

# TURTLE RIVER WATERSHED- LARIMORE DAM

## 1.0 PROJECT SUMMARY SHEET

### Lead Project Sponsor:

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**State:** North Dakota **Watershed:** Turtle River  
**Hydrologic Unit Code:** 09020307  
**High Priority Watershed:** Yes

<u>Project Type</u>	<u>Waterbody Types</u>	<u>NPS Category</u>
Watershed	Lakes/Reservoirs Rivers Streams Wetlands	Agriculture

**Project Location: Latitude:** 47.9° N **Longitude:** 97.5° W

### Summarization of Major Goals:

The overall goal of the project is to advocate for and implement agricultural Best Management Practices to restore recreational activities of the Turtle River and Larimore Dam. This includes reducing nutrient loading, mainly phosphorous, into Larimore Dam by 25%. Best management practices will be those that reduce nutrient and sediment loading within the Turtle River Watershed near Larimore Dam. The secondary goal is to provide education and outreach to residents of Grand Forks County and provide demonstration sites that are known to reduce nutrient and sediment delivery to the Turtle River.

### Project Description:

The South Branch of the Turtle River Watershed is located in the upper portion of the Turtle River watershed. This project will implement systematic BMP's that will help reduce non-point

source pollution and restore Larimore Dam recreational activities. Education will be a large component of the project through workshops, tours, and demonstration sites.

The main objectives are:

- 1) Achieve a 25% reduction in total Phosphorous entering Larimore Dam and achieve a future Trophic State Index (TSI) score of 50.
- 2) Reduce the overall sediment loading at Larimore Dam.
- 3) Document water quality trends (i.e. reduction in sediment, phosphorus, and nitrogen) within the watershed using water sampling data.
- 4) Inform and Educate local producers on local land management practices which improve soil health and water quality.
- 5) Provide education using demonstration sites that apply practices known to reduce nutrients and improve water quality.

### **Funding:**

319 funds requested: \$251,268

Match: \$167,512

319 Funded Full Time Personnel: 1

Total Project Cost: \$418,780

## **2.0 Statement of Need**

The Grand Forks County Soil Conservation District (GFCSCD) has long recognized the natural, economic, and recreational value of the many water bodies in the county and will provide financial and technical assistance to develop, coordinate, and implement tasks to reduce the cumulative effects of nutrients (particularly phosphorus) on recreational uses of Larimore Dam and its watershed.

According to the 2018 List of Section 303(d) TMDL Waters for the Red River Basin (NDDEQ), the North Dakota Department of Environmental Quality identified several reaches within the Turtle River watershed as threatened for fish and other aquatic biota. The main stressors are nutrient loading and sediment/siltation.

Segments included in the project area include:

- Larimore Dam – Biota/Habitat and nutrient impairment (A TMDL was developed for the nutrient impairments impacting the recreational uses of Larimore Dam. Implementation of this nutrient TMDL will be the focus of this project)
- 18.24 miles segment (ND-09020307-024-S\_00) South Branch Turtle River downstream to Larimore Dam.

- Fully Supporting but threatened for fish and other aquatic Biota due to combined biota/habitat bioassessments. (BMP implemented to address the nutrient TMDL for the Dam will also directly or indirectly address impacts to aquatic life uses of the South Branch of the river.)

Focus Area

With such a large watershed, the focus area for this phase of the proposal will include the South Branch of the Turtle River which feeds into Larimore Dam. Additional watershed project areas to be addressed in the Turtle River watershed will be identified during the final year of this phase.

