Environment and Natural Resources Trust Fund 2018 Request for Proposals (RFP)

Project Title: ENRTF ID: 082-B
Water Quality Benefits of Red River Basin Impoundments
Category: B. Water Resources
Total Project Budget: \$ 495,042
Proposed Project Time Period for the Funding Requested: <u>3 years, July 2018 to June 2021</u>
Summary:
Surface water management and biomass harvesting within impoundments can capture non-point source nutrients and sediment. This project will evaluate and enhance management of retention projects to maximize water quality improvements.
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Web Address
Location
Region: Central, Northwest
County Name: Becker, Big Stone, Clay, Grant, Mahnomen, Marshall, Norman, Otter Tail, Pennington, Polk, Roseau, Stevens, Traverse, Wilkin

City / Township:

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Alternate Text for Visual:

Water quality benefits and demonstrated biomass harvesting of the North Ottawa Impoundment.

Funding Priorities Multiple Benefits Outcomes Knowledge Base
Extent of Impact Innovation Scientific/Tech Basis Urgency
Capacity ReadinessLeverageTOTAL%



I. PROJECT STATEMENT

This project will evaluate and enhance management of retention projects in the Red River Basin for water quality improvements. Over 80% of the nutrient loads in the Red River of the North are coming from non-point runoff sources. A Red River Basin goal of reducing risk of flood damages has led to the planning and construction of distributed water storage throughout the basin. This project will provide additional valuable information to aid in design, location and operation of future distributed storage impoundments to enhance their water quality benefits to meet current and future goals for improving water quality and flood damage reduction.

PROJECT BENEFITS TO THE RED RIVER BASIN

- Water Quality Improvements: Nutrient capture and removal within impoundments addresses non-point nutrient runoff concerns.
- Flood Damage Reduction: Impoundments provide water retention during periods of flooding to reduce damages to agriculture land and downstream communities.
- Biomass Production: Harvested biomass removes nutrients from impoundments and can be utilized as a feedstock for fuel, fiber or green manure production
- Habitat Management: Water level management creates shallow water habitat for waterfowl resting and feeding. Mechanical harvesting of cattails is a sustainable management for maintaining biodiversity superior to spraying and burning management resulting in healthier habitat and cleaner water.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Implement Management Plan of North Ottawa Impoundment

Budget: \$ 75,000 The Red River Basin Commission will work with the Bois de Sioux Watershed District to actively manage water levels within the North Ottawa Impoundment to maximize sediment capture and grow wetland vegetation to maximize nutrient uptake and removal capacity. The North Ottawa Impoundment controls surface water runoff from a 75 square mile agricultural watershed. Management of this surface water allows for addressing non-point nutrient loading in the Red River Basin.

Outcor	Completion Date	
1.	Implemented management plan to maximize water quality improvements	6/2021
2.	Evaluated management plan to develop design and management guidance for	6/2021
	current and future impoundment projects	

Activity 2: Nutrient Load Monitoring

Detailed nutrient monitoring of inflows, interior movements and discharged water will be completed to further analyze the nutrient reduction capacity under various flow/seasonal variables and adaptive management.

Outcome	Completion Date
1. Install additional monitoring equipment to monitor water quantity and quality	5/2019
2. Conduct water quantity and quality monitoring to develop nutrient load budgets	6/2021

Activity 3: Biomass Harvesting and Utilization

Biomass harvesting for removal of nutrients from the project provides a mechanism for maintaining nutrient capture effectiveness by avoiding nutrient saturation. Harvested biomass is then spread on adjacent cropland to improve soil health through addition of organic matter and nutrients. The amount of nutrients removed will be documented and a detailed nutrient budget will be prepared. This project will evaluate the nutrient content and physical characteristics of the harvested biomass to identify additional utilization opportunities and the economic

Budget: \$ 87,000

Budget: \$ 208,500

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Environment and Natural Resources Trust Fund (ENRTF) 2018 Main Proposal

Project Title: Water Quality Benefits of Red River Basin Impoundments

evaluation of biomass utilization.

