

# Alternative Plan for the James River in Stutsman County, North Dakota



**Final:** August 2022

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## **Introduction:**

This is an alternative plan for E. coli bacteria submitted for the James River in Stutsman County, ND (assessment unit ND-10160001-006-S\_00). The North Dakota Department of Environmental Quality (NDDEQ), Watershed Management Program, determined that Best Management Practices (BMPs) have been initiated through a Section 319 Nonpoint Source Pollution Program (NPS) grant and the watershed is moving towards meeting water quality standards. In addition, the North Dakota Game and Fish Department (NDGF) has installed over 96,000 feet of fencing, 27,000 feet of waterlines and 10 water tanks through the Save our Lakes Program to minimize cattle access to the James River (personal communication, Elstad 2021). Monitoring will be conducted as a part of the grant to determine effectiveness of the BMPs and the project. If the BMPs implemented do not resolve the E. coli bacteria impairment following the five years of 319 implementation, a Total Maximum Daily Load (TMDL) will be written. The data gathered as a part of this alternative plan will be beneficial to a TMDL, if deemed necessary in the future.

This alternative plan is based on project implementation outlined in the FY2022 Section 319 Project Implementation Plan (PIP) for the Jamestown Reservoir Watershed Project. This PIP was submitted in 2021, with funding and implementation beginning in 2022. Reducing E. coli is a secondary objective of the PIP, and the Jamestown Reservoir Watershed Project encompasses a larger area than just the 303d listed assessment unit (ND-10160001-006-S\_00) for E. coli bacteria. However, the BMPs outlined will reduce E. coli bacteria contributions to the impaired assessment unit. As illustrated in Appendix 8, annual E. coli reductions have been documented and will be fully evaluated following the recreational season of 2022 as continual data collection efforts are ongoing. A crosswalk for how this document meets the Environmental Protection Agency's (EPA) considerations for an alternative plan is presented in Appendix 4.

## **Microbial Source Tracking:**

Primary land use surrounding Jim Lake (Figure 1) is utilized by the US Fish and Wildlife Service as a national wildlife refuge with management practices already in place. Additional 604b funds were utilized to support E. coli source tracking to determine the primary source, or host, of E. coli. The table below summarizes fecal detection and/or quantification results from 2021 and early 2022 (to date) recreational season. Cow and bird fecal markers were analyzed by Lumin-Ultra Laboratory once per month throughout the recreational season of May - September (detected and quantified via quantification Polymerase Chain Reaction (qPCR) DNA analytical technology) to identify the appropriate host. It is believed that the current management practices implemented through the NDDEQ (NPS Program), NDGF (Save Our Lakes Program), along with land management by the US Fish and Wildlife Service, are all providing beneficial on the ground efforts to reduce E. coli contributions to the listed segment. Additionally, based on preliminary source tracking data provided below, cattle are not the primary source of E. coli and have yet to be detected in a monthly sample. Since the avian community seems to be driving the E. coli concentrations and cattle are not the main contributor, continued grazing and manure management along the stream will continue to reduce E. coli contributions from cattle.

**Table 1. E. coli Source Tracking Results from 2021 and 2022 (to date).**

Site	Date	Cow	Bird
385418	7/28/21	Non-Detect	2.05E+04
385418	8/11/21	Non-Detect	6.95E+04
385418	8/25/11	Non-Detect	1.32E+04
385418	9/28/21	Non-Detect	1.32E+04
385418	5/25/22	Non-Detect	1.47E+05
386038	5/25/22	Non-Detect	6.15E+04
385418	6/13/22	Non-Detect	2.88E+04
386038	6/13/22	Non-Detect	2.05E+04
385418	7/18/22	Non-Detect	3.10E+04
386038	7/18/22	Non-Detect	2.95E+04

### **Routine Sampling and Alternative Plan Rationale:**

Weekly water quality sampling for E. coli will take place at three sites (Appendix 5 SAP) through September 2022 on the impaired segment of the James River (ND-10160001-006-S\_00) to obtain updated E. coli concentrations, in conjunction with continued monthly source tracking analysis. Water quality data will be reviewed annually, and a full water quality report will be produced. Although this is a secondary goal of the Section 319 Project Plan, it is the primary focus of this alternative plan.

As supported by Table 1, the avian community is driving E. coli contributions to the listed segment. There are no management practices available to the Watershed Management Program to address avian contributions and current management practices are limiting cattle contributions of E. coli. As of the date of this publication (August 2022), weekly E. coli samples since May of 2022 have not exceeded the current North Dakota Water Quality Standard of 126 organisms/100 mL. Therefore, current activities are providing sufficient protection to the listed segment and writing a TMDL is deemed unnecessary at this point. Data will be evaluated annually to determine TMDL needs in the future.

### **1.0 Project Overview**

#### **Stutsman County Soil Conservation District (SCD)**

1301 Business Loop East

Jamestown, ND 58401

(701)-252-1920 ext.3

E-mail: [dustin.krueger@nd.nacdnet.net](mailto:dustin.krueger@nd.nacdnet.net)

Website: <https://www.stutsmanscd.net/>

State Contact Person: Greg Sandness

Phone: (701)-328-5232

E-mail: [gsandnes@nd.gov](mailto:gsandnes@nd.gov)

**State:** North Dakota

**Watershed:** Jamestown Reservoir-James River

**Hydrologic Unit:** 1016000106                      **High Priority Watershed:** Yes  
101600010605  
101600010608  
101600010606  
101600010610

**Total Project Cost:**                              **\$1,238,380**

## **2.0 Statement of Need**

### **2.1 Assessment Unit**

Based on the 2018 section 303(d) List of Impaired Waters Needing TMDLs (NDDOH,2019), the North Dakota Department of Environmental Quality (NDDEQ) has identified the following impaired waterbodies in the Jamestown Reservoir watershed:

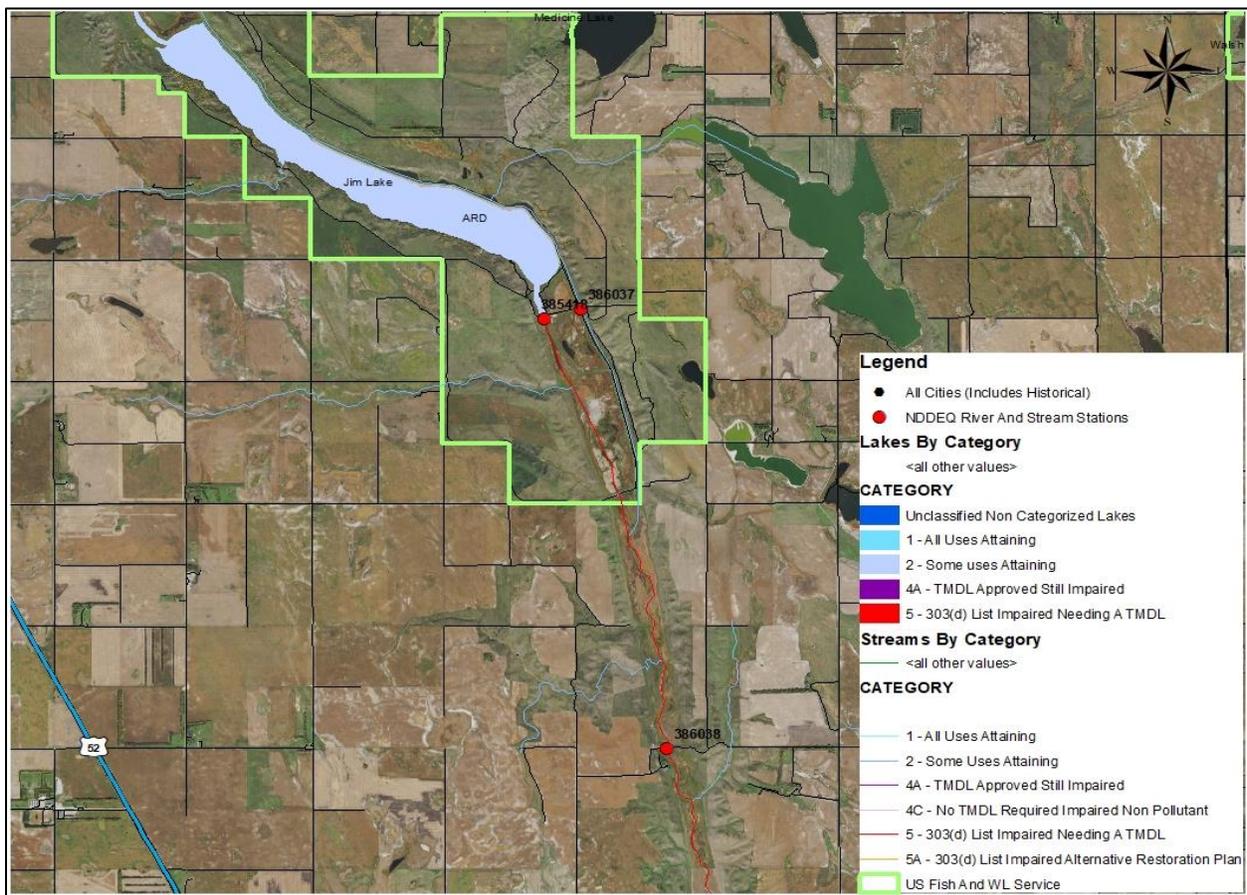
- Jamestown Reservoir, which is 2073 acres (ND-10160001-002-L\_00), is fully supporting but threatened for fish and other aquatic biota due to nutrient/eutrophication biological indicators.
- A 5.18-mile segment (ND-10160001-003-S\_00) of the James River from Arrowwood Lake, downstream to Jim Lake, including Mud Lake as fully supporting, but threatened for dissolved oxygen.
- A 7.23-mile segment (ND-10160001-006-S\_00) of the James River from Jim Lake, downstream to the Jamestown Reservoir. Recreational uses were assessed as fully supporting but threatened due to E. coli bacteria and listed as a high priority for TMDL development. The length of this segment varies depending upon how far Jamestown Reservoir backs up at full pool. There are no known point sources in the watershed. Waterfowl and livestock grazing in the riparian corridor are the likely source of E. coli bacteria impacting recreational use.

