: Prepare newsletter articles and direct mailings to local land users, public and media to promote projects and disseminate information on water.

    - Products - Minimum of 12 newsletters, 5 press releases, and 5 direct mailings.
    - Cost – $10,000

- Task 2: Hold educational workshops that highlight BMPs that include partners from other conservation organizations.

    - Products - Two educational opportunities that focus on BMPs with presenters from partner organizations and paid experts in the conservation field.
    - Cost – $10,000

    - Products – Coordinate with organizations/agencies, such as NDSU Extension Service and NRCS to conduct four field days addressing manure management, soil health, soil salinity, range management, cover crops, and/or riparian management.
    - Cost – $5,000

Permits

All necessary permits, specified in the NPS BMP guidelines, will be acquired. These may include CWA section 404/401 certifications, cultural resource reviews, county/township zoning approvals, etc. Cultural Resource concerns and issues will be addressed by consulting with the North Dakota State Historical Preservation Officer or approved third party archeological consultant.

Appropriateness of the Lead Sponsors

The Oliver Soil Conservation District is the appropriate entity to coordinate and implement this project. The SCD is a locally elected volunteer conservation organization that serves all the people in the district. They are able to employ the necessary personnel to carry out the project, as well as manage the funds involved.

Operation and Maintenance

The Oliver Soil Conservation District will be responsible for auditing Operation & Maintenance Agreements (O&M) on BMPs after completion through yearly status reviews of EPA-319 contracts. The lifespan of each BMP will be listed in the individual contracts to ensure longevity of the practices. The producer signs the "EPA 319 Funding Agreement Provisions" form which explains in detail the consequences of destroying a BMP before the completion of its lifespan.

Identify Agency Roles

This project is sponsored by the Oliver Soil Conservation District (OSCD). The project partners will be Natural Resources Conservation Service, ND Department of Environmental Quality, Farm Service Agency, Oliver County Water Resource Board, and NDSU County Extension Service. Additional project outreach partners will include Ducks Unlimited, North Dakota Grazing Lands Coalition, North Dakota Natural Resources Trust, Pheasants Forever, and North Dakota Game and Fish.

1. Oliver Soil Conservation

Oliver Soil Conservation District (OSCD) – The lead project sponsor is the OSCD. The North Dakota Department of Environmental Quality will hold a contract with the district. Land use assessment, BMP implementation project administration, computer entry, landowner contacts, water sampling, and water quality education will be the responsibility of the district.

2. 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 BMPs. NRCS personnel will conduct quality review and compliance checks of BMPs that are designed by NRCS personnel. Standards and Specifications for approved BMPs will be provided by local NRCS personnel from the NRCS Technical Guide. Environment Quality Incentive Program funds will also be available in limited amounts. (NRCS will aid by facilitating local involvement and participating in educational outreach programs during the project period.) An annual review will be conducted with the NRCS District Conservationist and the SCD to reconfirm and acknowledge NRCS's ability to commit to the project. A letter of support is pending due to the government shutdown.

3. ND Department of Environmental Quality (NDDEQ)

The NDDEQ 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 NDDEQ will provide the sponsor oversight to ensure proper management and expenditures of Section 319 funds. They will assist NRCS and the Oliver SCD personnel in reviewing O&M requirements for Section 319 funded BMPs.

4. USDA Farm Service Agency (FSA)

Programs available through FSA will be pursued for cost share assistance. **Letter of support submitted.**

5. Oliver County Water Resources Board

Oliver County Water Resource Board will be involved in the project by acting as advisors. The Oliver County Water Resource Board will have the ability to contribute technical and financial assistance and promote the project in Oliver County. **Letter of support submitted**.

6. NPS BMP Team

Engineering and technical assistance is available and will be pursued for project assistance when appropriate.

7. NDSU Cooperative Extension Service

To complement the project's information and education activities, local and state Extension personnel will contribute in-kind assistance. This will entail workshops and field tours. The specific role will be dependent on the type of information/education activity being implemented and availability of staff and materials. **Letter of support submitted.**

8. North Dakota Game and Fish

Programs and technical assistance are available and will be pursued for project assistance when appropriate.

9. ND Natural Resources Trust

Programs and technical assistance are available and will be pursued for project assistance when appropriate.

10. Pheasants Forever

Programs and technical assistance are available and will be pursued for project assistance when appropriate.

11. ND Grazing Lands Coalition

Technical assistance is available and will be pursued for project assistance when appropriate.

Local Support

The Oliver Soil Conservation District plans to devote portions of their newsletter to the Square Butte Creek watershed project. The page will include updates about potential opportunities, project successes, and surveys. These communications and tools will help build relationships with landowners in the project area to help aid in BMP adoption. As previously mentioned, educational and informational meetings will be conducted to keep the public informed. The OSCD's website will be updated on a regular basis with any pertinent information. OSCD also maintains a Facebook account which will be utilized to disperse information regarding the program. The project will make use of advertisements in local newspapers to spread word of the project and host informational meetings to recruit interested parties.

See Appendix C - letters of Support.

Other Watershed Projects

No other 319 watershed projects have been conducted in the Square Butte Creek Project Area.

Evaluation and Monitoring Plan

The sampling and analysis plan (SAP) for the project will be finalized by the NDDEQ after the Project Implementation Plan (PIP) is approved. An approved SAP will be included in the final project implementation plan.

Budget

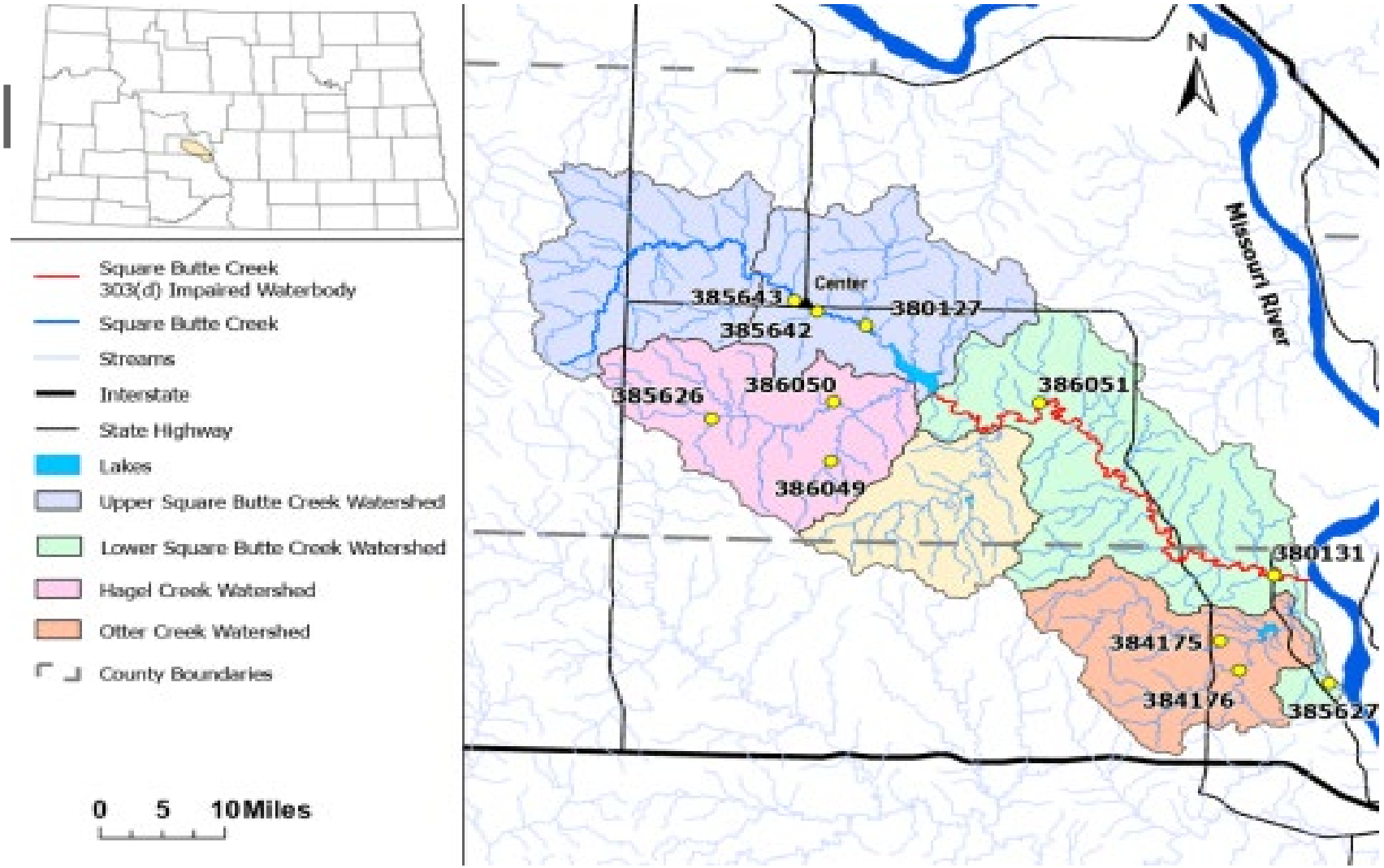
See Appendix B

Part 1 – Budget Sources, Part II – 319 Detailed (Federal / Non-Federal), and Supplemental BMP Budget Table