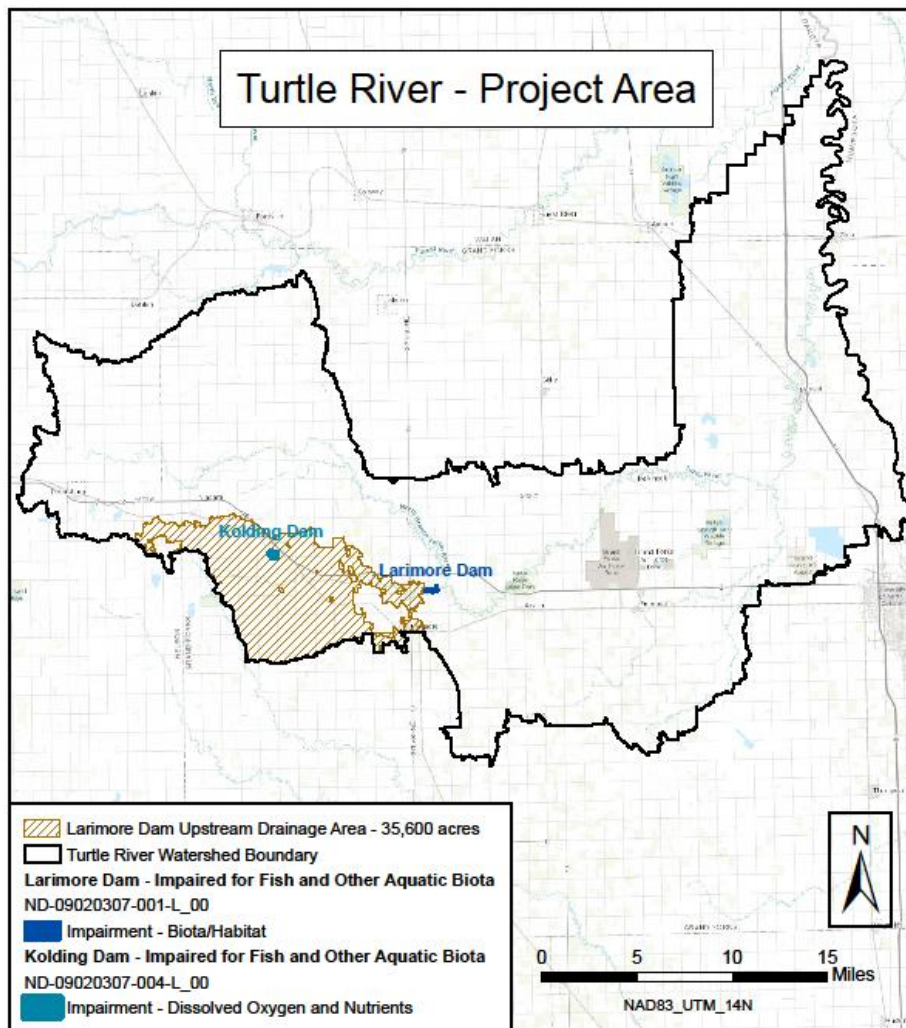


Figure 1. Project area Map.

Larimore Dam is a 66.7-acre multipurpose reservoir on the upper Turtle River in Grand Forks County. Completed in 1978, it is one of seven flood control structures with a watershed of 41,344 acres. The Larimore Dam watershed lies within three level IV Ecoregions. These are the Northern Glaciated Plains ecoregion (46i), which is characterized by a flat to gently rolling landscape composed of glacial drift; the Glacial Lake Agassiz Basin (48a), which is extremely flat with thick lacustrine sediments underlain by glacial till; and the Sand Deltas and Beach Ridges (48b), which consists of parallel lines of sand and gravel formed from the wave action of Lake Agassiz's varying shorelines. The subhumid climate fosters a grassland, transitional between the tall and shortgrass prairie. The historic tall grass prairie has been replaced by intensive agriculture. Though the soil is very fertile, agricultural success is subject to annual climatic fluctuations.

As part of the 2008 Clean Water Act Section 303(d) impaired waters listing process, the North Dakota Department of Environmental Quality (NDDEQ) included Larimore Dam as an impaired waterbody. Based on a Carlson's Trophic State Index (TSI) score, the recreational uses of Larimore Dam were identified as being impaired due to nutrient/eutrophication/ biological indicators. As a follow-up to the 303(d) listing, the NDDEQ developed a nutrient TMDL for Larimore Dam in 2009. The Larimore Dam TMDL was designed to focus specifically on the nutrient/eutrophication/ biological indicators impairment for recreational use. The approved TMDL is available on the NDDEQ website at [North Dakota Department of Environmental Quality \(nd.gov\)](http://nd.gov).

Based on the Carlson's Trophic State Index (TSI) scores in the TMDL, Larimore Dam is assessed as a eutrophic lake. Eutrophic lakes are characterized by the growth of weeds and occasional blue-green algal blooms. Because of the algal blooms and weed growth, these lakes are also undesirable for recreational uses such as swimming and boating. In the TMDL, a Carlson's TSI target of 50, (based on total phosphorus), was chosen for the Larimore Dam endpoint. To achieve this score, in-lake total phosphorus concentrations will need to be reduced to levels that change the lake trophic status from eutrophic to mesotrophic during all times of the year. Based on data collected in 2005 thru 2007, the annual total phosphorus loadings to Larimore Dam are estimated at 2,445.4 kg. Over the long-term, a 75 percent reduction in phosphorus loading to the lake will be needed to result in Larimore Dam reaching total phosphorus in-lake concentrations of 0.024 mg/L, which would, in turn, lower the Carlson's phosphorus TSI score from 63 to 50. For this phase of the project, a 25% reduction in estimated phosphorus loadings to the lake has been set to begin advancing toward the TMDL phosphorus TSI target score of 50.