### **2.2 Watershed Description**

Jamestown Reservoir is a 2,037-acre flood control reservoir on the James River in Stutsman County, North Dakota. The dam is located on the northeast corner of the Jamestown Reservoir, in south-central North Dakota. The reservoir's watershed encompasses 1,148,900 acres in eight counties (Benson, Burleigh, Eddy, Foster, Kidder, Sheridan, Stutsman, and Wells). Wells County contains 48% of the acreage in the watershed and the rest is divided between Foster 20%, Stutsman 15%, Eddy 13%, Sheridan 2%, and Kidder 2% and less than 1% in Burleigh and Benson Counties (NRCS 2007).

The project will be carried out in the watersheds of four 12-digit HUCs in Stutsman County that flow directly into the Jamestown Reservoir Watershed. Maps of these priority 12-digit HUCs can be found in Appendix 1.

This alternative plan focuses on the impaired 7.23-mile segment of the James River (ND\_10160001-006-S\_00). This portion of the James River has a diversion channel constructed to divert flow for US Fish and Wildlife Service activities on Arrowwood National Wildlife Refuge (i.e., wildlife and waterfowl propagation) as seen in Figure 1 below. This diversion complicates water quality issues by diverting flow from the natural channel, thereby altering flow regimes. Historical bacteria data has only been collected on the natural channel at site ID 385418 (Figure 1). To collect up to date data on this assessment unit and fully evaluate the extent of the E. coli impairment, an alternative plan is the best fit to address the current impairment (at least in the short term). Following the five-year 319 grant project period, the Department will determine if a TMDL is needed or if this alternative plan has adequately addressed the impairment.



**Figure 1.** Aerial Image of the 303d Listed Segment of the James River along with the Diversion Channel within Arrowwood National Wildlife Refuge.

## 2.3 Maps

See Maps, Appendix 1.

## **2.4 General Information**

The geologic unit (i.e., ecoregion) for the Jamestown Reservoir watershed is Northern Glaciated Plains. The Northern Glaciated Plains ecoregion is characterized by a flat to gently rolling landscape composed of glacial drift. The subhumid conditions foster a grassland transition between tall and shortgrass prairie. High concentrations of temporary and seasonal wetlands create favorable conditions for waterfowl nesting and migrations.

Approximately, seventy percent (i.e., 70.3%) of the land in the priority watersheds is cropland. Soybean, corn, wheat, forage, and dry edibles are the primary crops produced. Rangeland/pastureland make up approximately 15.5% of land in the watersheds. The project aims to work with producers to implement a rotational cropping system to be able to focus on cover crops during wheat and other small grain cropping years. Water erosion from the field is a main concern in cropland. The project will promote working with producers to create a rotational grazing system in rangeland acres along riparian areas to limit livestock. Limiting livestock in the riparian areas will lead to less nutrients and E. coli flowing into water bodies and downstream into the Jamestown Reservoir.

## **2.5 Water Quality Data**

Station 385418 is located on the James River 5.5 miles east of Pingree, ND and contains most of the water quality data on this assessment unit (Table 2). Preliminary data from 386037 and 386038 are provided in Table 3 and 4.

### **2.5a Recreational Use Support Assessment Methodology**

Recreational use is any activity that relies on water for sport and enjoyment. Recreational use includes primary contact activities such as swimming and wading and secondary contact activities such as boating, fishing, and bathing. The status of recreational use in rivers and streams is considered “fully supporting” when there is little or no risk of illness through either primary or secondary contact with the water. The State’s recreational use support assessment methodology for rivers and streams is based on the State’s numeric water quality standard for E. coli bacteria.

For each assessment based solely on E. coli data, the following criteria are used:

- Assessment Criteria 1: For each assessment unit, the geometric mean of samples collected during any month from May 1 through September 30 does not exceed a density of 126 colony forming units (MPNs) per 100 milliliters (mL). A minimum of five monthly samples are required to compute the geometric mean. If necessary, samples may be pooled by month across years.
- Assessment Criteria 2: For each assessment unit, less than 10 percent of samples collected during any month from May 1 through September 30 may exceed a density of 409 MPNs per 100 mL. A minimum of five monthly samples is required to compute the percent of samples exceeding the criteria. If necessary, samples may be pooled by month across years.

The two criteria are then applied using the following use support decision criteria:

- Fully Supporting: Both criteria 1 and 2 are met
- Fully Supporting but Threatened: Criteria 1 is met while 2 is not met
- Not Supporting: Criterion 1 is not met. Criteria 2 may or may not be met

Based on the data, recreational use assessments for the Jamestown Reservoir Watershed are threatened for recreational use due to E. coli bacteria impairment. The target for the watershed project is to achieve fully supporting status for recreational beneficial use by meeting both assessment criteria in the water quality standards.

### **2.5b Sources of Pollution**

The primary concern is impaired water quality due to high concentrations of E. coli from riparian grazing resulting in direct deposition of manure in the creek, and spring runoff from accumulations of manure in winter feeding areas and summer grazing within a two-mile corridor on the creek, see Appendix 1 Maps. Other concerns include range practices for summer grazing, cropland erosion and water erosion on rangelands, and confined areas for feeding livestock that are close and directly on the creek.

The primary land use adjacent to Jim Lake is utilized as a National Wildlife Refuge by the US FWS. As such, waterfowl utilize the waterbody in high densities and are a significant source of E. coli.

There are no permitted point sources within the Jamestown Reservoir Watershed.

Excessive amounts of fecal bacteria in surface waters used for recreation have been known to indicate an increased risk of pathogen-induced illness to humans. Infections due to pathogen contaminated waters include gastrointestinal, respiratory, eye, ear, nose, throat, and skin disease (EPA, 1986). The fecal bacteria known to cause the most harm to humans is E. coli bacteria and is the parameter used in NDDEQ water quality standards. A summary of E. coli bacteria data is shown in Appendix 1, Table 2-4.

Funds will be targeted to reduce E. coli bacteria inputs through the implementation of BMP's.

## **3.0 Project Description**

### **3.1 Goal**

The primary goal of the project is to minimize the occurrence of harmful algal blooms (HABs) in the Jamestown Reservoir to improve recreational opportunities. This will be accomplished by reducing the delivery of nutrients (primarily phosphorus) from watersheds immediately adjacent to reservoir. As a secondary goal, the recreational uses impaired by E. coli on the James River below Jim Lake (Assessment Unit ND10160001-006-S\_00) will also be restored.

## **3.2 Objectives and Tasks**

### **Objective 1:**

Provide local project administration and staffing to cooperate with the other organizations and agencies in providing technical assistance to producers, monitoring water quality, and providing materials to the public.

### **Task 1:**

Employ one full-time Watershed Coordinator for 5 years.

**Product:** 50%-time project coordinator for the first 3 years then 100%-time to manage office activities, assist landowners/producers, coordinate with other agencies to promote, and install BMPs.

**Cost:** \$198,500 (\$119,100 319 funds \$79,400 SCD match)

### **Objective 2:**

Reduce phosphorus and sediment loads delivered to the reservoir from the top 5 priority catchments in each of the targeted 12-digit HUs. The target is to reduce cumulative sediment and phosphorus loadings from the 4 priority 12-digit HUCs by 924 lbs of TP and 2,901 tons of sediment, respectively (Appendix 3 shows some examples how we are getting goals). At the bottom of each scenario builder there is an estimated total for reduction on TP and Sediment This objective will focus on reducing nutrient and sediment runoff using reduced tillage, cover crops, riparian buffers, nutrient management, and critical area plantings. The PTMApp prioritization tool will also identify high priority catchments in each 12-digit HUC for BMP implementation and provide estimated load reductions associated with each applied BMP.

### **Task 2:**

Work with the North Dakota Department of Environmental Quality (NDDEQ) and the International Water Institute to use PTMApp prioritization tool to define priority areas more clearly for targeting BMP implementation.

**Product:** PTMApp web-based prioritization tool maps. (Project area appendix 1)

**Cost:** \$0

### **Task 3:**

Using PTMApp prioritization tool, work with area landowners/producers to target high priority catchments for conservation planning aimed to reduce nutrient, sediment, and E. coli loads.

**Product:** PTMApp maps showing locations of the top 5 priority catchments in each of the 4 priority 12-digit HUs (Appendix 1). Producer contact will continue beyond the top 5 priority catchments as the project moves forward. Contact landowners/producers in the high priority catchments for education and promotion of BMPs.

**Cost:** Section 319 funding for BMP is provided under task 4, 5, 6 and 7.

**Task 4:**

Provide support to producers for installation of 2,500 acres of cover crops, nutrient management, and other cropland BMPs.

**Product:** Work with targeted landowners/producers to implement 2,500 acres of cover crops and other cropland BMPs. Estimated TP reduction of 775 lbs. annually and estimated sediment reduction of 2340 tons annually, these estimates are from the PTMApp scenario builder, each scenario with the BMPs chosen has an estimate of reduction (Example in appendix 1). These numbers are a total of all the four priority resource points.

**Cost:** PTMApp cost \$101,875 (\$61,125 319 funds, \$40,750 producer match)

**Task 5:**

Provide support to producers for installation of 500 acres of critical area seeding, grassed waterways or water and sediment control basins (WASCOBs).

**Product:** Work in targeted areas to implement 500 acres of drainage area treated throughout the watershed. Estimated TP reductions of 133 lbs. annually and estimated sediment reduction of 510 tons annually, these estimates are from the PTMApp scenario builder, each scenario with the BMPs chosen has an estimate of reduction (Example in appendix C). These numbers are a total of all the four priority resource points.