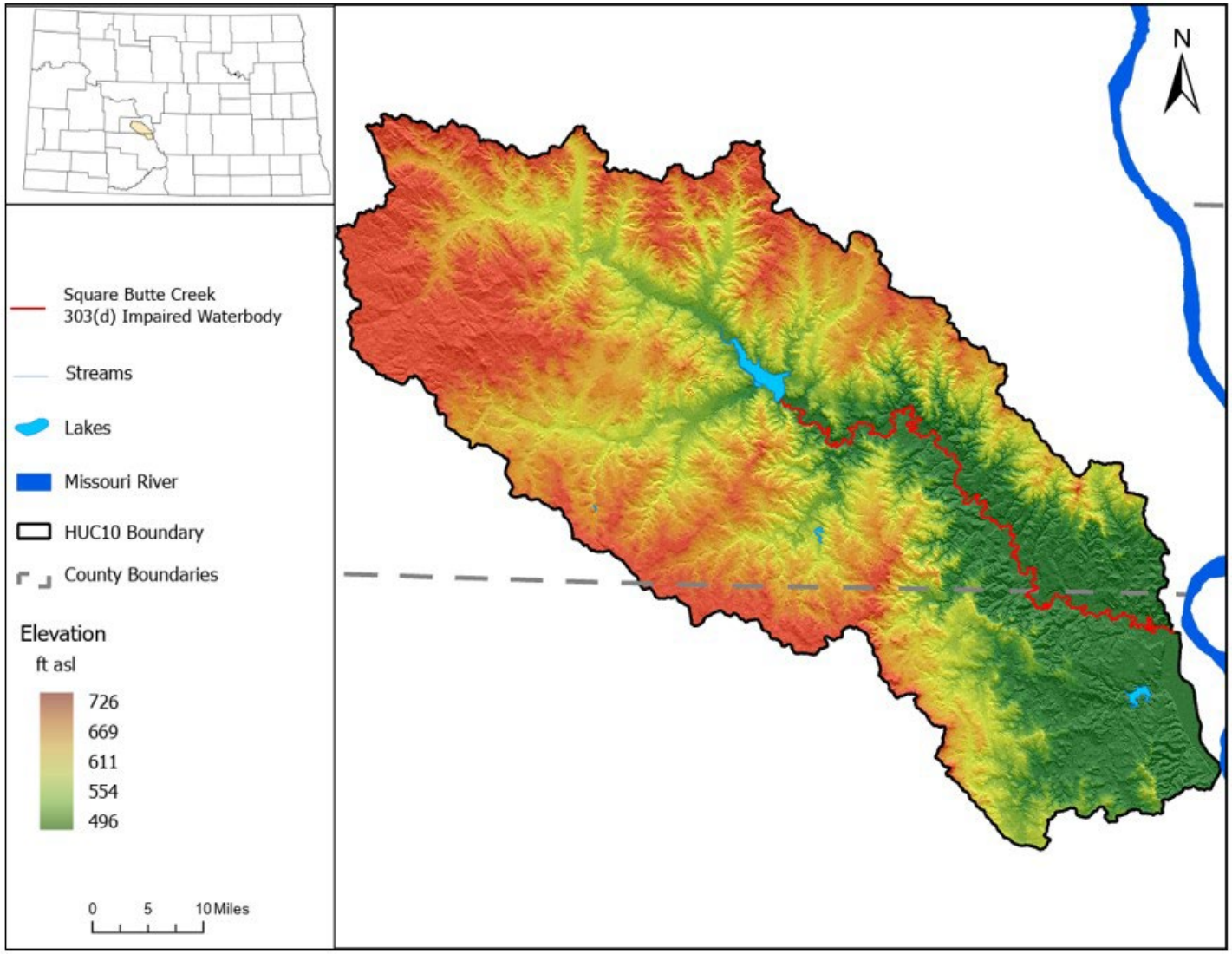
Appendix A

Watershed Area Maps

Sub watersheds making up Square Butte Creek Watershed and sampling locations in Oliver and Morton Counties

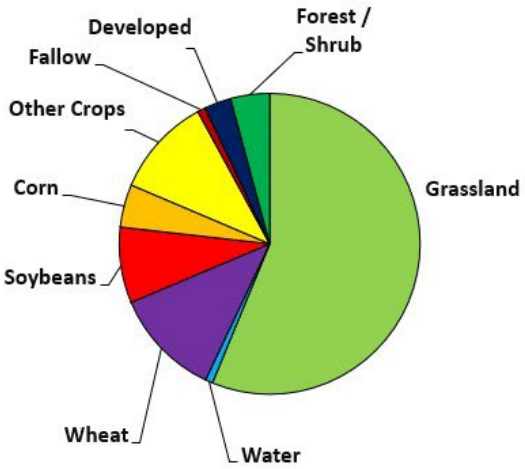


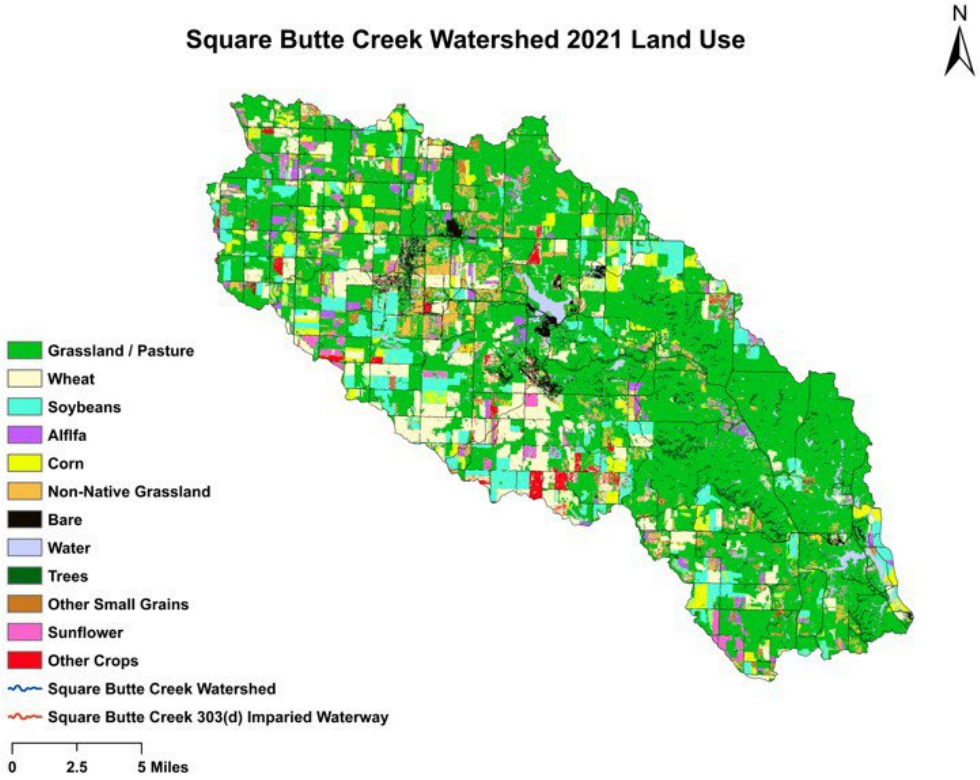
Elevation of Square Butte Creek Watershed