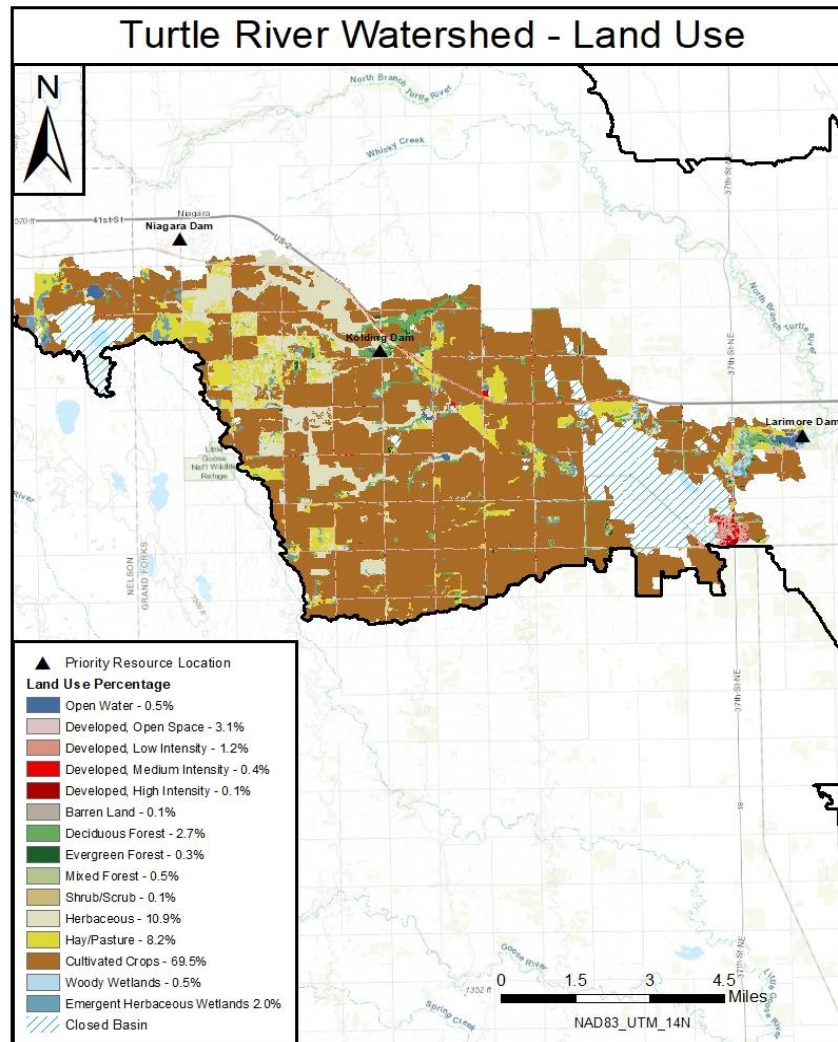
Larimore Dam has been classified as a Class 2 cool-water fishery, "capable of supporting natural reproduction and growth of cool-water fishes (i.e. walleye and northern pike) and associated aquatic biota and marginal growth and survival of cold-water species and associated biota" (NDDoH, 2006). The fishery that was initially established within the reservoir in 1979 consisted of rainbow trout, followed by walleye in 1981 and bluegill in 1982. The bluegill fishery improved each year and has remained stable in the last few decades. Recent fish stockings have included northern pike, crappie, yellow perch, and largemouth bass.

Land use in the Larimore Dam watershed is primarily agricultural (see figure 2 below).

According to the 2006 National Agricultural Statistical Service (NASS) land survey data, approximately 56 percent of the land is active cropland, 8 percent in mid-density urban development, and 36 percent is either wetlands, water, woods, or in the conservation reserve program (CRP). The majority of the crops grown consist of wheat, soybean, dry beans, corn, potatoes, sunflowers, and alfalfa. Concentrated livestock feeding and wintering areas within the watershed are not fully known at this time. If found, these could be additional sources of nutrients and E.coli bacteria.

There are no known point source pollution issues in the watershed, so most likely the elevated nutrient inputs are a result of land management practices within the Turtle River watershed. Likely sources include practices such as inefficient nutrient management on cropland acres and perhaps some livestock feeding operations. Increased tillage within the region leads to increased sediment loss and elevated nutrient levels through increased wind and water erosion. Nutrient management decision and application of these nutrients to the land all contribute to excess nutrients within our waterways.