**Cost:** PTMApp minimum cost for Wascobs \$67,975 (\$40,785 319 funds, \$27,190 producer match)

**Task 6:**

Provide support to producers within the Jamestown Reservoir 10 digit-HU watershed that directly feed to the Reservoir not within the 4 priority resource points. To reduce potential sources of nutrients by surface runoff, infiltration and improve nutrient management. BMPs that may be cost-shared include cover crops, critical area plantings, water and sediment control basins (WASCOB), pasture/hayland plantings, filter strips, etc.

**Product:** 580 acres of cover crops, 150 acres WASCOB or critical area plantings, filter strips, 150 acres nutrient management on land that directly drains into the Jamestown Reservoir. There are no load reductions for these practices at they are outside of the 4 priority resource points and do not have a resource point for individual 12-digit HUs.

**Cost:** \$51,330 (\$30,798 319 funds, \$20,532 producer match)

**Objective 3:**

Reduce E. coli bacteria levels to meet state standards for recreational uses in the listed reach (ND\_10160001-006-S\_00). State standard criteria for E. coli bacteria during the recreational

season are a geometric mean of 126 MPN/100ml with less than 10% of samples exceeding 409 MPN/100ml.

**Task 7:**

Minimize the length of time livestock are grazing in riparian areas by assisting producers to implement grazing management systems utilizing fences, water development and intense grazing management.

**Product:** Work with producers in critical areas on 1000 acres of prescribed grazing with installing fence, and water development at an average cost \$50 an acre, actual cost-share will be based on rates in the BMP Cost-share guidelines. Grazing time will be limited in riparian areas for grazing. Will try and use PTMApp herbaceous cover and prescribed grazing to identify targeted areas for sediment and phosphorus loads.

**Cost:** \$50,000 (\$30,000 319 funds, \$20,000 producer match)

**Objective 4:**

Monitor the effectiveness of BMP implementation in the reach from Jim Lake to the Reservoir through water quality sampling at assigned STORET sites. The feasibility of monitoring water quality trends in the priority 12-digit HUCs will also be evaluated in 2022. If feasible, sample collection will be initiated in 2023.

**Task 8:**

Collect samples, as outlined in sampling and analysis plan created by ND Department of Environmental Quality (NDDEQ).

**Product:** Approved Sampling and Analysis Plan. The goal will be to collect 20 samples at each STORET site, annually. Parameters to be monitored will include E. coli, Total Suspended Solids; Total Nitrogen; Total Phosphorus and Anions/Cations. Also see section 5.0, Monitoring and Evaluation.

**Cost:** \$0 NDDEQ will provide training, sample analysis, and supplies for the water sampling.

**Objective 5:**

Increase public awareness on NPS pollution issues and promote the use of effective best management practices to improve soil and water quality. When possible, these events will be coordinated with ongoing state and/or federal I/E programs in the area.

**Task 9:**

Conduct annual educational events at various locations throughout Stutsman County to allow area producers to see and learn about soil health practices.

**Product:** 2 farm tours, 5 educational workshops. Farm tours will focus on nutrient management targeted towards capturing the nutrients in the catchments and riparian grazing and limiting cattle in these areas. Educational workshops will focus on the soil

health. These events will be in cooperation with NRCS and other focus groups towards agriculture.

**Cost:** \$7,000 (\$4,200 319 funds, \$2,800 SCD match)

**Task 10:**

Prepare newsletters and direct mailings to local land users, public, and media to promote the project and disseminate information on water quality and NPS pollution control.

**Product:** 5 years of quarterly newsletters and direct mailings.

**Cost:** \$5,000 (\$3,000 319 funds, \$2,000 SCD match)

**Objective 6:**

Completion of necessary project reports.

**Task 11:**

Complete annual and final project reports to update the project progress and completion. These will be provided to NDDEQ, EPA and all sponsors and interested parties.

**Product:** Annual and final project reports.

**Cost:** Included in the Task 1 cost

**3.3 See Milestone Table, Appendix 3**

**3.4 Permits**

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

**3.5 Appropriateness of Lead Sponsor**

Stutsman County Soil Conservation District (SCSCD) is sponsoring this water quality project. The SCSCD board will oversee the Jamestown Reservoir Watershed Project. The Stutsman County SCD's annual and long-range plans help to prioritize and provide guidance to the field service staff. The SCSCD board has legal authority to employ personnel and receive and expend funds. The SCSCD has credible experience in personnel management and conservation leadership. The SCSCD has sponsored 4 other projects in Stutsman County and two of the projects had a Phase II.

**4.0 Coordination Plan**

**4.1 Agency Roles:**

The project sponsor for the Jamestown Reservoir Watershed Project is the Stutsman County Soil Conservation District (SCSCD). Major partners include the Natural Resource Conservation

Service (NRCS), Stutsman County Water Resource Board, North Dakota Department of Environmental Quality (NDDEQ), and the North Dakota Game and Fish Department.

- 1) The lead project sponsor is the Stutsman County SCD. The ND Department of Environmental Quality will hold a contract with the district. BMP implementation, project administration, computer entry, landowner contacts, water sampling and water quality education will be the responsibility of the district.
- 2) The USDA Natural Resource Conservation Service (NRCS) – the NRCS will provide day to day assistance in conservation planning, plan writing, contract writing, and technical assistance for construction and installation of planned BMP. NRCS personnel will conduct quality review and compliance checks of BMP that are designed by NRCS personnel. Local NRCS personnel will provide approved BMP standards and specifications from the NRCS technical guide. Environmental Quality Incentive programs 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 ASTC (FO), DC, and the SCD to reconfirm and acknowledge NRCS’s ability to commit to the project.
- 3) North Dakota Department of Environmental Quality (NDDEQ) – the NDDEQ will oversee the 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 also provide analytical support for the water quality samples collected during the project. The NDDEQ will provide the sponsor oversight to ensure proper management and expenditures of Section 319 funds. They will assist NRCS and the SCSCD personnel in review of operation and maintenance requirements for Section 319 funded BMP.
- 4) The North Dakota Game and Fish Department (NDGF) – as needed, technical and/or financial assistance will be requested from the Game and Fish Department to assist with riparian management practices and other aspects of the project that involve combining wildlife and water quality. As mentioned previously, the NDGF has invested Save our Lake dollars in the project area to enhance and protect Jamestown Reservoir.
- 5) International Water Institute (IWI) – will continue to assist with developing maps through PTMApp to prioritize water quality improvement projects. IWI staff has previously assisted with training the watershed coordinator.
- 6) Will work with other entities including the Stutsman County Extension, Ducks Unlimited, Dakota Audubon, Pheasants Forever, NRCS, the BMP Team, Industrial Commission, and other entities to provide technical and/or financial assistance to the project.

#### **4.2 Local Support:**

There is growing interest in participation to increase sustainable conservation practices in the area. Additionally, the land immediately adjacent to the listed segment is owned by the US Fish and Wildlife Service, where best management practices are of interest.

#### **5.0 Evaluation and Monitoring Plan**

A sampling and analysis plan (SAP) will be developed by the ND Department of Environmental Quality after the project is fully approved. A copy of the SAP will be included the final approved project implementation plan (PIP).

The SAP will describe the monitoring goals, objectives, and tasks to be initiated to evaluate project progress and success. The time frame for the SAP will be consistent with the approved period for the PIP. A report interpreting data collected through the SAP will be included in the final project report submitted to NDDEQ at the end of the 5-year project period. The water quality report will summarize the data collected and describe the effectiveness of the project in progressing toward water quality targets and/or beneficial use improvement goals. The SAP will identify and describe:

- Water quality and/or beneficial use monitoring goals, objectives, and tasks
- Specific parameters to be monitored to track progress toward quantified PIP objectives and beneficial use restoration goals
- Sample collection locations, frequencies, and schedules
- Standard operating procedures for data collection, preservation, and transportation
- Responsible parties for data collection

In addition to data collection scheduled in the SAP, interim measures will also be used to evaluate short term progress and inform project management decisions. These measures will include BMP tracking and annual load reductions estimates associated with applied BMP. The NPS Program BMP Tracker Database will be used to document the type, amount, location, and cost of BMP applied in the watershed. This information will be used as a surrogate measure for evaluating producer interest and effectiveness of the technical and financial assistance delivered by the project. The data for BMP types and amounts will also be used to estimate the annual field-edge nitrogen, phosphorus and sediment load reductions associated with applied BMP. Models that may be used to generate these estimates include STEPL, Animal Feedlot Runoff Risk Index Worksheet (AFRRIW) and the Prioritize, Target and Measure Application (PTMApp). The annual load reduction estimates will provide a quantified value to help gauge potential water quality benefits at the subwatershed and/or full watershed scale. All the annual load reduction data will be provided to the NDDEQ and entered in the EPA Grants Reporting and Tracking System (GRTS).

## **6.0 Budget**

Budget details can be found in Appendix 2.

## **7.0 Public Involvement**

The community will be informed of project updates and cost-share opportunities in our quarterly newsletters, website <https://www.stutsmanscd.net/>, and Facebook page Stutsman County SCD and 319.