Land use in Square Butte Creek Watershed

Land Use





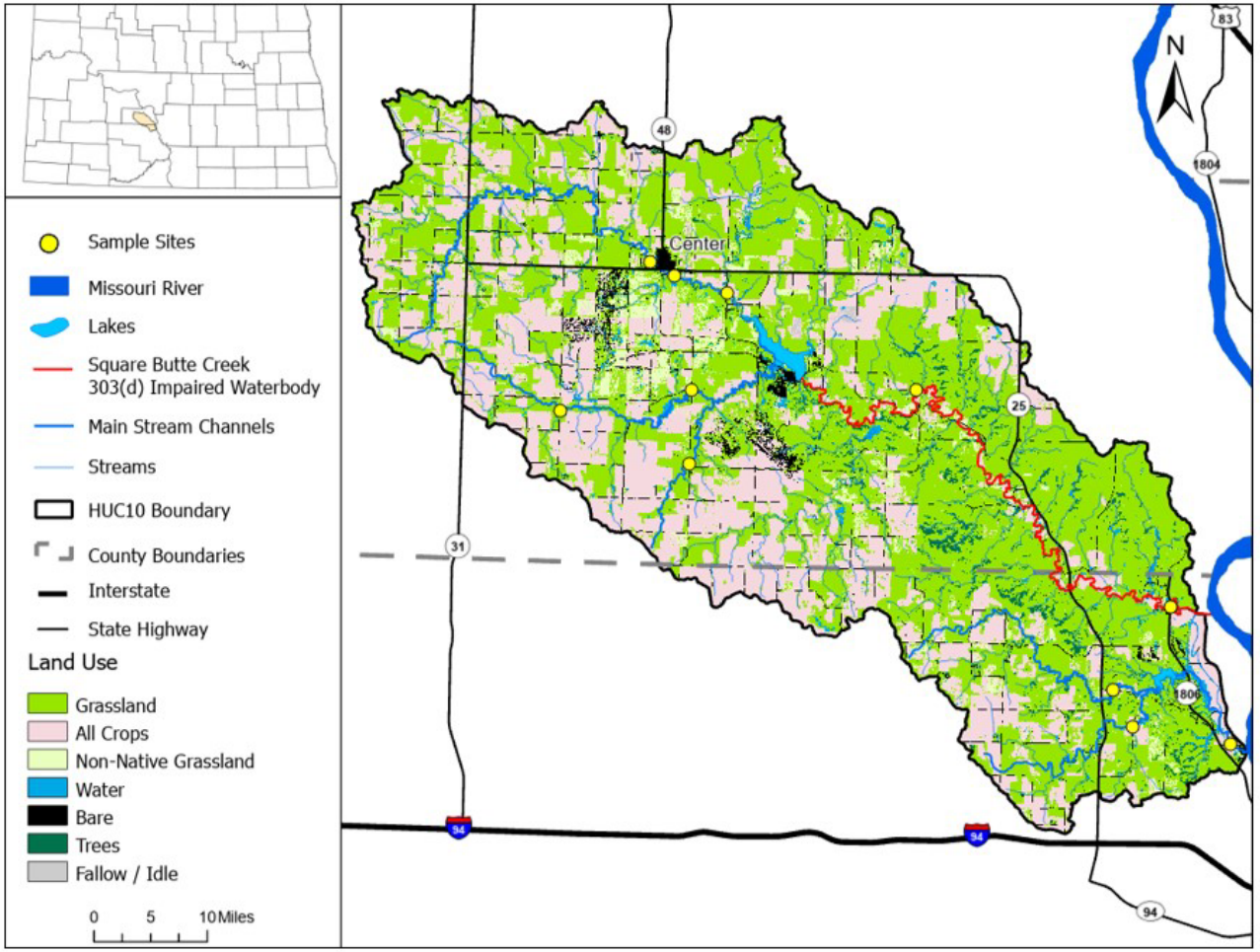


Figure 8. 2022 land use in the Square Butte Creek watershed (NASS 2022 Data)

Appendix B

Budget & Milestones

1. Budget Sources
2. 319 Detailed (Federal / Non- Federal)
3. Supplemental BMP Budget Table

Part 1.: Funding Sources						
	2026	2027	2028	2029	2030	Total
EPA SECTION 319 FUNDS						
1)FY26 Funds (FA)	$45,600	$95,040	$95,970	$106,320	$104,820	$447,750
OTHER FEDERAL FUNDS						
1) Natural Resource Conservation Service (TA, EQIP, CSP, OTHER PROGRAMS)	$125,000	$125,000	$125,000	$125,000	$125,000	$625,000
2) Farm Service Agency (TA, CRP)	$5,000	$5,000	$5,000	$5,000	$5,000	$25,000
Subtotals	$130,000	$130,000	$130,000	$130,000	$130,000	$650,000
TOTAL FEDERAL BUDGET						
	$175,600	$225,040	$225,970	$236,320	$234,820	$1,097,750
STATE/LOCAL MATCH						
1) Oliver SCD (TA & FA)	$17,600	$35,080	$32,680	$36,680	$35,680	$157,720
2) Landowners (FA)	$12,800	$28,280	$31,300	$33,200	$34,200	$139,780
4) NDSU Extension Service (TA)	$750	$750	$750	$750	$750	$3,750
5) Oliver County Water Resource District (FA)	$8,000	$8,000	$8,000	$8,000	$8,000	$40,000
Subtotals	$39150	$72110	$68,942	$74,630	$78630	$319,050
TOTAL BUDGET	$214,750	$297,150	$293,730	$310,950	$313,450	$1,430,030

FA: Financial Assistance
TA: Technical Assistance
SCD: Soil Conservation District
EQIP: Environmental Quality Incentive Programs
CRP: Conservation Reserve Programs
CSP: Conservation Stewardship Program
NDSU: North Dakota State University

Part 2.: 319 Detailed (Federal / Non-Federal)									
	2026	2027	2028	2029	2030	Total	Cash	In Kind	319 Funds
Objective 1: BMP Implementation									
Task 1 - Hire Full Time Watershed Coordinator									
1)Salary - FICA & Benefits	$35,000	$70,000	$72,000	$74,,000	$76,500	$327,500	$131,000		$196,500
2) Administration	$1,500	$3,000	$3,000	$3,000	$3,000	$13,500	$5,400		$8,100
2)Travel / Training	$2,000	$2,000	$2,000	$2,000	$2,000	$10000	$4000		$6,000
3)Telephone	$500	$500	$500	$500	$500	$2500	$1000		$1,500
4)Equipment / Supplies	$2,000	$1,200	$1,200	$1,200	$1,200	$6800	$2,720		$4,080
5) Sample and Transport	$3,000	$3,000	$3,000	$3,000	$3,000	$15000	$6000		$9,000
Task 2 - Improve vegetative conditions along riparian corridors									
1)Grassland Mgmt Systems	$32,000	$65,000	$65,000	$65,000	$65,000	$292,000	$116,800		$175,200
2)Cropland Mgmt Systems.	$0	$5,700	$12,550	$19,500	$19,500	$57,250	$22,900		$34,350
3)Buffers	$0	$0	$700	$1,000	$1,000	$2,7000	$1,080		$1,620
4)Prescribed Grazing (InKind)	$0					$0	$0		$0
Objective 2: Provide Landowner with additional sources of technical and financial support									
1) Additional funding		$0	$0	$0	$0	$0	$0		$0
Objective 3: Landowner and Community Education									
Task 1 - Newsletters									
1)Newsletter / Mailings	$2,000	$2000	$2,000	$2,000	$2,000	$10,000	$4,000		$6,000
Task 2 - Educational Workshops									
1)Workshop	$0	$5,000	$0	$5,000	$0	$10,000	$4,000		$6,000
Task 3 - Producer Outreach									
Field Days & Producer Meetings	$1,000	$1,000	$1,000	$1,000	$1,000	$5,000	$2,000		$3,000
TOTAL BUDGET									
	$79,000	$158,400	$162,950	$177,200	$174,700	$752,250	$300,900	$0	$451,350
319 Budget	$47,400	$95,040	$97,770	$106,320	$104,820	$451,350			
SCD Match	$18,800	$35,080	$33,880	$36,680	$35,680	160,120			
SCD Cost Share	$28,200	$52,620	$50,820	$55,020	$53,520	$240,120			
Producer BMP Match	$12,800	$28,280	$31,300	$34,200	$34,200	$140,780			
Total BMP Cost Share	$19,200	$42,420	$46,950	$51,300	$51,300	$211,170			

Supplemental Potential BMP Budget Table					
BMP Practice	Cost /Unit	Estimated Units	319 Cost	Producer Match	Total Cost
340 - Cover Crop	$35/ac.	300 ac.	$6,300	$4,200	$10,500
380 - Windbreak /Shelterbelt Establishment	$.50/100ft	10000 ft	$3,000	$2,000	$5,000
060 - Weed barrier	$.75	10000 ft	$4,500	$3,000	$7,500
516 – Pipelines	$5.50/ft.	20,000 ft	$66,000	$44,000	$11,000
391 - Riparian Forest Buffer	$350 /ac	40 ac	$8,400	$5,600	$14,000
516 - Pipeline	$5.50 / ft	20000 ft	$66,000	$44,000	$110,000
614 - Tank / Trough	$2,100/unit	10 tanks	$12,600	$8,400	$21,000
642 – Well	$12,000/well	5 wells	$36,000	$24,000	$60,000
382 – Fencing	$2.00/ft.	20,000 ft.	$24,000	$16,000	$40,000
001- Cultural Resources	$2000/ review	10 items	$12,000	$8,000	$20,000
550 - Range Planting	$40 / ac	50 ac.	$1,200	$800	$2,000
512 - Pasture & Hayland Planting	$55/ac.	200 ac.	$6,600	$4,400	$11,000
390 - Riparian Herbaceous Cover	$135a/ac.	10 ac.	$810	$540	$1,350
393 - Filter Strip	$135/ac.	10 ac.	$810	$540	$1,350
528 - Prescribed Grazing	$5.00/ac		$0	$0	$0
472 - Access Control / Use Exclusion (Livestock Only)	$25.00/ac	10 ac.	$1,500	$1,000	$2,500
590 - Nutrient Management	$27/ac.	1250 ac.	$20,250	$13,500	$33,750
Buffers			$1,620	$1,080	$2,700
Grasslands Total			$175,200	$116,800	$292,000
Cropland Total			$34,350	$22,900	$57,250
Total			$211,170	$121,440	351,950

Appendix C

Letters of Support & Water Quality Data

1. Letters of Support
2. Water Quality Summary

USDA

United States Department of Agriculture

October 23, 2025

Jerimiah D. Hanson, Conservation District Manager
Oliver County Soil Conservation District
304 Lignite Ave S / PO Box 87
Center, ND 58530

Dear Mr. Hanson,

The Oliver County Farm Service Agency is pleased to provide a letter of support for the Square Butte Creek Watershed project. This 319 watershed project will be instrumental in addressing water quality needs and concerns across Oliver County.

Present and past 319 watershed projects have increased conservation practices on the ground across the county. They have also been a useful tool for education and outreach activities to engage producers and landowners.

We look forward to collaborating with you in the future, as you assess needs and assist landowners in this area.