**Figure 2. Land use within the Turtle River Watershed.**



## Nutrient Results

Based on the draft report *An Ecological Assessment of Perennial, Wadeable Streams in the Red River Basin*, (Larsen, 2012), a total phosphorus reference value of 0.148 mg/L was estimated for the Lake Agassiz Ecoregion (48). This reference value was developed based on data collected at “least disturbed” reference sites located in the Northern Glaciated Plains Ecoregion. A reference value of 0.148 mg/L is not a water quality standard but is provided as a point of reference when evaluating the data.

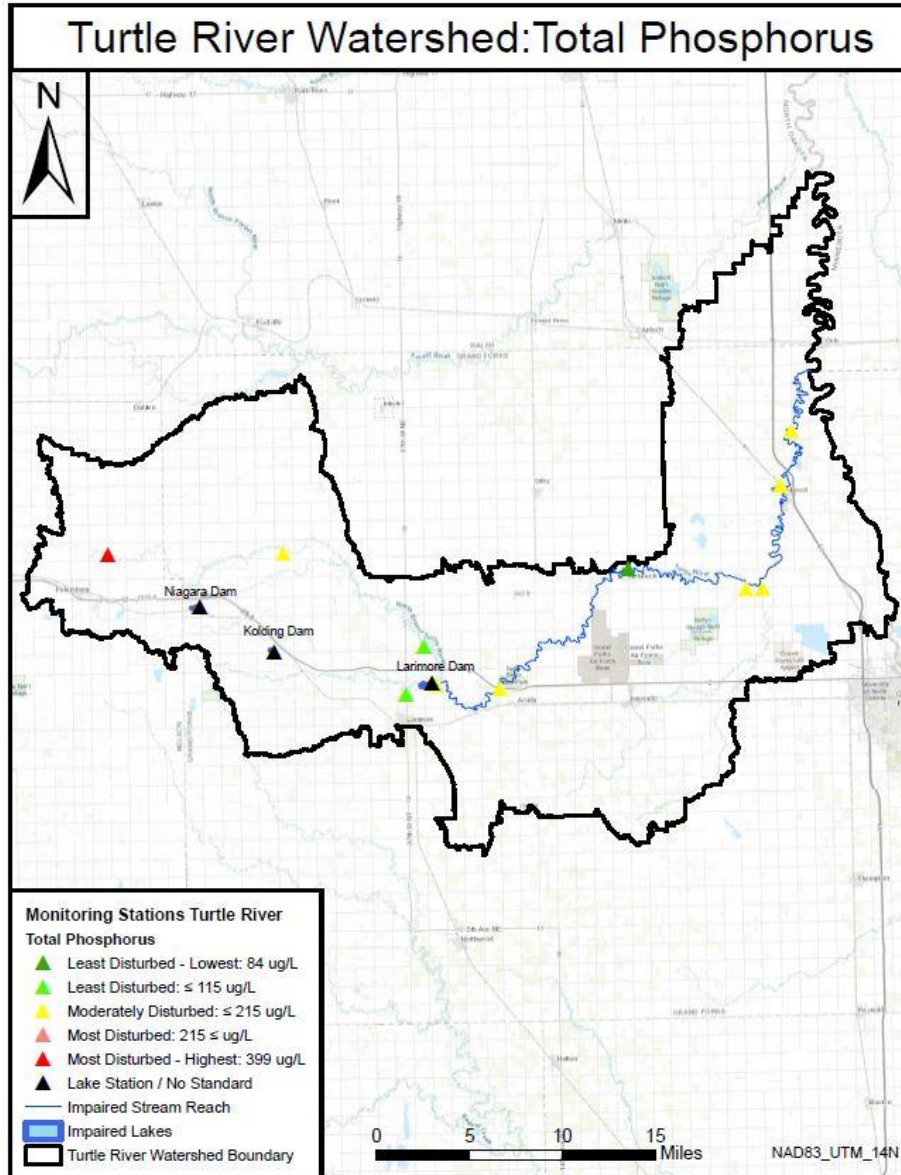
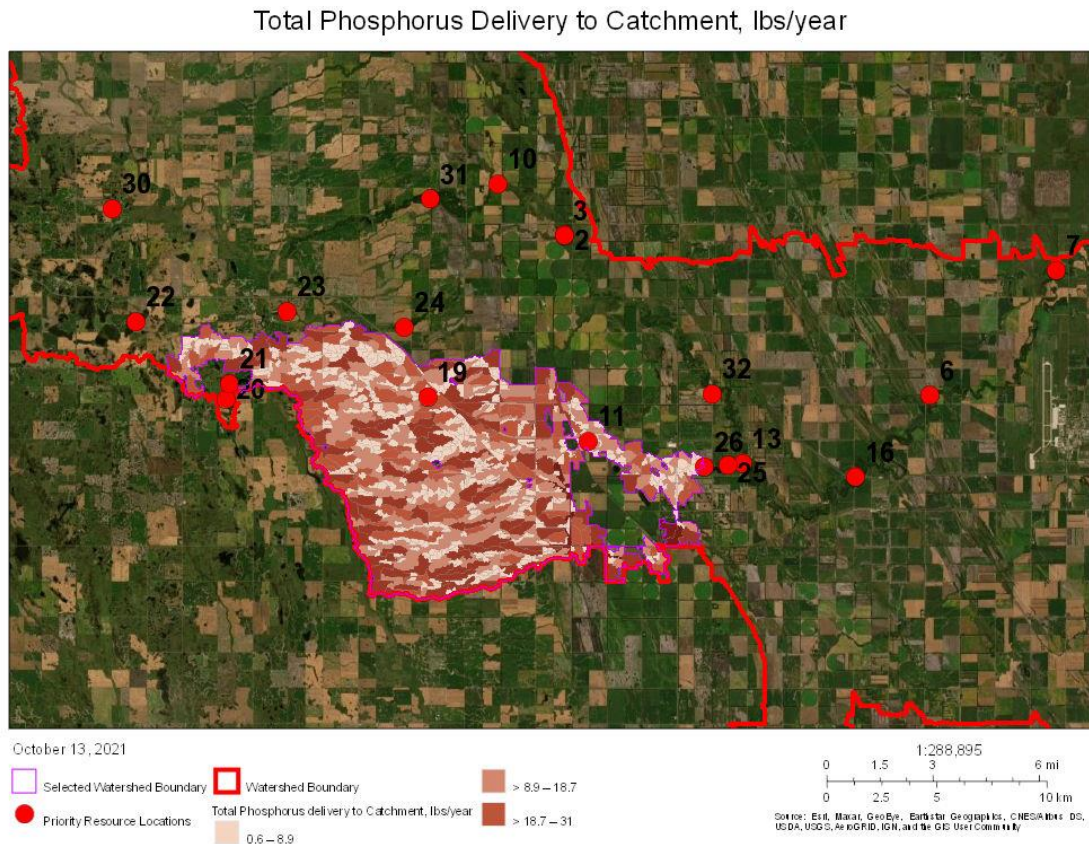