# **James River Project Implementation Plan**

## **Appendix List**

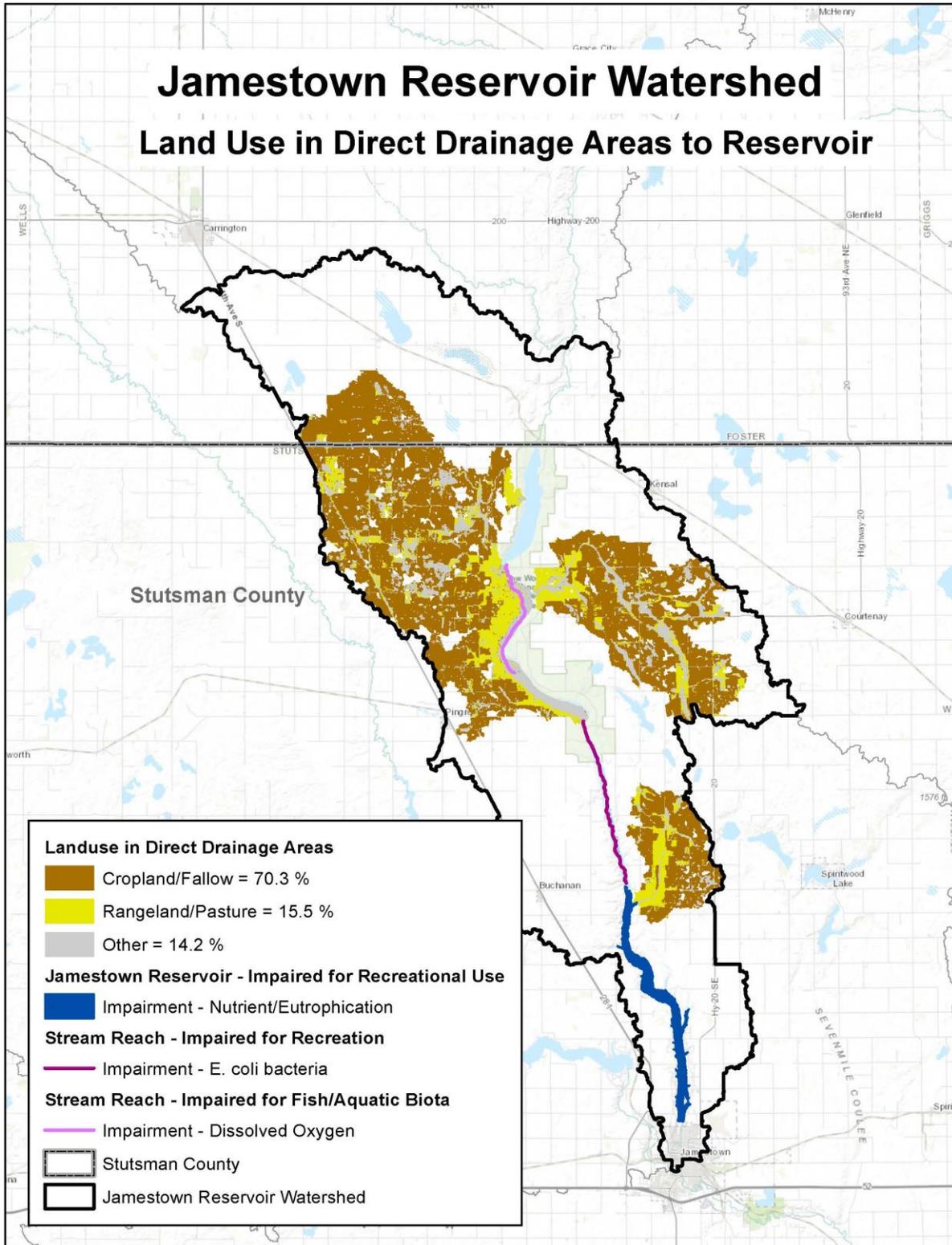
- 1. Stutsman County Maps, Tables and Figures**
- 2. Budget Tables**
- 3. Milestone Table**
- 4. Crosswalk for EPA Considerations for an Alternative Plan**
- 5. Sampling and Analysis Plan (SAP) for the James River**
- 6. SAP Maps**
- 7. Field & Custody Forms**
- 8. Annual Report** – annual report will be due in October of 2023. Once received, this plan will be updated accordingly.

## **Appendix #1**

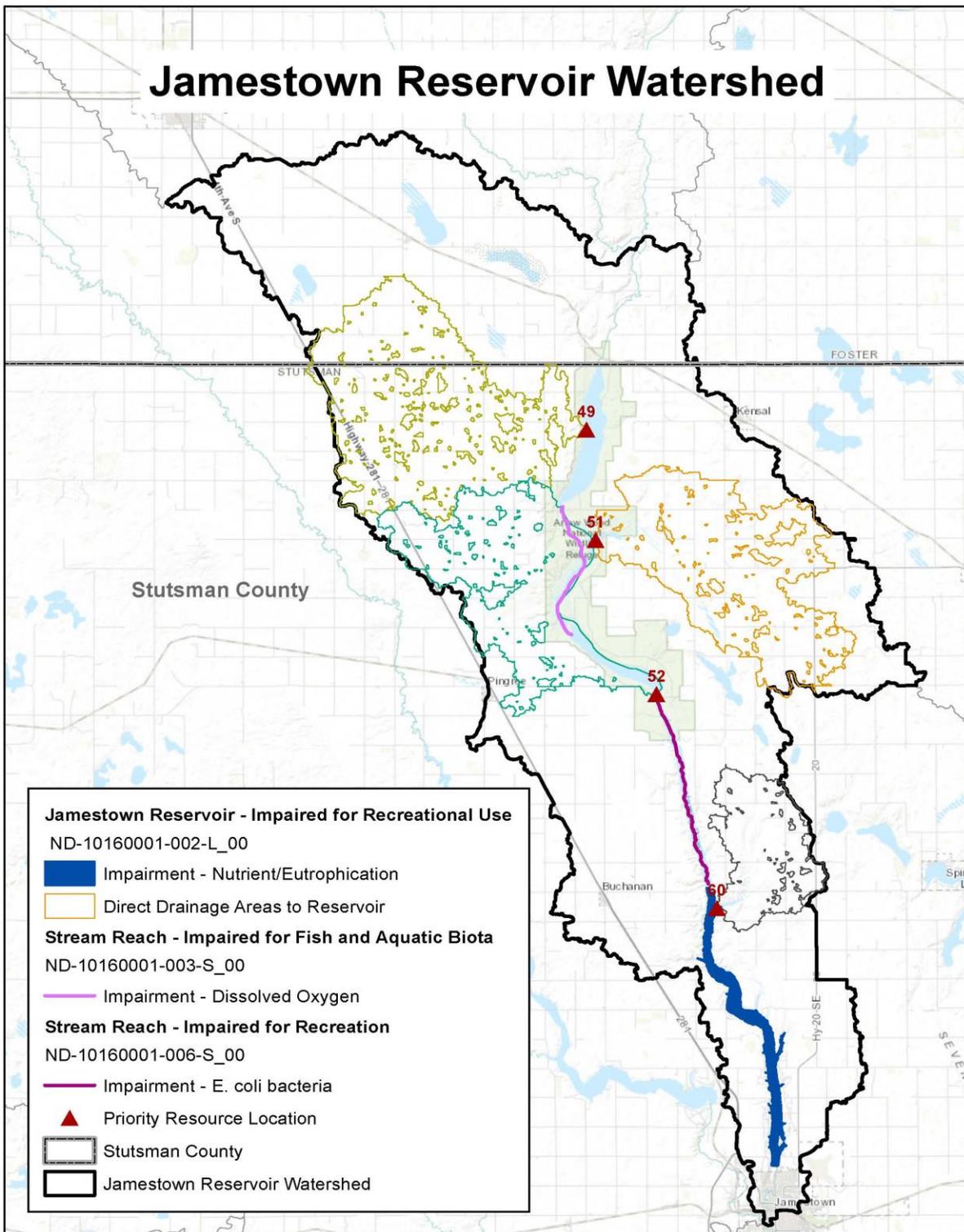
### **Stutsman County Maps, Tables, and Figures**

# Jamestown Reservoir Watershed

## Land Use in Direct Drainage Areas to Reservoir



# Jamestown Reservoir Watershed



**Table 2. E. coli Bacteria 30-day Geometric Mean, Percent Exceedance of 409 MPN and Support Status for Sampling Site 385418.**

385418	May		June		July		August		September	
	5/19/08	60	6/2/08	200	7/7/08	310	8/4/08	110	8/2/08	460
5/27/08	80	6/9/08	40	7/29/08	240	8/11/08	460	8/8/08	50	
5/4/22	ND	6/24/08	90	7/28/21	74	8/18/08	20	8/23/08	980	
5/11/22	ND	6/26/08	800	7/5/22	10	8/25/08	80	8/29/08	130	
5/17/22	ND	6/26/08	150	7/11/22	ND	8/1/22	20	8/28/21	52	
5/25/22	ND	6/30/08	80	7/18/22	ND					
		6/6/22	10	7/25/22	ND					
		6/13/22	ND							
		6/20/22	ND							
		6/27/22	ND							
Geo Mean	69.3		94.86		86.14		69.48		172.42	
#	6		10		7		5		5	
% over	0%		10%		0%		20%		40%	
Status	FS		FST		FS		FST		NS	

ND = Non-detect

FS = Fully Supporting

FST = Fully Supporting but Threatened

NS = Not Supporting

**Table 3. E. coli Bacteria 30-day Geometric Mean, Percent Exceedance of 409 MPN and Support Status for Sampling Site 386037.**

386037	May		June		July		August		September	
	5/4/22	ND	6/6/22	10	7/28/21	51	8/11/21	20	9/28/21	41
5/11/22	10	6/13/22	10	7/5/22	10	8/25/21	41			
5/17/22	10	6/20/22	10	7/11/22	ND	8/1/22	20			
5/25/22	ND	6/27/22	10	7/18/22	31					
5/31/22	75			7/25/22	10					
Geo Mean	19.57		10		19.94		25.40		41	
#	5		4		5		3		1	
% over	0%		0%		0%		0%		0%	
Status	FS		FS		FS		NA		NA	

**Table 4. E. coli Bacteria 30-day Geometric Mean, Percent Exceedance of 409 MPN and Support Status for Sampling Site 386038.**