Sincerely,

Kale Rorvik
Oliver County
County Executive Director

OLIVER COUNTY WATER RESOURCE DISTRICT
PO Box 1231
Center ND 58530

Mike Tietz - Chairman
Linda Price – Board Member
AJ Bohm – Board Member

Lauren Eggers
Secretary/Treasurer
yourtaxservicesllc@gmail.com
Telephone: (701)-471-1996

November 10, 2025

Jerimiah D. Hanson, Conservation District Manager
Oliver County Soil Conservation District
PO Box 87
Center ND 58530

To Whom It May Concern:

The Oliver County Water Resource District is proud to provide a letter of support for the Square Butte Creek Watershed project. The 319 watershed project will be fundamental in addressing water quality needs and issues across Oliver County.

We look forward to collaborating with you in the future as you assess needs and assist landowners in this area.

Sincerely,

Mike Tietz
Chairman
Oliver County Water Resource District

NDSU | EXTENSION SERVICE
OLIVER COUNTY

November 6, 2025

To: Oliver County Soil Conservation District

Fm: Rick Schmidt – NDSU Extension Agent – Oliver County

Re: Square Butte Creek Watershed – Letter of Support

Dear committee;

Earths most essential element for people, plants and animals is water. As the NDSU Extension Agent, I have conducted many water samples to determine nutrient content for home owners, land owners and livestock producers. There is a lot of variability in quality throughout the county. The Square Butte Creek Watershed is no different.

The Square Butte Creek is very narrow with steep banks in many areas. It has many crop fields that are adjacent to its banks which causes a high risk of erosion, sediment deposit and chemical drift. The Square Butte Creek has some additional dynamics with the upper Square Butte Creek as it feeds into Nelson Lake, while the discharge into lower Square Butte Creek is somewhat regulated by release from Nelson Lake.

Management of the property in this watershed is important to improve the water quality for all involved including farmers, ranchers, and recreation who all need to have high quality water.

This project is very important to the residents of the Square Butte Creek Watershed. I am in full support of funding for management to improve its quality.

Sincerely;

Rick Schmidt

Rick Schmidt

Oliver County Extension Agent

North Dakota State University
NDSU EXTENSION SERVICE | OLIVER COUNTY
Courthouse | 115 Main St | PO Box Box 166 | Center ND 58530 | 701.794.8748 | Fax 701.794.3476
NDSU.Oliver.Extension@ndsu.edu | www.ag.ndsu.edu/olivercountyextension | www.ndsu.edu/extension

OLIVER COUNTY

Courthouse -115 W Main-PO Box 188
Center, North Dakota 58530-0188
Office: 701-794-8721

November 10, 2025

Jerimiah D. Hanson, Conservation District Manager
Oliver County Soil Conservation District
304 Lignite Ave S – PO Box 87
Center, ND 58530

Dear Mr. Hanson,

The Oliver County Commission is pleased to provide a letter of support for the Square Butte Creek Watershed project. The project will be instrumental in addressing water quality needs and concerns across the County.

We look forward to hearing about the progress of the project and assisting in any way we are able.

Sincerely,

/s/ Oliver County Commission
Oliver County, ND

Square Butte Creek Watershed Assessment Project

2023-2024 Water Quality Summary

Prepared by:

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Prepared for:

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PURPOSE

This water quality summary was developed for the Oliver County Soil Conservation District (SCD) to support the Square Butte Creek Watershed Assessment Project – (RNASQBCR). The goal is to acquire baseline water quality data that can better direct Best Management Practices (BMP) in future implementation phases. These BMP's will be effective at reducing concentrations of nutrients (phosphorus and nitrogen), total suspended solids (TSS) and *E. coli* bacteria including critical area treatment, nutrient management, cover crops, sediment basins, prescribed grazing, and fencing. The following provides an overview and analysis of the water quality data collected (2023-2024) and future monitoring planning for the project. Data from the 2025 season was not available to incorporate into this summary.

LOCATION

Water quality sampling took place at three sites in the Hagel Creek watershed, 3 sites in the Otter Creek watershed, 3 sites in the Upper Square Butte Creek watershed (above Nelson Dam), and 2 sites in the Lower Square Butte Creek watershed (below Nelson Dam).

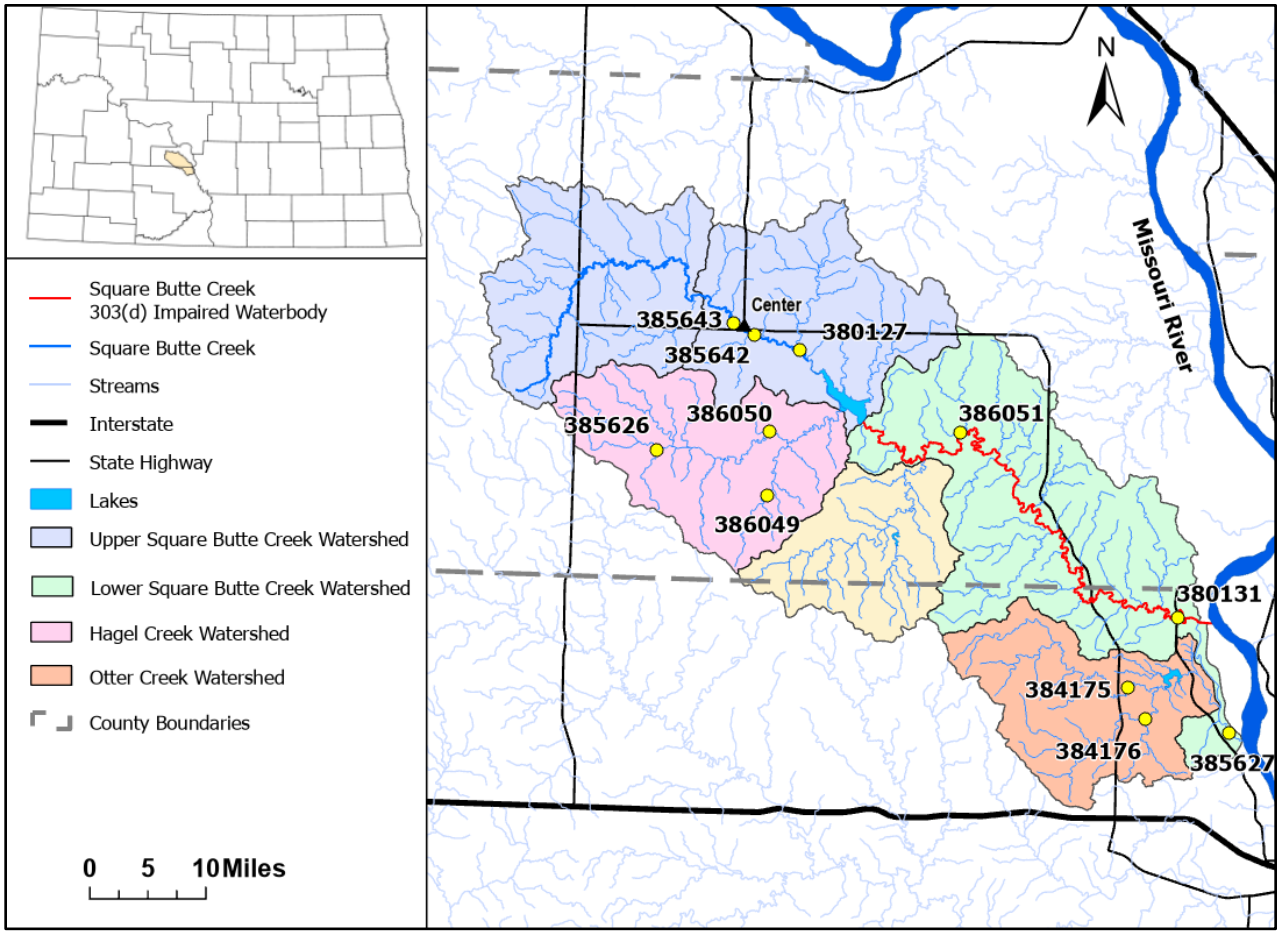


Figure 1: RNASQBCR project area and sampling locations.

SAMPLING OVERVIEW

To determine impacts to recreation and aquatic life in streams, water quality samples were collected by the SCD and analyzed for *Escherichia coli* bacteria (*E. coli*), TSS, and nutrients complete, which included Total Phosphorus and Total Nitrogen. Note: only *Escherichia coli* bacteria (E. coli) samples were taken in the 2023 field season.

Each water body in the state is assigned a unique ID to track water quality status. Waterbodies in this project area were largely unassessed, however Square Butte Creek below Nelson Dam to its confluence with the Missouri River (ND-10130101-009-S_00) was deemed ***Not Supporting*** for recreation in a previous TMDL. More information on waterbody assessment ca be found in the North Dakota Integrated Report issued every two years.

(https://deq.nd.gov/WQ/3_Watershed_Mgmt/2_TMDLs/TMDLs_IR.aspx).

WATER QUALITY STANDARDS

Recreation and aquatic life uses are assessed based on North Dakota surface water quality standards. The following sections list the numeric standards used to determine water quality conditions and project progress. The state also has narrative water quality standards describing conditions needed to support uses, such as “All waters of the state shall be free from nutrients attributed to municipal, industrial, or other discharges or agricultural practices, in concentrations or loadings which will cause accelerated eutrophication…to the extent that it threatens public health or welfare or impairs present or future beneficial uses.”

Complete water quality standards can be found at:
https://ndlegis.gov/information/acdata/pdf/33.1-16-02.1.pdf.

Recreation

Recreation use is assessed based, in part, on the amount of *Escherichia coli (E. coli)* bacteria in a river or stream.