Figure 3. Total Phosphorus ranking within the Turtle River Watershed.

Typical sources of pollution within the Turtle River Watershed can be linked to agricultural runoff. Overland flows across cropland can mobilize significant amounts of commercial fertilizers causing nutrient impairments in nearby waterbodies. These nutrients can be dissolved or adhered to suspended soil particles in the runoff waters. Animal feeding operations and riparian grazing are also potential sources of nutrients that will be addressed through grazing or manure management BMP. Most of the land use within the watershed consists of tilled cropland that can leave the land exposed and susceptible to wind and water erosion, which are the primary means and sources of nutrients and sediments being transported to waterways in the watershed. Funds will be targeted to reduce these cropland inputs through the implementation of BMPs.

To address the sources of nutrients (primarily phosphorus) in the watershed, the Prioritize, Target and Measure Application (PTMApp) will be used to identify priority catchments and optimal BMP locations in the watershed. The catchments are delineated according to hydrologic boundaries and are approximately 40 acres in size. Priority catchments will be those with the highest estimated phosphorus loads/year. The PTMApp (Scenario Builder) will also be used to identify priority locations for BMP implementation that will result in the highest phosphorus load reductions at the inlet to Larimore Dam.



**Figure 4. Total Phosphorus Delivery to Catchment in total /bs/year.**

## Best Management Practices for Filter Strips and Grassed Waterways



**Figure 5. PTMapp Map showing an example of priority locations for Best Management Practices.**

The primary target audience for BMP implementation in the watershed will be landowners/producers involved in crop production. The target audience for the educational events will be landowners/producers, agencies and organizations involved in the agricultural industry and residents of the county.

### 3.0 Project Goals and Objectives

3.1 The primary goal for this project is to improve recreational uses in Larimore Dam by reducing the phosphorus loadings at the lake inlet. A phosphorous load reduction target of 25% is the initial objective during this phase of the project. Over the long term, the objective is to achieve a 75% reduction to fully restore recreational uses.



## 3.2 Objectives and Tasks

### Objective 1:

Manage the implementation of Best Management Practices, coordinate outreach events, and provide assistance to local landowners on local conservation concerns.

#### Task 1

Employ one full-time Watershed Coordinator and provide administrative oversight for a period of 5 years.