386038	May		June		July		August		September	
		5/4/22	10	6/6/22	ND	7/5/22	ND	8/1/22	20	
	5/11/22	ND	6/13/22	ND	7/11/22	ND				
	5/17/22	10	6/20/22	ND	7/18/22	ND				
	5/25/22	10	6/27/22	ND	7/25/22	ND				
	5/31/22	63								
Geo Mean	15.84		0		0		20			
#	5		4		4		1			
% over	0%		0%		0%		0%			
Status	FS		FS		FS		NA			

**Appendix #2**  
**Budget Tables**

Part 1: Funding Sources						
	2022	2023	2024	2025	2026	Total
<b>EPA SECTION 319 FUNDS</b>						
1)FY 2022 Funds (FA)	\$36,546	\$51,724	\$75,048	\$73,444	\$56,266	\$293,028
<b>STATE/LOCAL MATCH</b>						
1) Stutsman County SCD (TA & FA)	\$6,669	\$13,788	\$14,188	\$26,268	\$25,966	\$86,879
2) Landowners (FA)	\$17,695	\$20,694	\$35,845	\$22,694	\$11,545	\$108,473
Subtotals	\$24,364	\$34,482	\$50,033	\$48,962	\$37,511	\$195,352
<b>TOTAL BUDGET</b>						
	\$60,910	\$86,206	\$125,081	\$122,406	\$93,777	\$488,380
<b>OTHER FEDERAL FUNDS</b>						
1) NRCS (TA, EQIP, and other programs)	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$750,000
TOTAL FEDERAL FUNDS						\$750,000
TOTAL PROJECT COST						\$1,238,380

FA: Financial Assistance

TA: Technical Assistance

SCD: Soil Conservation District

NRCS: Natural Resource Conservation Service

FSA: Farm Service Agency

Part 2: Detailed Budget (Section 319/Non-Federal)								
	2022	2023	2024	2025	2026	Total Costs	Cash and In-kind Match	319 Funds
<b>PERSONNEL/SUPPORT/ADMIN</b>								
Salary/Fringe FTE 50%	\$13,500	\$28,000	\$29,000	\$58,200	\$60,000	\$188,700	\$75,480	\$113,220
Travel, Food & Lodging	\$1,000	\$2,000	\$3,000	\$3,000	\$2,000	\$11,000	\$4,400	\$6,600
Supplies	\$250	\$500	\$500	\$500	\$250	\$2,000	\$800	\$1,200
Rent/Utilities	\$140	\$340	\$340	\$340	\$340	\$1,500	\$600	\$900
Communications (Telephone/Postage)	\$200	\$450	\$450	\$450	\$450	\$2,000	\$800	\$1,200
<b>Subtotals</b>	<b>\$15,090</b>	<b>\$31,290</b>	<b>\$33,290</b>	<b>\$62,490</b>	<b>\$63,040</b>	<b>\$205,200</b>	<b>\$82,080</b>	<b>\$123,120</b>
<b>Objective 2-3 Implement BMP's</b>								
Implement on cropland (cover crops, nutrient management, and other BMPs)	\$20,375	\$20,375	\$40,750	\$20,375	\$0	\$101,875	\$40,750	\$61,125
Implement critical area seeding, grassed waterways, and water and sediment control basins	\$13,595	\$13,595	\$13,595	\$13,595	\$13,595	\$67,975	\$27,190	\$40,785
BMP implementation outside of the 4 priority resource points.	\$10,266	\$10,266	\$10,266	\$10,266	\$10,266	\$51,330	\$20,532	\$30,798
Improve nutrient management on rangeland		\$7,500	\$25,000	\$12,500	\$5,000	\$50,000	\$20,000	\$30,000
<b>Subtotals</b>	<b>\$44,236</b>	<b>\$51,736</b>	<b>\$89,611</b>	<b>\$56,736</b>	<b>\$28,861</b>	<b>\$271,180</b>	<b>\$108,472</b>	<b>\$162,708</b>
<b>Objective 4: Water Sampling</b>								
Conduct water sampling						\$0	\$0	\$0
<b>Subtotals</b>						<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Objective 5: Public Information Campaign</b>								
Public informational meetings/Tours	\$1,000	\$2,000	\$1,000	\$2,000	\$1,000	\$7,000	\$2,800	\$4,200
Prepare newsletter and other outreach	\$584	\$1,180	\$1,180	\$1,180	\$876	\$5,000	\$2,000	\$3,000
<b>Subtotals</b>	<b>\$1,584</b>	<b>\$3,180</b>	<b>\$2,180</b>	<b>\$3,180</b>	<b>\$1,876</b>	<b>\$12,000</b>	<b>\$4,800</b>	<b>\$7,200</b>
<b>Objective 7: Project Reporting</b>								
Annual project report						\$0	\$0	\$0
<b>Subtotals</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Total for all Objectives/Tasks</b>								
<b>Total 319/Non-federal Budget</b>	<b>\$60,910</b>	<b>\$86,206</b>	<b>\$125,081</b>	<b>\$122,406</b>	<b>\$93,777</b>	<b>\$488,380</b>	<b>\$195,352</b>	<b>\$293,028</b>

NDDEQ: North Dakota Department of Environmental Quality

**Appendix #3**  
**Milestone Table**

Jamestown Reservoir Watershed Project

Milestone Table

Task/Responsible Organizations	Output	Qty.	Year 1 2020	Year 2 2021	Year 3 2022	Year 4 2023	Year 5 2024	
<b>Objective 1:</b>								
Task 1: Group 1,5	Hire watershed coordinator 47% FTE	Watershed Coordinator	1	1	1	1	1	1
<b>Objective 2:</b>								
Task 2: Group 1, 2, 3	PTMApp priority areas	Web-based prioritization maps	1	X	X	X	X	X
Task 3: Group 1, 5	Use PTMApp to work with landowners to reduce nutrient and sediment loads.	Maps showing locations of top 5 priority catchments per 12-digit HU.	5	X	X	X	X	X
Task 4: Group 1,2,3	Cover Crops, nutrient management on 2500 acres	Cover crops, nutrient management and other BMPs	2500 ac	500 ac	500 ac	1000 ac	500 ac	
Task 5: Group 1,2,3	500 acres of Critical Area plantings and WASCOb's	Critical area planting, grass waterways, and WASCOb's	500 ac	100 ac	100 ac	100 ac	100 ac	100 ac
Task 6: Group 1,2,3	Practices for HUC 10 Jamestown Reservoir Watershed that drain directly into the reservoir	Cover crops, nutrient management, WASCOb's and other BMPs	880 ac	176 ac	176 ac	176 ac	176 ac	176 ac
<b>Objective 3:</b>								
Task 7: Group 1,2,3	Minimize gazing along riparian area by implementing grazing plan	Fencing, water, prescribed grazing and other BMPs	1000 ac	200 ac	500 ac	500 ac	200 ac	100 ac
<b>Objective 4:</b>								
Task 8: Group 1	Monitor BMP effectiveness	Concentration data for E. coli bacteria, nutrients, and TSS for 2 Sites	20 samples per site per year	40	40	40	40	40
<b>Objective 5:</b>								
Task 9: Group 1	Informational Events	7-tours/workshops	7	1	2	1	2	1
Task 10: Group 1	Newsletters and other media	Quarterly newsletters, mailing, brochures	17	2	4	4	4	3
<b>Objective 6:</b>								
Task 11: Group 1,5	Complete annual and final project reports	Project reports	5	1	1	1	1	1

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

Group 2 - Landowners in the Jamestown Reservoir Watershed - Make land management decisions and provide cash and in-kind match for BMPs.

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

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

**Appendix #4**  
**Crosswalk for EPA Considerations of an Alternative  
Plan**

## **CROSSWALK FOR JAMESTOWN RESERVOIR WATERSHED ALTERNATIVE PLAN AND EPA REGION 8 CONSIDERATION TABLE**

This crosswalk was developed to summarize how the James River alternative plan addresses the considerations put forth in EPA Region 8's discussion of alternative plans (Table 4.) The number in the summary corresponds to the Alt Plan Considerations Number in the table that follows.

- 1) Information on Assessment Units and the 303(d) list is provided on Section 2.1. Point and nonpoint sources are discussed in Section 2.5b. Because there are no permitted point sources in the watershed, all contributions are assumed to be nonpoint sources.
- 2) The target is identified in Section 2.5a, Implementation measures needed to achieve fully supporting recreational beneficial use are identified in Objective 3, Task 7.
- 3) Proposed controls are identified as the product of various Tasks in Section 3.2, as well as in the milestone table in Appendix 3.
- 4) Funding sources are provided in the budget tables of Appendix 2.
- 5) Agencies involved in this project, along with their roles, are discussed in the coordination plan Section 4.1.
- 6) The timeframe of WQS will depend on many factors such as landowner interest, economic conditions, weather, etc. Section 5.0 discusses how monitoring and evaluation will be conducted to describe progress towards the established targets (also see Appendix 5, SAP). If progress is not deemed sufficient, a TMDL will be completed. The Implementation Project will run from 2022 to 2024.
- 7) Effectiveness monitoring is discussed in Section 5.0.
- 8) This will be done as a part of the effectiveness monitoring (Section 5.0 and Appendix 5). As stated in the introduction, upon project completion, a larger report summary will be written to see if sufficient progress towards the targets have been made. If E. coli water quality standards are not met within a reasonable period after implementation, a TMDL will be developed.