Outcome

Dutcome		Completion Date
1.	Conduct biomass harvesting and quantify nutrient removal	9/2020
2.	Evaluate value added biomass utilization opportunities and economics	6/2021

Activity 4: Reporting and Outreach

Budget: \$ 124,542

The Red River Basin Commission will work to inform stakeholders within the Red River Basin and elsewhere about the outcomes of this project. Stakeholder meetings will be conducted in the first and final year of the project to provide background and outcomes of the project. Stakeholder meetings will include watershed districts, county boards, conservation districts and agricultural groups.

Outcor	ne	Completion Date
1.	Host and participate in meetings to discuss interim and final results (20 events in each of the 1 st and 3 rd year)	6/2021
2.	Produce informational handouts for outreach	6/2021

III. PROJECT STRATEGY

A. Project Team/Partners

Red River Basin Commission: Aaron Ostlund, Project Manager, Leah Thvedt, Outreach Specialist, Julie Goehring, Manager, to implement the management plan, evaluate outcomes and conduct outreach

Bois de Sioux Watershed District: Troy Fridgen, BdSWD Technician to implement the management plan and conduct outreach.

RMB Environmental Laboratories: Robert Borash, RMB is a State of Minnesota approved laboratory and will be under contract to design and coordinate the monitoring activities based on their extensive experience in surface water monitoring.

Richard Hemmingsen, past director of the University of Minnesota Initiative for Renewable Energy and the Environment Center will investigate biomass utilization opportunities.

Dr. David Ripplinger, chair of the North Dakota State University Bio Energy and Products Innovation Center will investigate biomass utilization opportunities and economics of the harvested biomass material.

B. Project Impact and Long-Term Strategy

This project will develop a new approach to reduce the nutrient impairments common to the agricultural regions of our state. This project work could aid in advancing water quality improvements in the Red River Basin to meet proposed nutrient reduction goals for the State of Minnesota and the Red River. The current nutrient reduction goals being discussed on the Basin scale include the need to reduce current loading to the Red River by over 50%. In addition, Governor Mark Dayton has set forth an ambitious goal of achieving a 25% improvement in Minnesota's water quality by 2025. We need to develop new techniques if we ever want to be able to reach improvement goals. This work could be used for many existing and proposed flood retention projects in the Red River Basin.

C. Timeline Requirements

The activities in this proposal will be completed over 3 years.

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2018 Detailed Project Budget

Project Title: Water Quality Benefits of Actively Managed Retention Sites

IV. TOTAL ENRTF REQUEST BUDGET 3 years

BUDGET ITEM		AMOUNT	
Personnel:			
Aaron Ostlund, RRBC Project Coordinator (84% Salary, 16% Benefits); 30% FTE for 3 years	\$	70,086	
Julie Goehring, RRBC Manager (72% Salary, 28% Benefits); 20% FTE for 3 years	\$	71,283	
Leah Thvedt, RRBC Outreach Specialist (89% Salary, 11% Benefits); 20% FTE for 3 years	\$	43,173	
Professional/Technical/Service Contracts:			
Troy Fridgen, BdSWD Technician, Water management and monitoring equipment maintenance	\$	40,000	
Robert Borash, RMB Environmental Laboratories, Water monitoring and laboratory analysis	\$	150,000	
Richard Hemmingsen, Past director of UofM IREE, Biomass Utilization Investigation	\$	15,000	
David Ripplinger, North Dakota State Univerisity, Utilization Economic Evaluation	\$	25,000	
TBD, Competative bid for Harvesting and Utilization of wetland biomass as green manure	\$	30,000	
Equipment/Tools/Supplies:			
Automated water collection equipment (inlet and outlet sampling modifications and repair)	\$	8,000	
Remote monitoring equipment purchase and install	\$	5,000	
Computer for data management from monitoring equipment	\$	2,500	
Travel:			
6,000 miles per year (6,000 x 0.54 x 3 = \$9720) and meals for travel to project site. Milage and	\$	25,000	
meals to host and participate in outreach events (20 events in 1st year, 20 events in 3rd year)			
Additional Budget Items:			
Printing of interm and final outcome reports and education materials for distribution throughout	\$	10,000	
the state			
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$	495,042	