E. coli Bacteria

Monthly geometric mean ≤ **126 CFU/100mL** (CFU = colony forming units)
AND
≤ 10% monthly samples exceed 409 CFU/100mL

Aquatic Life

Aquatic life use is assessed based, in part, on the amount of sediment and nutrients in a river or stream and its biological integrity.

Total Suspended Solids (TSS)

North Dakota does not currently have numeric water quality standards for TSS. Similar stream projects in the Lower Missouri River Basin have used a guideline target of **≤ 85 mg/L.**

Total Phosphorus (TP)

North Dakota does not currently have numeric water quality standards for total phosphorus. Similar stream projects in the Lower Missouri River Basin have used a guideline target of **≤ 0.1 mg/L.**

Total Nitrogen (TN)

North Dakota does not currently have numeric water quality standards for total nitrogen. Similar stream projects in the Lower Missouri River Basin have used a guideline target of **≤ 2.5 mg/L.**

RESULTS

Between May 2023 and October 2024 water quality samples were collected and analyzed for this project. 2025 data was not available at the time of this report and may shift overall results described below. Sites with insufficient data were added to the sampling schedule in 2024 and have no other datasets to compare against. The following sections summarize results for each sampling site. A complete set of water quality data can be found at: https://deq.nd.gov/WQ/3_Watershed_Mgmt/SWDataApp/viewer/index.html.

Stream Results

E. coli Bacteria

E. coli concentrations in rivers and streams can be highly variable. As a result, the state water quality standard is represented by a *monthly* geometric average (≤ 126 CFU/100mL). To compare the average to the state water quality standard a minimum of five samples should be used per month during the recreational season (May-Sept.). For the purposes of this summary all data was used to calculate and display monthly geomeans even if less than five samples were available. Sample sets were compared by month over the two-year period using a 10% benchmark for determining increase / decrease.

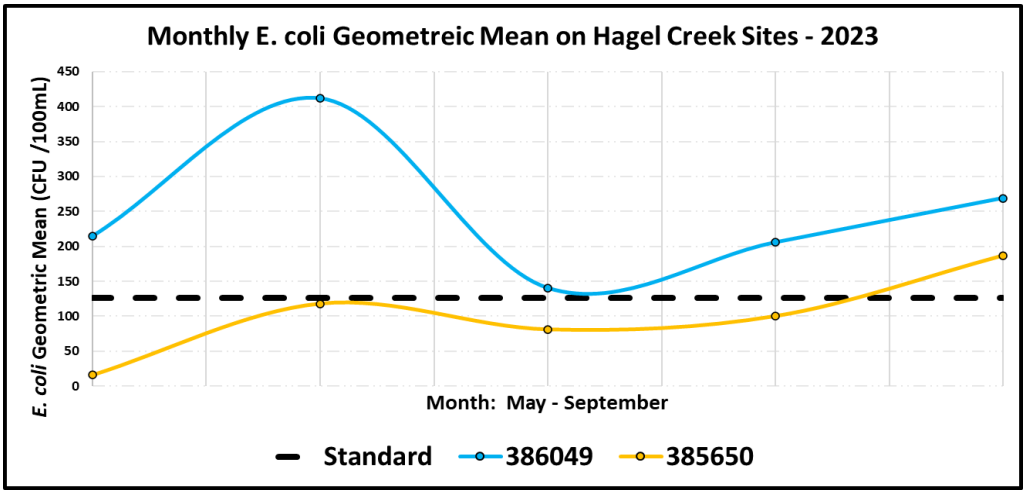
E. coli levels were highly variable across sites, with some watersheds (Otter Creek, Hagel Creek, and parts of Square Butte Creek) showing increases across some months, while others had decreases. Several sites had insufficient data, but most locations periodically exceeded the recreational standard of 126 CFU/100mL. (**Table 1**).

Table 1. Overall change in monthly *E. coli* geometric mean May 2023 – September 2024.

Site ID	Water Body	Overall Change*
380127	Square Butte Creek – Center 2 miles E and 0.5 miles S of Center	Increase
380131	Square Butte Creek 10 miles N of Hwy 94 on Hwy 1806, on bridge	Insufficient Data
384175	Otter Creek	Decrease
384176	Tributary to Otter Creek	Decrease
385626	Upper Hagel Creek	Insufficient Data
385627	Otter Creek 5 miles NW of Mandan, 5 miles N on Hwy 1806	Insufficient Data
385642	Square Butte Creek SE of center near baseball diamonds	Insufficient Data
385643	Square Butte Creek W side of Center, near storage building	Insufficient Data
386049	Unnamed Tributary to Hagel Creek	Increase
386050	Hagel Creek	Increase
386051	Square Butte Creek Downstream on Nelson Lake	Decrease

*Note: Once 2025 data is available this trend may change.

Figures 7 - 8. The monthly *E. coli* geometric mean for the Hagel Creek Watershed (2023 - 2024) during the recreation season compared to the state water quality standard (≤ 126 CFU/100mL)



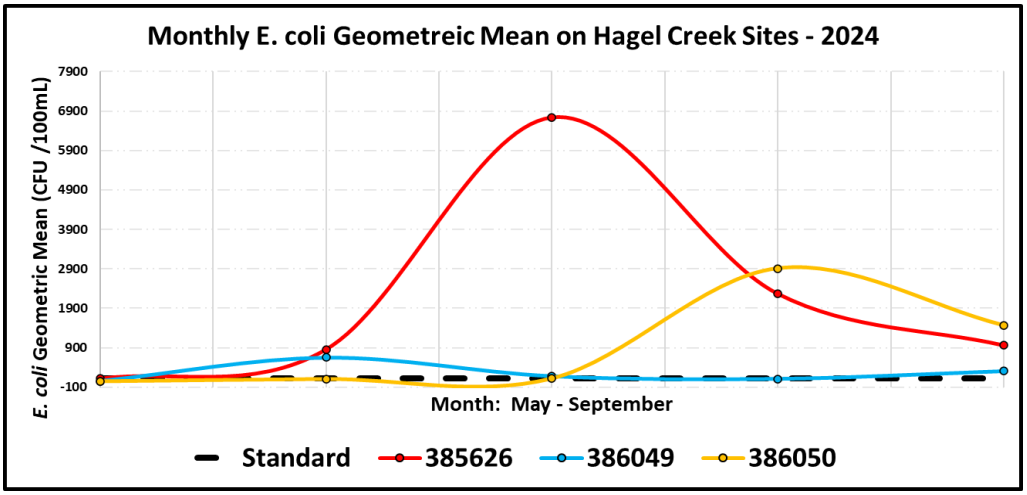
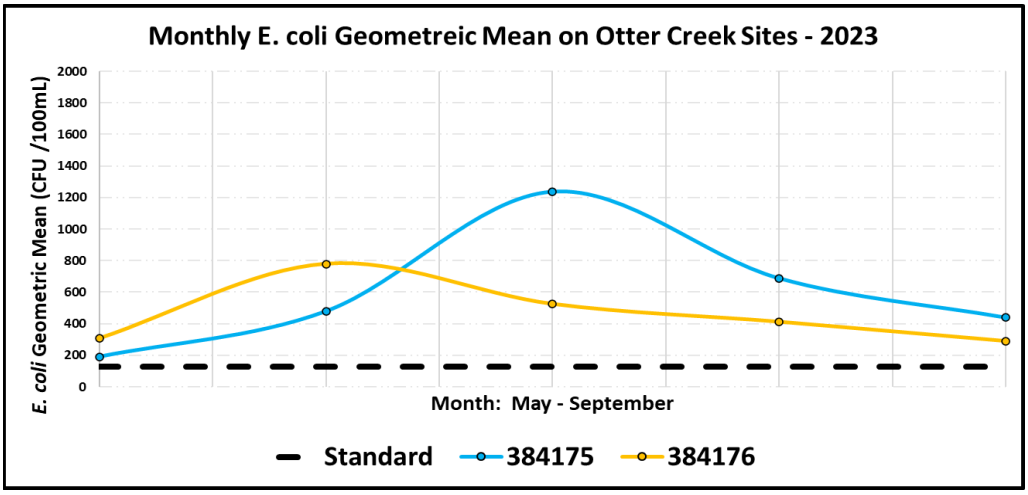
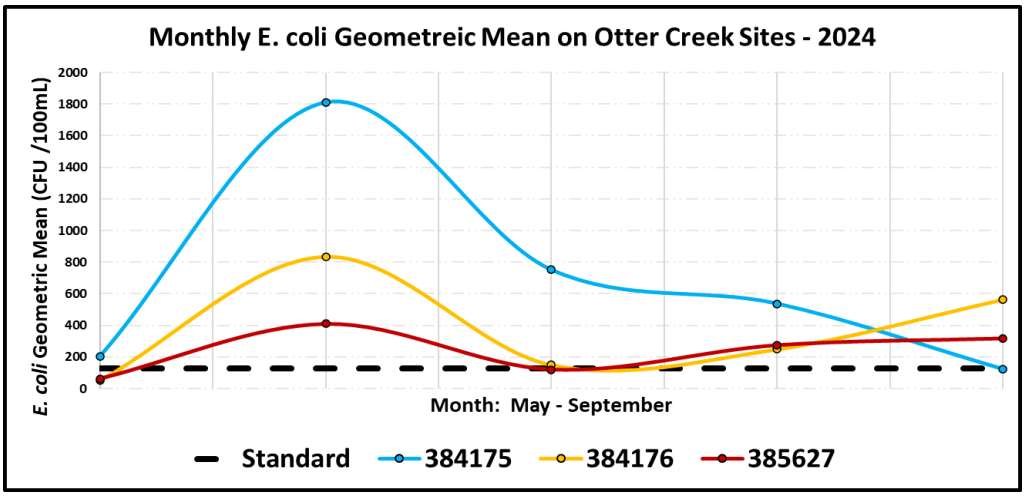
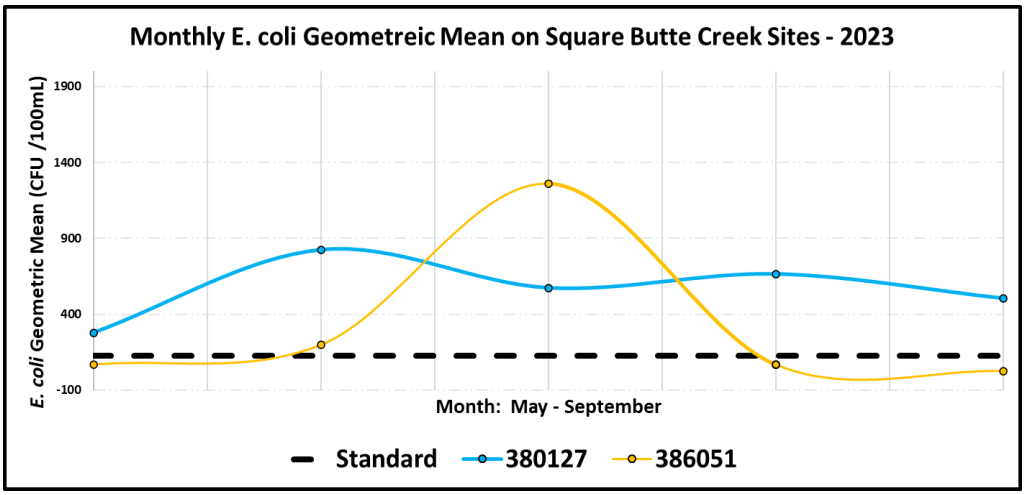