**Table 4. Table of EPA Region 8 Summary of the Alternative Plan Considerations**

Alt Plan Considerations Number	Alt Plan Considerations Summary Description	Potential Information to Include an Alternative Plan
1	Identify the specific impaired waters, causes, and sources	<ul style="list-style-type: none"> <li>• Assessment Unit (AU) numbers, descriptions and pollutants that match state's most recent 303(d) list</li> <li>• Include a list or table of all contributing permitted point sources</li> <li>• Identify general nonpoint source (NPS) contributors by category</li> <li>• Include relative source contribution estimates</li> </ul>
2	Clearly identify the target(s), consistent with water quality standards (WQS), which will be used to demonstrate restoration. Provide an analysis that shows how planned implementation actions can meet that target(s).	<ul style="list-style-type: none"> <li>• Clear target(s) consistent with WQS</li> <li>• Load reduction estimates needed to meet the target</li> <li>• Description of the management measures that will need to be implemented to achieve load reductions</li> </ul>
3	Provide an implementation plan to address all sources and a schedule with milestones and target dates	<ul style="list-style-type: none"> <li>• A schedule with proposed controls and target dates</li> <li>• A description of interim measurable milestones</li> </ul>
4	Identify sources of available funding to implement the plan	<ul style="list-style-type: none"> <li>• A table, list, or description of the available funding sources</li> </ul>
5	Identify all parties committed to or assisting in implementation	<ul style="list-style-type: none"> <li>• A table, list, or description of all parties that are committed to or assisting in implementation</li> </ul>
6	Provide an estimate or projection of time when WQS will be met	<ul style="list-style-type: none"> <li>• An estimated date or number of months/years</li> </ul>
7	Describe the plans for effectiveness monitoring to show restoration progress and identify corrective measures	<ul style="list-style-type: none"> <li>• A plan for effectiveness monitoring designed to show restoration progress and identify corrective measures</li> </ul>
8	Describe the plans to periodically evaluate the alternative plan to determine if it's on track to more immediately meet WQS, or if adjustments need to be made, or if impaired water should be assigned a higher priority for TMDL development.	<ul style="list-style-type: none"> <li>• A plan to periodically evaluate the alternative plan to determine if it's on track to meet WQS or if adjustments need to be made</li> </ul>

Table 4 is EPA Region 8's summary of the alternative plan considerations and potential information to include in an alternative plan. The full description of the alternative restoration approach, the circumstances to consider, the elements to consider and the use of the 5-alternative IR category is contained in the 2016 IR memorandum, available at: [https://www.epa.gov/sites/production/files/2015-10/documents/2016-ir-memo-and-cover-memo-8\\_13\\_2015.pdf](https://www.epa.gov/sites/production/files/2015-10/documents/2016-ir-memo-and-cover-memo-8_13_2015.pdf)

**Appendix #5**  
**Sampling and Analysis Plan (SAP) for the James  
River**



Environmental  
Quality

4201 Normandy St.  
Bismarck, North Dakota 58503  
Phone: (701) 328 -5210  
Fax: (701) 328-5200

**Project Team**

Title	Name	Signature
Field Investigator	Dustin Krueger, Stutsman County SCD	
NDDEQ Designated Project Manager	Aaron Larsen	
Program Manager	Aaron Larsen	

**QUALITY CONTROL/QUALITY ASSURANCE DOCUMENTATION**

Title: James River E. Coli Assessment and Source Tracking Project  
 Type: Sampling and Analysis Plan (SAP)  
 Version: 1.0  
 Date: 4/7/2022  
 Author: Aaron Larsen  
 Project Code: RTMDLJRA

This Sampling and Analysis Plan (SAP) has been prepared in accordance with the programmatic QA/QC umbrella document for the Watershed Management Program 'Quality Assurance Program Plan for Water Quality and Watershed Project Studies'.

**REVISION HISTORY**

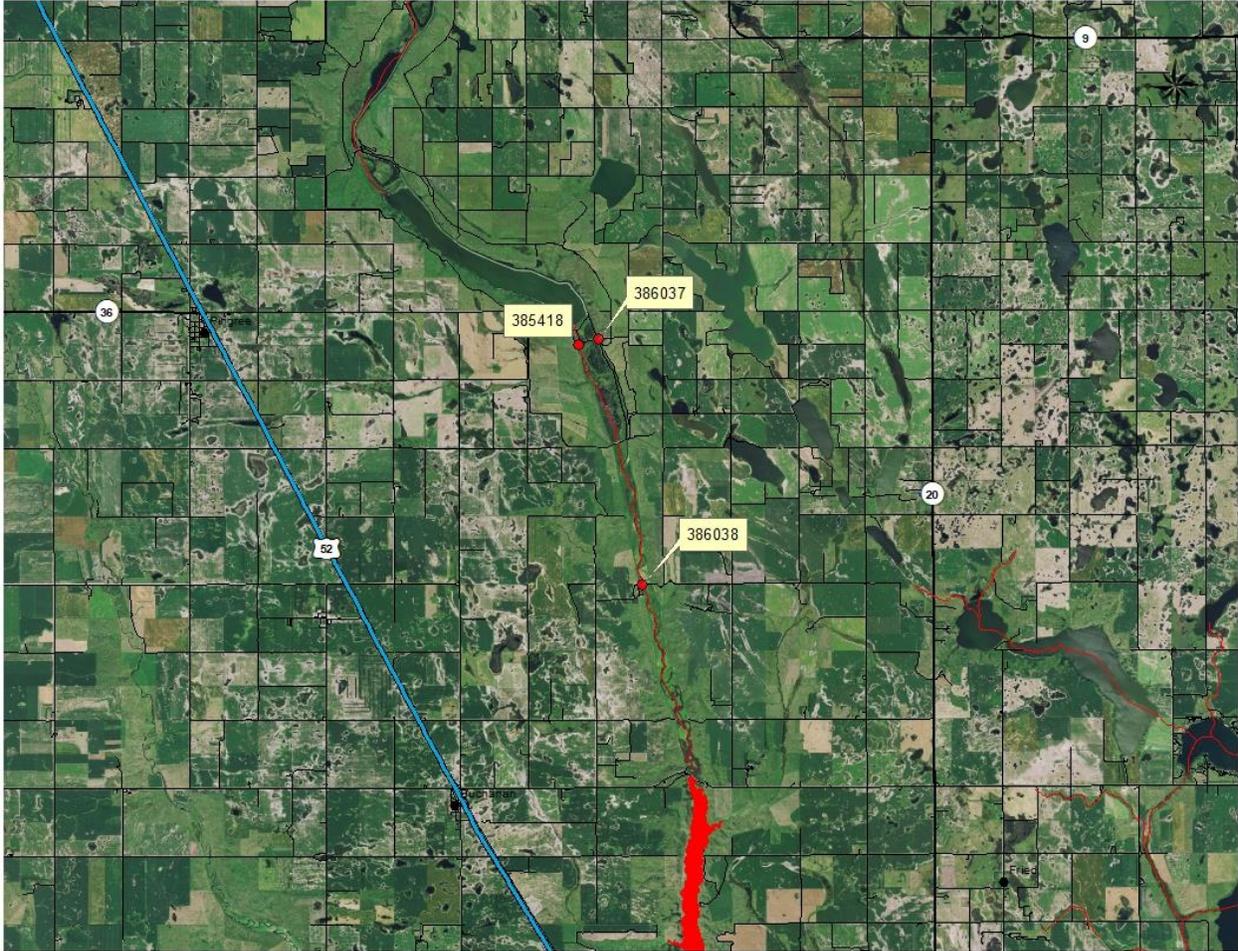
Revision	Change Description	Date	Authorization
1	2022 update	4/7/22	A.L.

## Project Contacts

Name	Role	Email	Phone
Dustin Krueger	Field Investigator	<a href="mailto:Dustin.krueger@nd.nacdn.net">Dustin.krueger@nd.nacdn.net</a>	701-525-2521
Aaron Larsen	Watershed Management Program Manager and DPM	<a href="mailto:allarsen@nd.gov">allarsen@nd.gov</a>	701-328-5230

### 1. Background & Project Area Description

The objective of this project is to assess the extent and sources of E. coli pollution in the James River, below Jim Lake to Jamestown Reservoir. According to the North Dakota 2018 Integrated 305b Water Quality Assessment Report and Section 303d List of Waters Needing Total Maximum Daily Loads (IR), the James River segment (ND-10160001-006-S\_00) is listed as impaired for recreation due to high E. coli concentrations. Results from this project will be used to determine water quality improvement objectives in the watershed and for TMDL or alternative plan development in the future.



**Figure 1.** Map showing the location of three sampling sites on the James River.

One *E. coli* sample will be collected at each of three sampling locations (Figure 1 and Table 1) on a weekly basis. Additionally, once per month, *E. coli* samples for source tracking will be collected from 385418 and 386038 – James River @ 21st SE. Upon completion of the weekly *E. coli* sample collection, three *E. coli* samples will be shipped in a cooler with icepacks overnight via Spee-dee Delivery to the NDDEQ Division of Chemistry (address below). Once per month, the source tracking *E. coli* samples from 385418 and 386038 – James River @ 21st St SE, will be shipped in a cooler with icepacks overnight to Lumin-Ultra/Source Molecular for fecal host quantification ID testing and/or reporting. Detection and quantification of the fecal host associated gene biomarkers will be completed by qPCR (polymerase chain reaction) analytical technology. The address for the NDDEQ Division of Chemistry and Lumin-Ultra/Source Molecular is as follows:

NDDEQ Division of Chemistry  
2635 E Main Ave  
Bismarck, ND 58501

Lumin-Ultra/Source Molecular  
15280 NW 79th Court, Suite 107  
Miami Lakes, Florida 33016  
(786)-220-0379

Once E. coli samples are received by Lumin-Ultra/Source Molecular, they will be retained and filtered appropriately by Lumin-Ultra/Source Molecular staff. Those filters will then be analyzed for E. coli biomarkers. Biomarkers of interest include cow, bird, or human if deemed necessary. Primary markers for this project will be cow and bird.

## 2. Monitoring Goals and Objectives

The goal of this SAP is to document the monitoring plan and provide clear documentation for how the NDDEQ and our partners will conduct monitoring activities.

Specific Objective of this project:

1. Collect E. coli data from three sites on the James River in North Dakota, one immediately downstream of Jim Lake, one due east on the James River diversion and another further downstream. Data will be collected during the open water season from May through September.