Product: Coordinator to manage day-to-day project activities; provide technical assistance to landowners/producers; organize and conduct education and outreach events, and work with local federal and state agencies to coordinate and implement best management practices.

Cost: \$276,60000 (Salary/Fringe for 4.5 years)

### Objective 2:

Reduce phosphorous loading at Larimore Dam by 25%. [Current load estimates generated by PTMApp (7,583 lbs./yr.) will be used as the baseline prep-project loadings.] This objective will focus on reducing runoff using cover crops, reduced tillage, riparian buffers, and field buffers.

#### Task 2

Improve water infiltration and reduce surface runoff through the use of residue management, reduced tillage, cover crops, filter strips, critical area plantings, and grassed waterways.

Product: 2,000 acres. To include BMP's to reduce nutrient loading.

Cost: \$40,000.00 (4.5 year span at \$20/acre)

#### Task 3

Establish 4 demonstration sites that show cost effective practices that can be used to restore the vegetation within degraded riparian areas.

Product: Demonstration sites showing riparian restoration through the use of tree/shrub plantings, grass seeding, land management changes along with riparian buffer strips.

Cost: \$9750.00

#### Task 4

Coordinate with local NRCS and FSA on opportunities to install riparian buffers along the Turtle River.

Product: 500 acres of CRP and 50 acres of riparian buffers.

Cost: USDA funding

#### Task 5

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. The goal is to move cattle away from riparian zones.

Implement three prescribed grazing plans for a total of 700 acres along with 30,000 feet of fencing, 1,320 feet of pipeline, and 3 watering tanks to have a complete systems approach. Implement 100 acres of access control/use exclusion (livestock only).

Product: 700 acres of prescribed grazing, 30,000 feet of fencing, 1,320 feet of pipeline, 3 watering tanks, and 100 acres of access control/use exclusion.

Cost: \$3,500.00 for prescribed grazing, \$34,500.00 for fencing, \$3,960.00 for pipelines, \$6,810.00 for watering tanks, and \$2,000.00 for access control/use exclusion. Total cost over 4.5 years is \$50,770.00

#### Objective 3:

Increase public and local producer understanding and awareness of water quality issues within the watershed.

#### Task 6

Host biennial winter soil health workshops. The workshops will provide a holistic approach to our agricultural practices that tie in soil health, water quality, biology, vegetation, and more. Speakers will include producers and experts in their fields of study.

Product: 2 workshops promoting sustainable agricultural practices.

Cost: \$20,000 (Speakers' fees, speakers' travel expenses, room rental, educational materials, and advertising.)

#### Task 7

Host 5 annual summer tours and 2 workshops that showcase Best Management Practices and soil health principles.

Product: 5 annual summer tours and 2 Workshops

Cost: \$5,000 (Speakers' fees, speakers' travel expenses, educational materials, advertising, and bus rentals.)

#### Task 8

The Coordinator will continue to be involved with local schools, library, and organizations such as the FFA and youth programs to promote water quality and conservation activities.

Product: Roughly 1000 participants for youth involvement and youth education about sustainable agriculture practices and protecting our natural resources.

Cost: \$1000.00 (Educational materials and travel expenses)

#### Task 9

Coordinate projects using the Red River Wildlife and Water Quality Enhancement Program funds. Projects will focus on marginal cropland that is converted to perennial vegetation which improves water quality and wildlife habitat.

Product: Roughly 10 participants within the watershed area.

Cost: \$5000 (Educational materials and travel expenses)

### 4.0 Coordination Plan

4.1 The lead project sponsor is the Grand Forks County Soil Conservation District (SCD). The SCD is responsible for the day-to-day oversight of the project objectives and tasks and will provide assistance and information to landowners for the enhancement of natural resources. Cooperating agencies include: Natural Resources Conservation Service (NRCS), North Dakota Department of Environmental Quality, North Dakota Forest Service, Grand Forks County Water Board, North Dakota Game & Fish, Farm Service Agency, North Dakota State University Extension Service, and the University of North Dakota.

1. Grand Forks County Soil Conservation District (SCD)-The SCD is the lead project sponsor. Project administration, landowner contacts, producer contracts, and water quality education will be the responsibility of the SCD.
2. Natural Resources Conservation Service (NRCS)- The NRCS will provide day-to-day assistance in conservation planning, plan writing, contract writing, technical assistance, and O&M guidance. NRCS will conduct quality review and compliance checks on BMP's designed by NRCS. Environmental Quality Incentive Program (EQIP) funds will also be used as available and appropriate. Technical assistance will be provided for outreach and educational events.
3. North Dakota Department of Environmental Quality (NDDEQ)- The NDDEQ will oversee 319 funding and ensure proper management and expenditures of funding. NDDEQ staff will also provide technical training and guidance through the project activities. NDDEQ will coordinate with SCD personnel in the review of O & M requirements for Section 319 funded BMP's. They will provide

support for water sample analysis, training for sample collection, transportation and preservation as well as developing the Sampling and Analysis Plan (SAP).