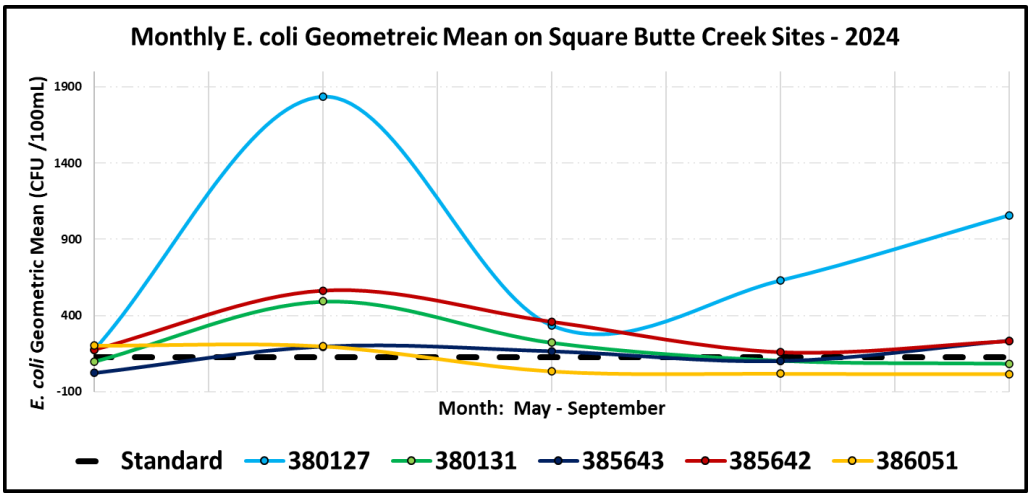
Figure 9 - 10. The monthly *E. coli* geometric mean for the Otter Creek Watershed (2023 - 2024) during the recreation season compared to the state water quality standard (≤ 126 CFU/100mL)





Figures 11 - 12. The monthly *E. coli* geometric mean for the Square Butte Creek Watershed (2023 - 2024) during the recreation season compared to the state water quality standard (≤ 126 CFU/100mL)





Total Suspended Solids (TSS)

Similar to *E. coli*, TSS concentrations in rivers and streams can be highly variable. TSS samples are collected from April-October. Note that reduced flow and limited datasets can affect analysis.

TSS results showed wide fluctuations by site, with some watersheds (particularly Hagel and Lower Square Butte) frequently above the guideline of 85 mg/L. Variability was influenced by stream flow characteristics, isolated runoff events, and limited datasets.

Figure 13 Average TSS ranges for each site in the Hagel Creek Watershed compared to the target in 2024 sample season

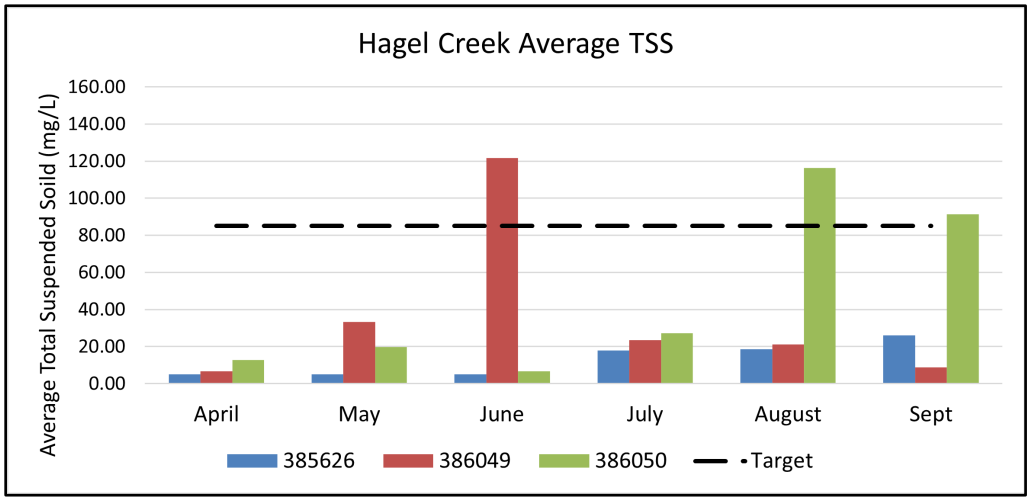


Figure 14 Average TSS ranges for each site in the Otter Creek Watershed compared to the target in 2024 sample season

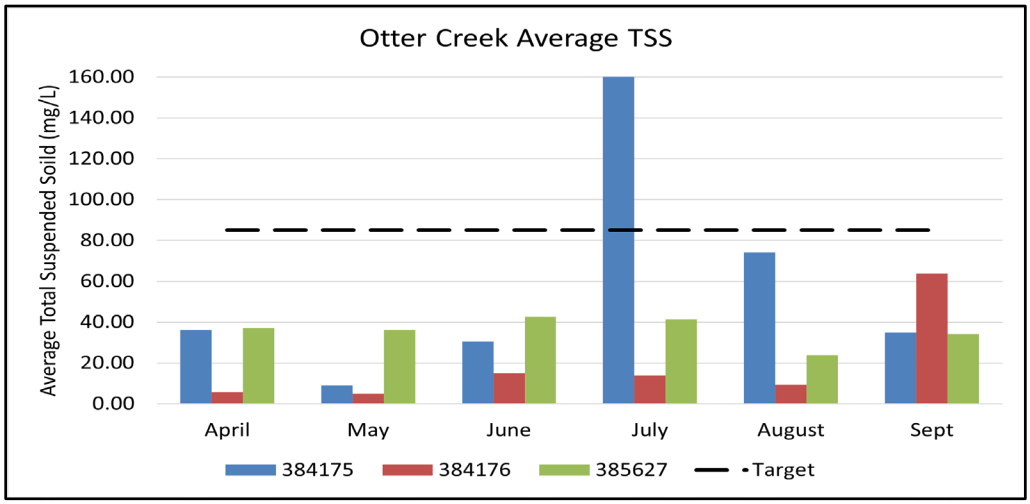


Figure 15 Average TSS ranges for each site in the Upper Square Butte Creek Watershed compared to the target in 2024 sample season