## 3. Sampling Locations

Sampling locations are detailed in Figure 1 and Table 1 below. Current drought conditions are severe in North Dakota. If these conditions persist, this plan is subject to change at the last minute due to environmental conditions at that time.

**Table 1.** List of sampling locations.

<b>STORET Station</b>	<b>Station Name</b>	<b>Station Type</b>	<b>Latitude</b>	<b>Longitude</b>
385418	James River below Jim Lake	River	47.1608	-98.7897
386037	James River Diversion @ 17 <sup>th</sup> St SE	River	47.1622	-98.7838
386038	James River @ 21 <sup>st</sup> St SE	River	47.1098	-98.7700

#### 4. Sampling Frequency

**Table 2.** Sample date ranges for the James River E. Coli Assessment and Source Tracking Project.

<b>Parameter</b>	<b>Period</b>	<b>Frequency</b>
E. coli at all three sites <sup>1</sup>	Open Water Season of May – September	Weekly
E. coli at 385418 <sup>2</sup>	Open Water Season of May – September	Monthly
E. coli at 386038 – James River @ 21 <sup>st</sup> St SE <sup>2</sup>	Open Water Season of May – September	Monthly

<sup>1</sup>Samples shipped to NDDEQ Chemistry Lab

<sup>2</sup>Samples shipped to Lumin-Ultra/Source Molecular Lab

#### 5. Custody Forms and Shipping Instructions

##### **Lumin-Ultra/Source Molecular**

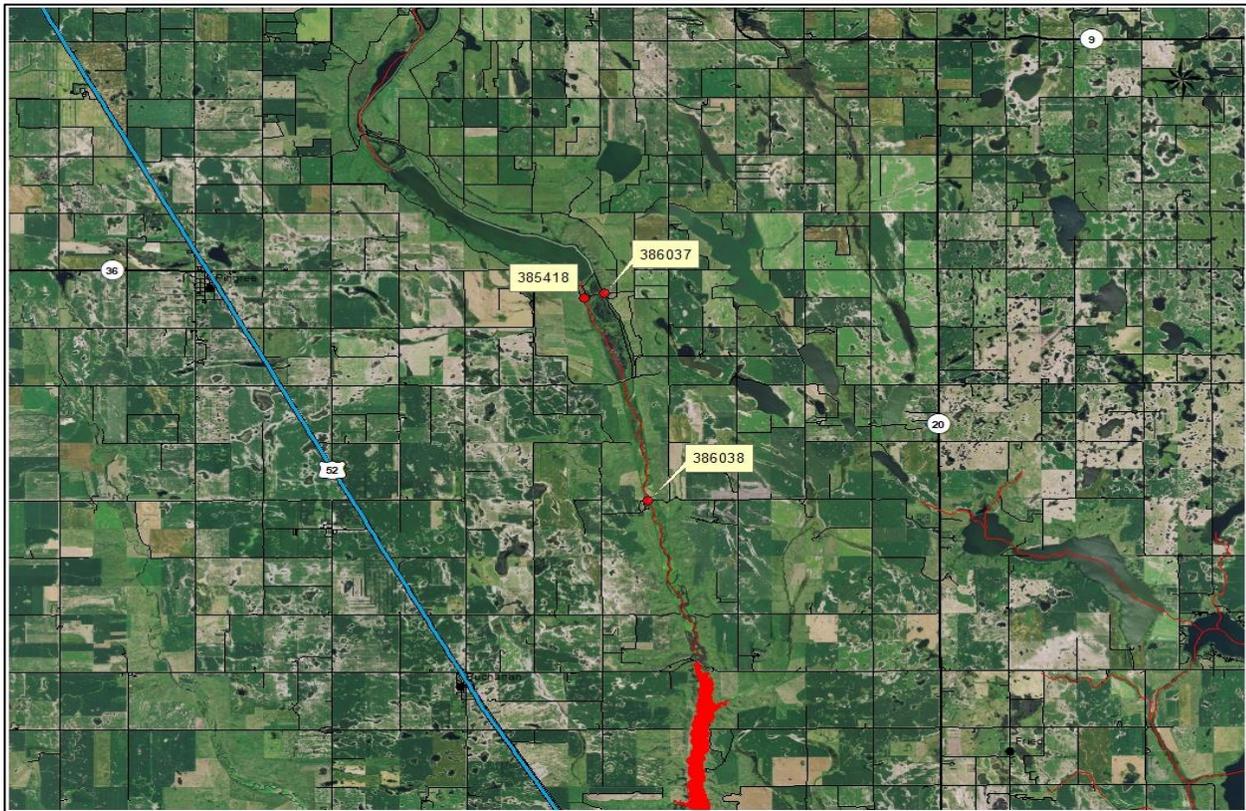
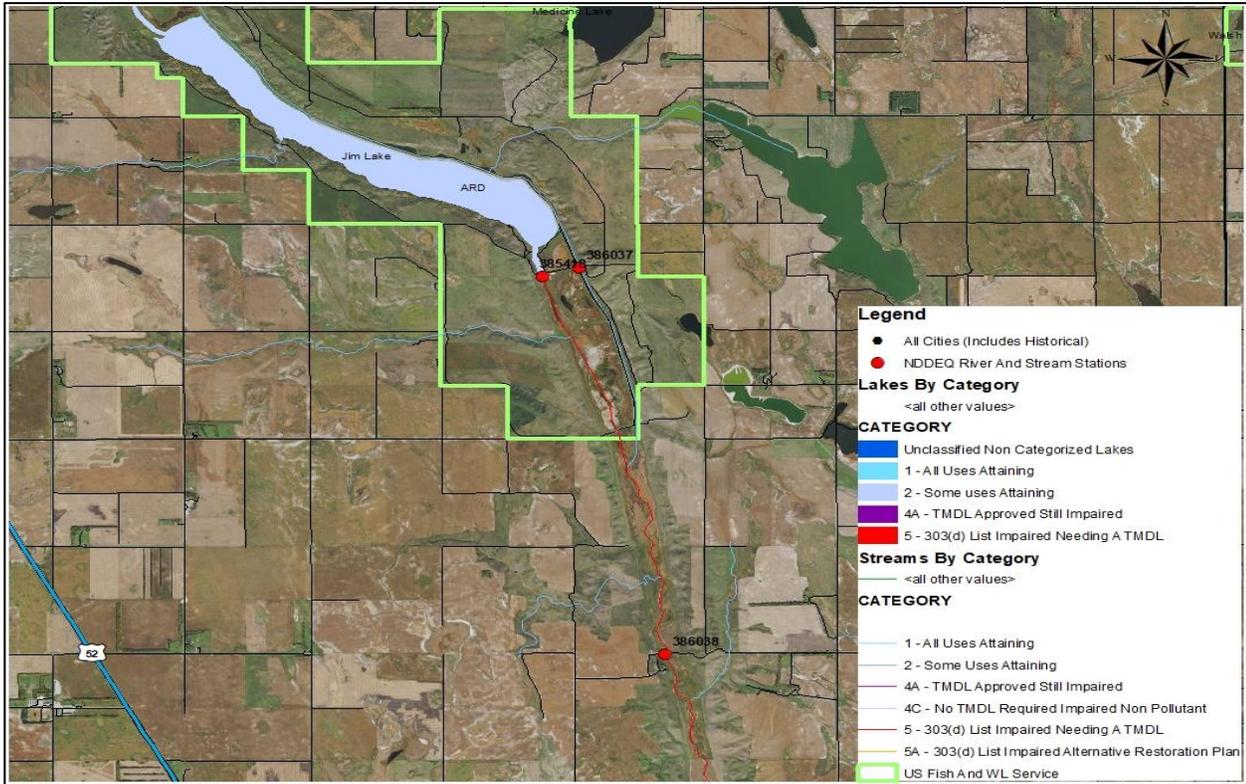
For the monthly source tracking E. coli samples at 385418 and 386038, upon completion of sample collection, a Source Molecular sample custody form (attached) will be filled out and relinquished at the time of overnight shipment drop-off. Additionally, shipping and/or packing instructions are also attached.

##### **NDDEQ Division of Chemistry**

For the weekly E. coli samples at all three (3) sites for quantification, upon completion of sample collection, an NDDEQ sample custody form (attached) will be filled out and relinquished at the time of overnight shipment drop-off. The analysis requested will be 33130 (e. coli quanti-tray) and the collection method will be a grab sample.

## **Appendix #6**

### **SAP Maps**



**Appendix #7**  
**Field & Custody Forms**

## Chain Of Custody Record



Luminultra Technologies, Inc.  
 15280 NW 79th Court, Suite 107  
 Miami Lakes, FL 33016  
 Tel: (1) 786 220 0379

<b>Mark boxes with "X" for requested source.</b>  Sample ID for	Human (HF183)	<input type="checkbox"/> ddPCR	Human (HumM2)	<input type="checkbox"/> ddPCR	Dog	Cow	<input type="checkbox"/> CowM2	<input type="checkbox"/> CowM3	Pig	<input type="checkbox"/> ddPCR	Chicken	Poultry	Elk / Deer	Geese	Gull	Bird	Horse	Ruminant	Beaver	Gen Bacteroidetes	Gen Enterococcus	Company Name	Stutsman County, SD	
						<input checked="" type="checkbox"/>										<input checked="" type="checkbox"/>						Contact Name(s)	Aaron Larson and Dustin Kreuger	
																							Send Results To	<a href="mailto:allarsen@nd.gov">allarsen@nd.gov</a> <a href="mailto:Dustin.Kreuger@nd.nacdnet.net">Dustin.Kreuger@nd.nacdnet.net</a>
																							Phone	
																							<b>TAT: 10 Business Days</b>	
																						Comments	Collection Date	Collection Time

**Completed by LuminUltra:**

Temperature \_\_\_\_\_ Received/Filtered \_\_\_\_\_

Thermometer \_\_\_\_\_ Signature \_\_\_\_\_

Date/Time \_\_\_\_\_

**Completed by Client:**

Relinquished By \_\_\_\_\_

Signature \_\_\_\_\_

Date/Time \_\_\_\_\_

To protect confidentiality, confirmation and results will only be sent to email address provided or authorized by contact provided. Signed form indicates agreement with the privacy policy and terms of service. Contact [scott.harding@luminultra.com](mailto:scott.harding@luminultra.com) for a full copy.