4. North Dakota Game & Fish- Will be asked to provide technical assistance as needed. The Red River Pilot Program will be a part of improving water quality.
  5. Farm Service Agency (FSA)- Programs available through FSA will be pursued for cost share assistance. (i.e.-Conservation Reserve Program (CRP))
  6. North Dakota State University Extension Service (NDSU-Extension)-Research, outreach, and technical assistance will be provided for all stakeholders.
  7. University of North Dakota (UND)-Research, outreach, technical assistance, and a continued partnership in a demonstration plot will be provided for all stakeholders.
  8. The Local county water board will be asked to participate in local watershed meetings and events, provide technical assistance and assist coordinator with local watershed issues.
- 4.2 The SCD Board of Supervisors, who are local landowners themselves, have continued to strongly support water quality projects. The SCD has been involved in the Turtle River Watershed Assessment, Larimore Dam Reservoir Assessment, and English Coulee Watershed Assessment and Implementation projects. The SCD Board wants to continue to make progress in water quality through this implementation proposal.

Local landowners throughout the watershed have expressed a desire to make improvements to their land that would improve water quality. Current interest in septic system renovations, cover crops, and livestock grazing improvement is also being expressed throughout the watershed. Some have requested assistance in streambank rehabilitation.

- 4.3 The project will utilize NRCS Environmental Quality Incentive Program, ND Game and Fish programs, Audubon Dakota resources, and FSA cost share programs to help maximize the projects accomplished in the watershed without completely relying on 319 funding.

## 5.0 Evaluation and Monitoring Plan

North Dakota Department of Environmental Quality staff will develop a sampling and analysis plan for the project after the final project implementation plan is approved. Parameters to be monitored in the river will be nitrogen, phosphorus, and total suspended solids. In-lake samples will include nutrients (N&P), chlorophyll-a, secchi disk transparency, temperature, and dissolved oxygen. Data collection is tentatively scheduled to begin in 2023

## 6.0 Budget

See attached budget in Appendix B.

## 7.0 Public Involvement

- 7.1 As with any conservation program, public involvement is an essential component to the program's success. The Grand Forks County Soil Conservation District (SCD) mails newsletters on a regular basis to landowners throughout the project area. These newsletters regularly have information regarding Watershed Project activities and water quality educational information. In addition, there will be opportunities to discuss water quality programs and activities at events that the SCD regularly attends, such as the International Crop Expo, held in Grand Forks on a yearly basis. Annual Soil Health workshops and tours are currently being planned where staff will have the opportunity to present and discuss water quality issues as well. The SCD also has a 319 Eco-Ed program that is attended by approximately 700-800 youth from across the county. Part of this program addresses water quality issues. The SCD has a website, [www.gfscd.org](http://www.gfscd.org), where there are links and postings with updates and educational materials concerning our 319 Watershed Projects. The SCD Facebook page will continue adding new video links and news items relating to conservation and water quality. The SCD Board of Supervisors and staff will also have opportunities to work and meet with local landowners and discuss our programs through one-on-one communication.