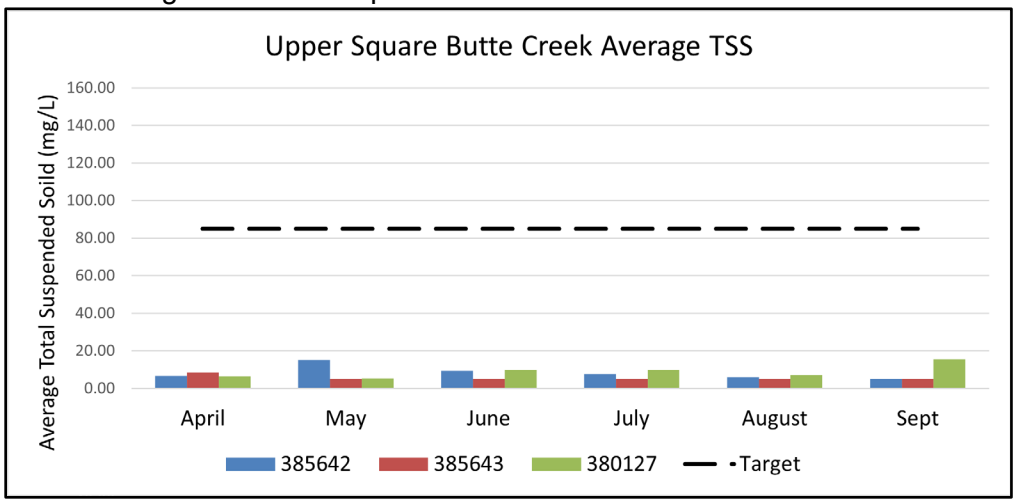
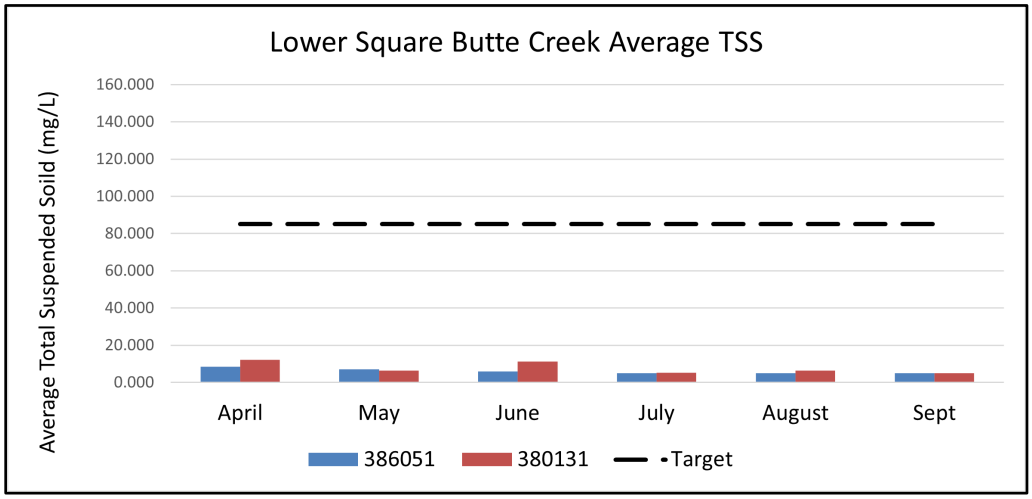


Figure 16 Average TSS ranges for each site in the Lower Square Butte Creek Watershed compared to the target in 2024 sample season.



Total Phosphorus (TP)

TP samples are collected from April-October. Nearly all monitored sites in every watershed exceeded the guideline target of 0.1 mg/L for phosphorus. Elevated phosphorus was consistent throughout the April–October sampling seasons.

Figure 17 Average TP ranges for each site compared to the target in the Hagel Creek Watershed.

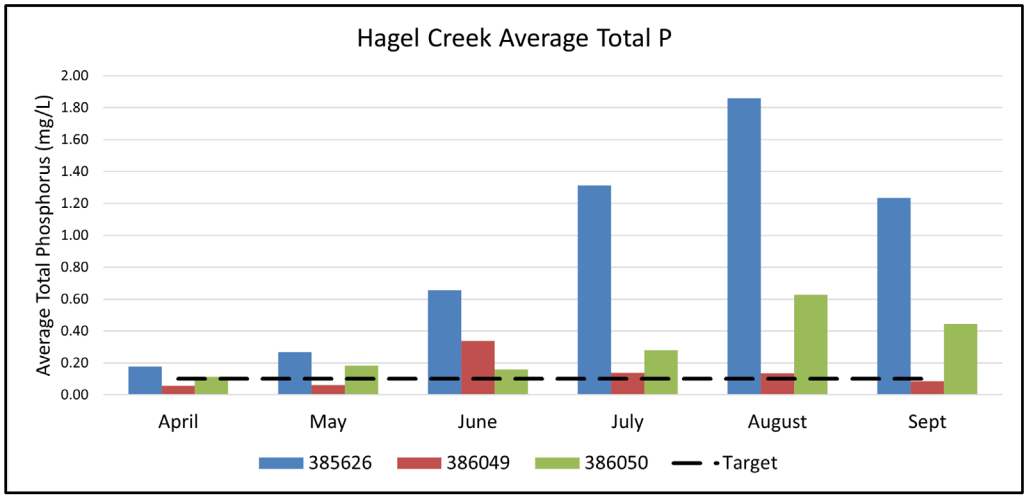


Figure 18 Average TP ranges for each site compared to the target in the Otter Creek Watershed

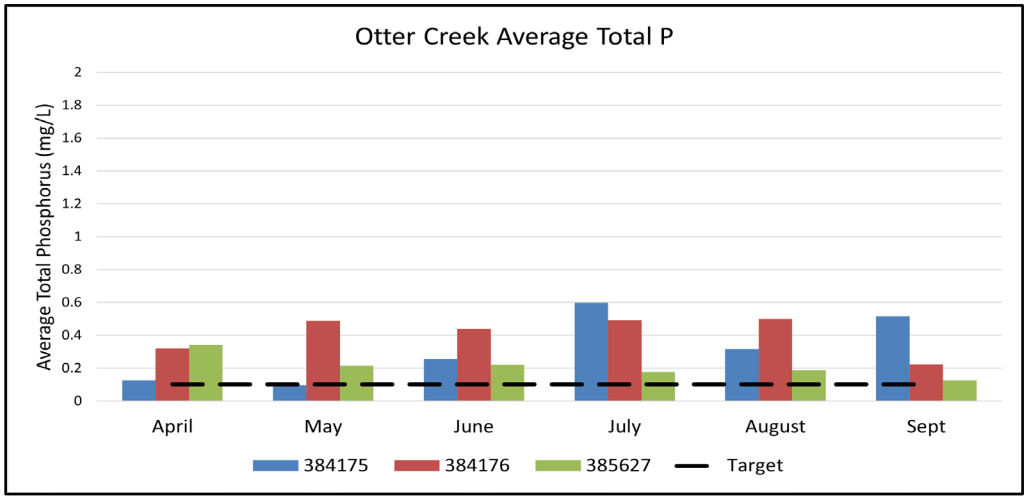


Figure 19 Average TP ranges for each site compared to the target in the Upper Square Butte Creek Watershed

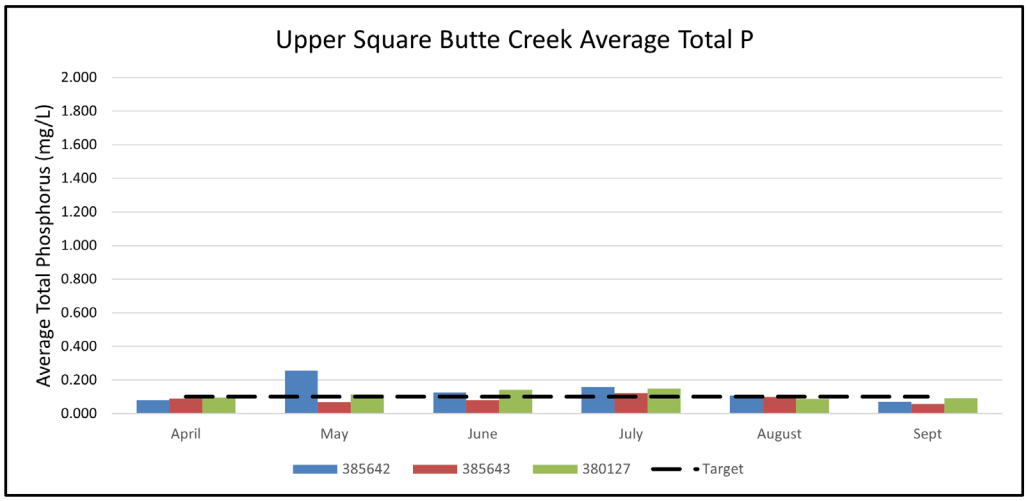
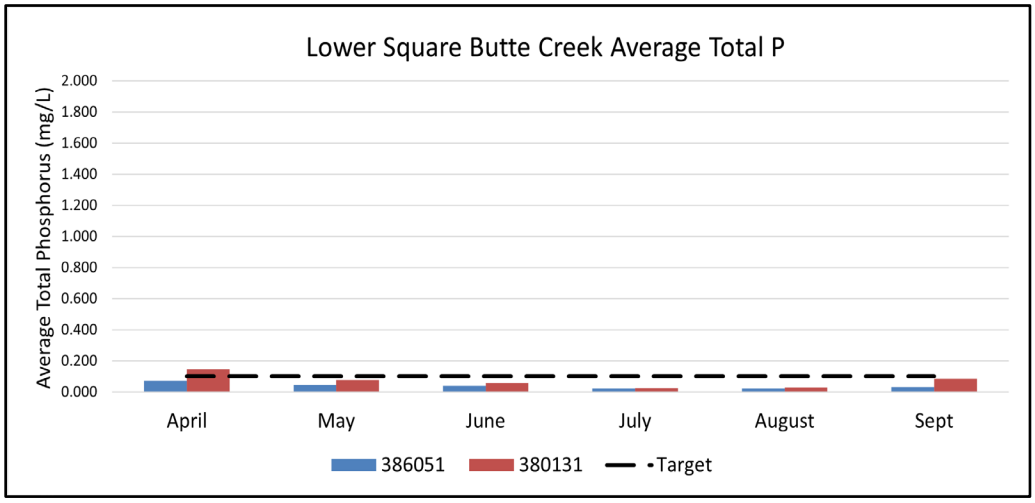


Figure 20 Average TP ranges for each site compared to the target in the Lower Square Butte Creek Watershed.