Sample Arrival Time-Stamp: \_\_\_\_\_

### CUSTODY RECORD AND ANALYSIS REQUEST – Watershed Management Program

Account #	Project Code:	Project Name:				<b>FOR LABORATORY USE ONLY</b> Nutrient/Nitrate bottle(s) checked for preservation by:  Temp of Cooler:	
DEQ Program:	DEQ Project #:	DEQ Cost Center #:	Point of Contact/DPM:				
Sampled By:		Sampler Phone #:					
Analysis Requested:		*Collection Method: (See Note)	Matrix: Soil Water Other (explain)		Enforcement? Yes No		

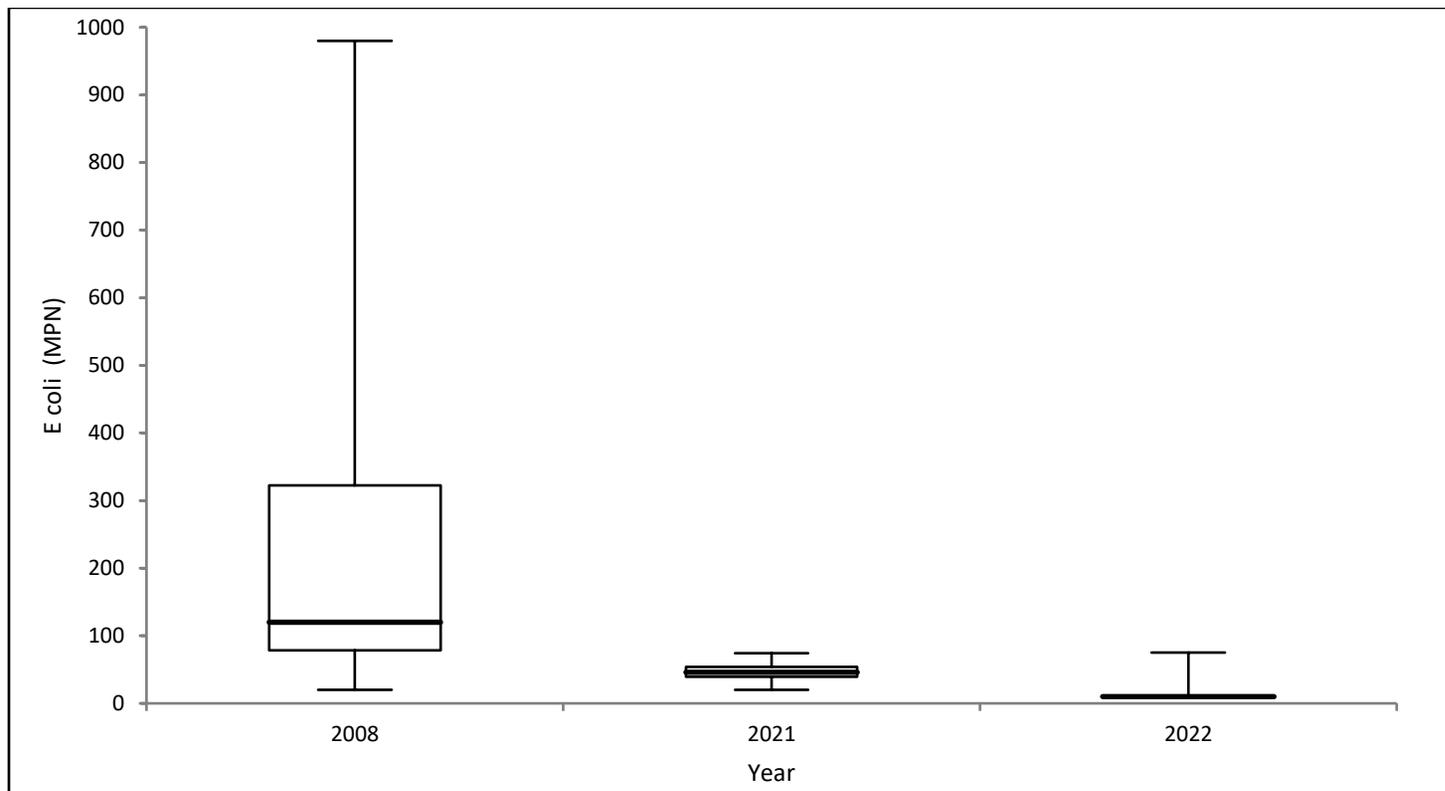
Lab ID <small>(Enter # from lids of samples here)</small>	Site ID/STORET #	Sample Location <small>(Lat Long or TRS)</small>	Sample Date	Sample Time	# of Bottles	Cooler #	Co-located Site ID and/or Comments	Depth in meters	Field Measurements	
									Temp °C	DO mg/L
									SC	pH
									μ	
									Temp	DO
									°C	mg/L
									SC	pH
									μ	
									Temp	DO
									°C	mg/L
									SC	pH
									μ	
									Temp	DO
									°C	mg/L
									SC	pH
									μ	

\* **Collection Methods (Record Above):** Depth Integrated (DI) ~ Depth/Width Integrated (DWI) ~ Grab ~ 0-2 meter column  
 When collecting lake samples, you **MUST** include the sampling depth(s).

Relinquished by	Date and Time	Received by	Date and Time

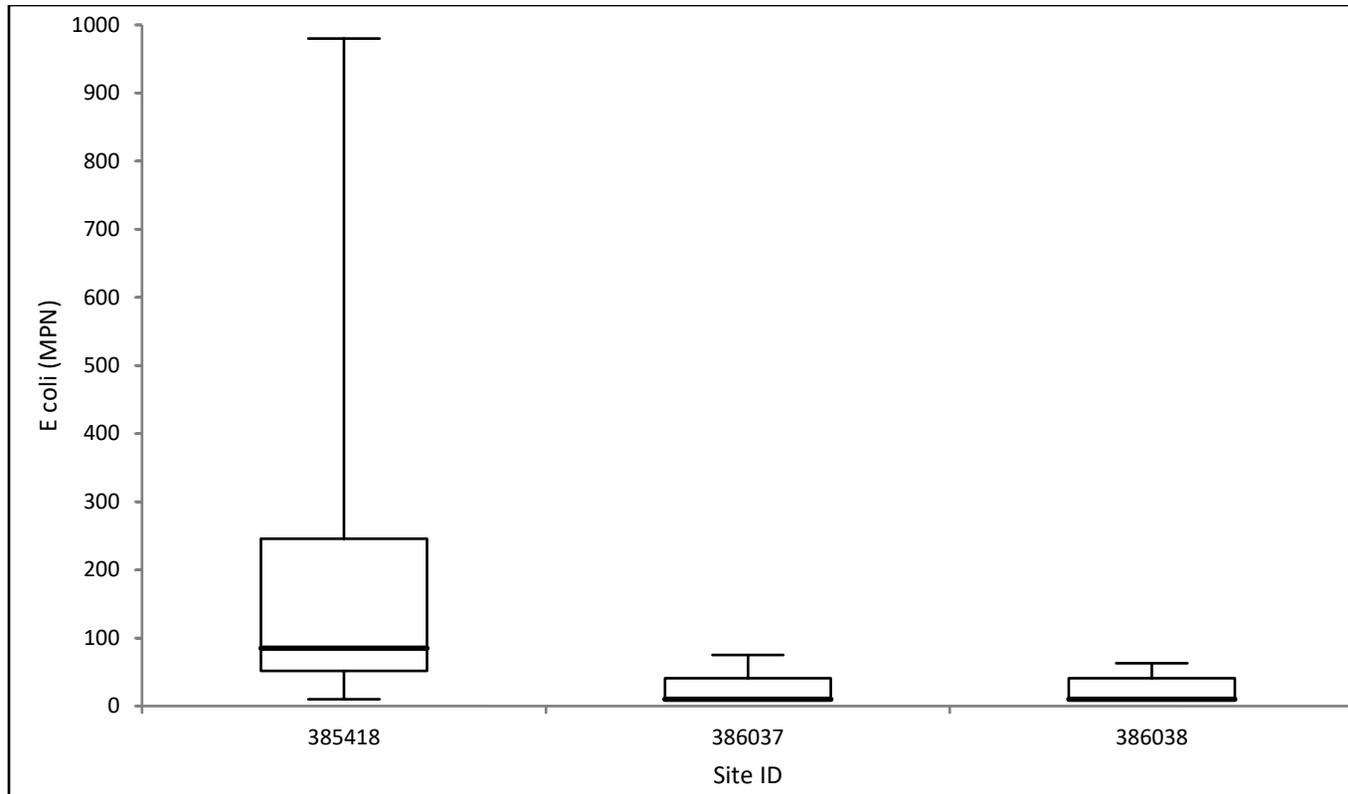


**Appendix #8**  
**E. coli Boxplots**  
**By Year and Site ID**



N | 39

E coli results by Year	Minimum	1st Quartile	Median	3rd Quartile	Maximum
2008	20	78.3	120.0	322.5	980
2021	20	39.3	46.0	53.8	74
2022	10	10.0	10.0	10.0	75



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E coli results by Site ID	Minimum	1st Quartile	Median	3rd Quartile	Maximum
385418	10	51.8	85.0	245.8	980
386037	10	10.0	10.0	41.0	75
386038	10	10.0	10.0	40.9	63