## Appendix A

**Table 2. Turtle River Watershed-Larimore Dam**

**Milestone Table**

				<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	
	<b>Task/Responsible Organization</b>	<b>Output</b>	<b>Quantity</b>						
<b>Objective 1</b>	Grand Forks County SCD-Lead Sponsor								
<b>Task 1</b>	Employ Full-Time Watershed Coordinator		1	X	X	X	X	X	
<b>Objective 2</b>	Watershed Coordinator, NRCS, Local Landowners								
<b>Task 2</b>	Cover Crop, Nutrient reduction BMP's	Improve water infiltration, reduce runoff, reduce phosphorous loads.	2000 acres	400 ac	400 ac	400 ac	400 ac	400 ac	
<b>Task 3</b>	Demonstration Site	Riparian improvements	80 acres of buffer	10ac	10ac	20ac	20ac	20ac	
<b>Task 4</b>	FSA/NRCS/Watershed Coordinator	CRP Acres/Riparian buffer	500 acres CRP and 50 acres Riparian buffer	100ac	100ac	100ac	100ac	150ac	
<b>Task 5</b>	Livestock BMP	Prescribed Grazing	700 ac	100 ac	175 ac	125 ac	175 ac	175 ac	
		Fencing	30,000 ft	4,000 ft	7,500 ft	6,000 ft	6,250 ft	6,250 ft	
		Pipeline	1,320 ft	—	330 ft	330 ft	330 ft	330 ft	
		Watering Tanks	3	—	1	—	1	1	
		Use Exclusion/Access	100 ac	—	50 ac	—	50 ac	—	
<b>Objective 3</b>									
<b>Task 6</b>	Education and Outreach	Annual Winter Soil Health Workshop	2	—	1	—	1	—	
<b>Task 7</b>	Education and Outreach	Annual Summer Tours/Workshops	7	2	1	2	1	1	
<b>Task 8</b>	Education and Outreach	Youth Outreach	1000 youth participants	This will be ongoing throughout the project. The Watershed Coordinator will participate in water festivals, Eco-Ed camps, library education days, and assist with 4-H and FFA programs.					
<b>Task 9</b>	Nutrient reduction	Water quality and wildlife habitat	10 participants	This project will be ongoing throughout the grant as funding is available. These funds are used in conjunction with 319 funds to improve water quality and habitat on marginal cropland within the watershed.					

The Grand Forks County SCD will be the lead sponsor of the project.

NRCS will provide technical assistance for BMPs and educational activities.

Landowners will provide a 40% match to implemented BMPs on their land.

Other potential sponsors include NDSU Extension, UND, and the ND Game and Fish.

The ND Department of Environmental Quality will provide oversight of the project.

## Appendix B

### Budget for Upper Reaches of the Turtle River

Part 1: FUNDING SOURCES	2022	2023	2024	2025	2026	TOTAL
EPA SECTION 319 FUNDS						
1) FY2022 Funds (FA)	\$31,254	\$56,943	\$51,963	\$58,248	\$52,860	\$251,268
<b>Subtotals</b>	\$31,254	\$56,943	\$51,963	\$58,248	\$52,860	\$251,268
STATE/LOCAL MATCH						
1) Landowner match (FA)	\$7,980	\$8,180	\$8,180	\$8,080	\$7,788	\$40,208
2) Local SCD (TA&FA)	\$12,856	\$29,782	\$26,462	\$30,752	\$27,452	\$127,304
<b>Subtotals</b>	<b>\$20,836</b>	<b>\$37,962</b>	<b>\$34,642</b>	<b>\$38,832</b>	<b>\$35,240</b>	<b>\$167,512</b>
<b>TOTAL BUDGET</b>	<b>\$52,090</b>	<b>\$94,905</b>	<b>\$86,605</b>	<b>\$97,080</b>	<b>\$88,100</b>	<b>\$418,780</b>





<b>Priority BMP TABLE</b>
<b>Task 2 Cover Crop</b>
340-Cover Crop seed
<b>Task 3 Livestock Grazing Improvement</b>
614- Trough/Tank
642- Well
516- Pipelines
528A- Prescribed Grazing
382- Fencing
472-Access Control/Use Exclusion (Livestock Only)
*All systems will be installed according to NDDEQ guidelines for BMP cost share *Other eligible BMP under the NPS program may be used as needed

**Table 3. Budget Table for Biennial Soil Health Workshops**

	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>Totals</b>
<b>Speaker Fees</b>	\$4000		\$4000	<b>\$8000</b>
<b>Speaker Travel Expenses</b>	\$2,000		\$2,000	<b>\$4000</b>
<b>Meals*</b>	\$4,500		\$4,500	<b>\$9000</b>
<b>Facility Rental/Equipment</b>	\$1,750		\$1,750	<b>\$3500</b>
<b>Advertising</b>	\$1,200		\$1,200	<b>\$2400</b>
<b>Printing</b>	\$2,000		\$2,000	<b>\$4000</b>
<b>Total</b>	\$15,450		\$15,450	<b>\$30,900</b>
*319 funds will NOT be used for meal expenses.				

**Table 4. Budget Table for Annual Summer Tours**

	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>Totals</b>
<b>Speaker Fees</b>	\$250	\$250	\$250	\$250	<b>\$1000</b>
<b>Speaker Travel Expenses</b>	\$750.00	\$750.00	\$750.00	\$750.00	<b>\$3,000</b>
<b>Meals*</b>	\$300	\$300	\$300	\$300	<b>\$1,200</b>
<b>Advertising</b>	\$250	\$250	\$250	\$250	<b>\$1,000</b>
<b>Total</b>	\$3,250.00	\$3,250.00	\$3,250.00	\$3,250.00	<b>\$6,200</b>
*319 funds will NOT be used for meal expenses. Local SCD will match the expenses if needed.					