Total Nitrogen (TN)

TN samples are collected from April-October. Nitrogen concentrations rarely exceeded the 2.5 mg/L guideline at most sites across all watersheds. This indicates persistent nutrient enrichment during the sampling period was not present.

Figure 21 Average TN ranges for each site compared to the target in the Hagel Creek Watershed.

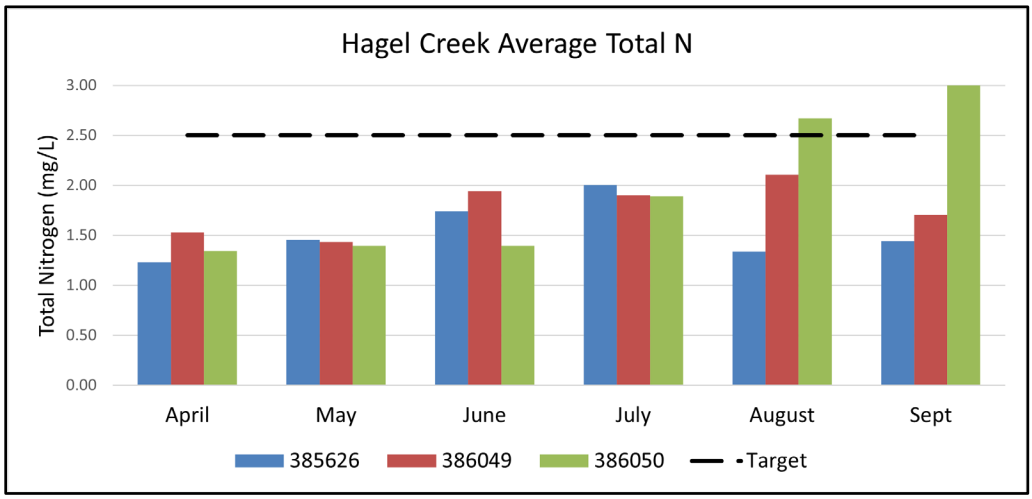


Figure 22 Average TN ranges for each site compared to the target in the Otter Creek Watershed.

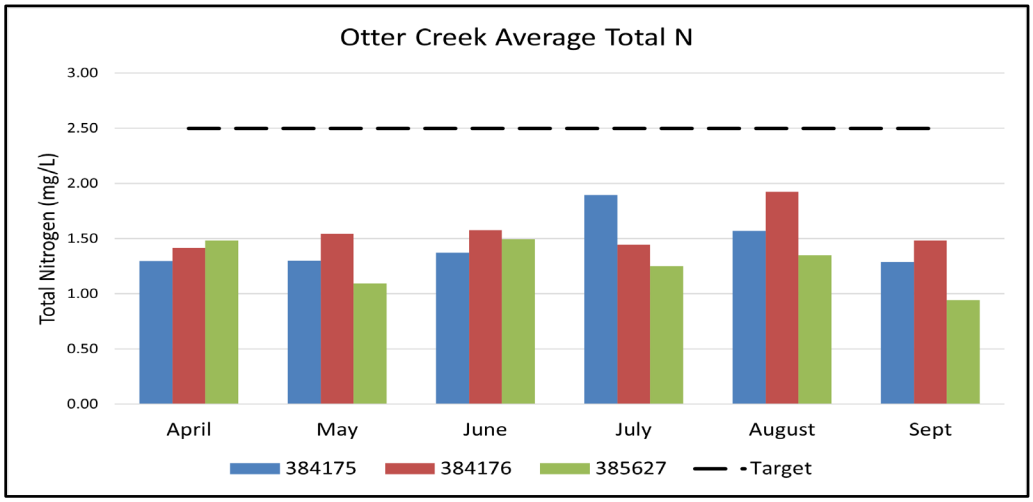


Figure 23 Average TN ranges for each site compared to the target in the Upper Square Butte Creek Watershed.

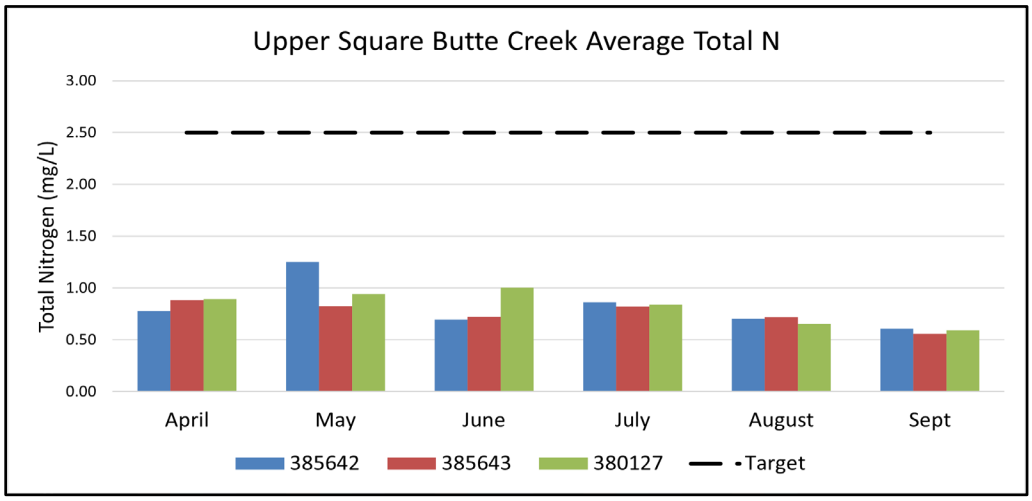
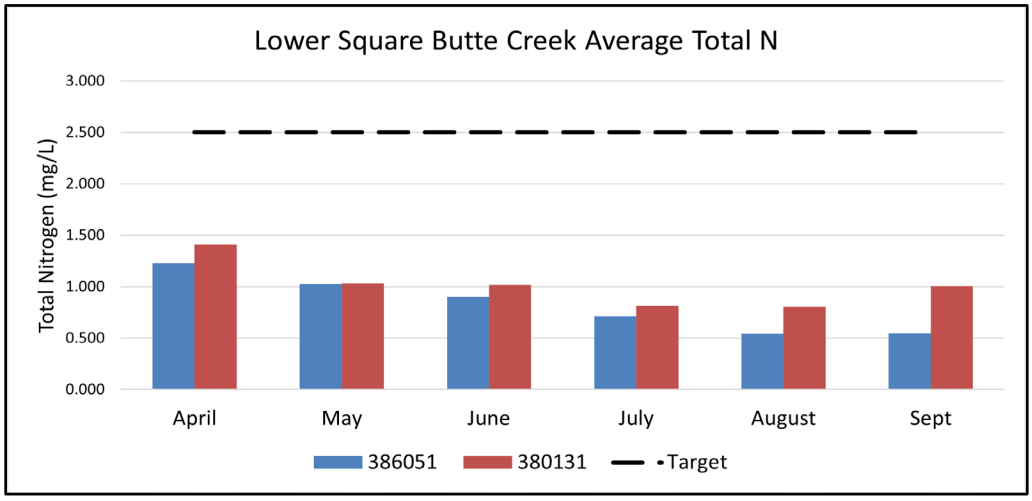


Figure 24 Average TN ranges for each site compared to the target in the Lower Square Butte Creek Watershed.



NEXT STEPS

The Square Butte Creek Assessment project stream sites exceeded state standards and/or project targets for *e. coli*, total suspended solids, and total phosphorus (TP) but did meet the state standards for total nitrogen (TN). This data gives strong evidence that BMP Implimnetation could help lower values in most watersheds. Application of the following BMPs may help reduce nutrient, bacteria, and sediment loading. BMPs are not limited to this list, however it gives a baseline of common techniques.

1. E. coli (Recreation Use Impairments)

- **Livestock Exclusion & Fencing:** Prevent direct livestock access to streams to reduce manure inputs.
- **Riparian Buffers:** Establish vegetated buffer strips along waterways to filter runoff and reduce bacterial and sediment transport.
- **Manure & Septic Management:** Improve manure handling and inspect/repair failing septic systems in rural areas.

2. Total Suspended Solids (TSS – Sediment Issues)

- **Cover Crops & Reduced Tillage:** Increase ground cover to reduce soil erosion and stabilize fields.
- **Sediment Basins & Grassed Waterways:** Capture and slow runoff before it enters streams.
- **Streambank Stabilization:** Use riparian vegetation, bioengineering, or rock structures to reduce erosion in high-risk areas.

3. Nutrients (Total Phosphorus & Nitrogen – Enrichment Issues)

- **Nutrient Management Planning:** Optimize fertilizer and manure application rates, timing, and placement to match crop needs.
- **Cover Crops & Extended Rotations:** Uptake of residual nutrients and reduce leaching losses.

4. Watershed-Scale Strategies

- **Target Critical Areas:** Use monitoring data to prioritize fields/stream reaches with highest pollutant loads – Hagel Creek and Otter Creek Subwatershed.
- **Education & Outreach:** Work with producers and landowners to highlight economic and soil health benefits of conservation.
- **Long-Term Monitoring:** Continue sampling to measure BMP effectiveness and adapt strategies as needed.