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	<u>Status</u>
Other Non-State \$ To Be Applied To Project During Project Period: NA		
Other State \$ To Be Applied To Project During Project Period: NA		
In-kind Services To Be Applied To Project During Project Period: RRBC indirect personnel salary	\$ 36,000	Secured
(Executive Director)		
Past and Current ENRTF Appropriation: This project adds to data and knowledge obtained from	\$ 300,000	in progress
ML 2014, Nutrient Capture Through Water Management and Biomass Harvesting		(\$ 108,000)
Funding History: Bush Foundation - Conduct Public Outreach for Nutrient Reduction	\$ 198,000	completed
Funding History: MPCA/EPA 319 - Initial Monitoring Equipment Purchase and Installation	\$ 27,960	completed
Funding History: MPCA/EPA 319 - North Ottawa Watershed and Impoundment Monitoring	\$ 290,000	in progress

Water Quality Benefits of the North Ottawa Impoundment

The North Ottawa Impoundment is a flood damage reduction project in the Red River Basin. The project is managed to maximize the capture and removal of nutrients and sediment found in surface runoff from its 75 square mile agricultural watershed. A multiple cell system is operated to maximize impoundment water quality benefits through:

- Surface water management to slow flows and capture suspended sediments
- Nutrient uptake by wetland vegetation
- Harvesting wetland vegetation during optimal times of the growing season to maximize nutrient removal



Photo: Cattail biomass harvesting conducted in 2016 using conventional forage chopping equipment. Harvested biomass is then land applied as an agricultural soil amendment. **Background Photo:** North Ottawa Impoundment with abundant water bird use.

Detailed nutrient monitoring of the inflowing surface waters from the watershed above the impoundment and water discharged has been ongoing with the 2016 season overall nutrient load reductions (table below) indicating significant water quality improvements. It is anticipated that through additional adaptation of the management plan these load reductions can be improved.

North Ottawa Impoundment 2016 Nutrient Load Reductions		
Total Phosphorus % Load Reduction	54%	
Total Nitrogen % Load Reduction	68%	
Total Suspended Solids % Load Reduction	47%	

Project Publication YouTube Link https://youtu.be/5X5E3APpsMQ Page 5 of 6 ENRTE ID: 082-B

Project Manager Qualifications

Aaron Ostlund, Red River Basin Commission Project Coordinator

B.S. Environmental Science and Engineering – University of Minnesota

Aaron has work experience and education in project management and water quality monitoring. His work with the RRBC includes participation with government agencies, local governing units and active citizen groups on water and land management in the Red River Basin. Aaron also has an agriculture background which aids in understanding the land practices that impact water resources. Through work on water resource monitoring and strategic nutrient planning in the RRB Aaron is capable of evaluating and providing guidance on project outcomes.

Organization Description

The Red River Basin Commission's (RRBC) mission is to develop a Red River Basin integrated natural resources framework plan; to achieve commitment to implement the framework plan; and to work toward a unified voice for the Red River Basin with a vision to bring Basin residents, organizations, and governments from three states and one province together to achieve basin-wide commitment to integrated watershed stewardship and management. RRBC works across the jurisdictional boundaries to create a shared vision in managing the land and water. The goal is a unified voice for the Basin around a comprehensive, sustainable plan for the safety and well-being of the Basin's citizens. RRBC's work is vital to Basin citizens given the complexity in managing the resources. The RRBC offers assistance in resolving problems and issues among the multiple jurisdictional entities.