

**Environment and Natural Resources Trust Fund
2014 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 058-B

Nutrient Capture Through Water Management and Biomass Harvesting

Category: B. Water Resources

Total Project Budget: \$ 478,500

Proposed Project Time Period for the Funding Requested: 3 Years, July 2014 - June 2017

Summary:

Evaluate potential capture of nutrients by utilizing cattails grown and harvested within shallow flood reservoirs. Treatment cells will be constructed within existing flood reservoirs. Harvested vegetation utilized for bioenergy.

Name: Jeff Lewis

Sponsoring Organization: Red River Basin Commission

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Location

Region: Northwest

County Name: Becker

City / Township:

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ Employment	_____ TOTAL _____%



Environment and Natural Resources Trust Fund (ENRTF)

2014 Main Proposal

Project Title: Nutrient Capture Through Water Management and Biomass Harvesting

I. PROJECT STATEMENT

Excess nutrients are one of the most common impairments for the watercourses of the Red River Basin (RRB) and the rest of the State of Minnesota. About 80% of the landuse of the RRB is agricultural cropland. Over 90% of the phosphorus and nitrogen found in the rivers and streams of the RRB originate from nonpoint sources. Minnesota Pollution Control Agency (MPCA) is currently completing watershed assessments on the sub-basins within the RRB. The MPCA and the International Red River Board through the International Joint Commission are currently in discussions on completing a nutrient reduction strategy for the Red River including where the Red River crosses the international boundary and eventually empties into Lake Winnipeg. This project intends to develop a new tool that can be used to help reduce excess nutrient runoff and improve water quality of the sub-watershed streams within the RRB and Lake Winnipeg the RRB’s outlet. Excess nutrients, especially phosphorus from nonpoint sources, have been one of the most difficult impairments to correct.

The RRB is also subject to significant flooding. One approach adopted by the Red River Water Management Board is to construct shallow off-channel flood storage reservoirs to reduce flood damages. The North Ottawa Reservoir recently constructed by the Bois de Sioux Watershed District is one such example. Our proposed project will expand the use of these types of flood reservoirs by redesigning the impoundments so that all streamflow above these reservoirs will be rerouted through vegetated treatment cells. These treatment cells will capture, and tie up in the vegetation (cattails), the phosphorus that is currently being discharged downstream. The vegetation in these treatment cells will be harvested to remove the excess nutrients and the vegetation will be utilized for bioenergy, the capture and reuse of phosphorus and other beneficial uses will be explored. We plan to use three locations, one in Minnesota, North Dakota and Manitoba. We have applied for funding or will be in all three jurisdictions. The budget proposal submitted to ENRTF here will allow us to do one site in Minnesota.

Recent work completed in Manitoba indicated a potential phosphorus capture of 10-20 pounds of phosphorus per acre of cattail harvested. Depending on the capture rate of the treatment cells it is possible to design a system that would capture and harvest all phosphorus being exported from the watershed above the North Ottawa Impoundment. Water quality monitoring will be done above and below these treatment cells to document the phosphorus and nutrient capture achieved. Soil sampling within the treatment cells and nutrient analysis of the vegetation will be done to help develop a detailed nutrient budget.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Design, Construct and Operate Treatment Cells

Budget: \$310,000

Description: Utilize information available to size and design the treatment cells to maximize the capture of nutrients. Retrofit the existing pools within the North Ottawa Impoundment to allow all streamflow to enter the impoundment by constructing an interior diking system and water distribution system that will enable the expansion of cattail growth in all pools. We will harvest individual cells at different times of the year to evaluate the optimum time to harvest for maximum nutrient capture. We will work with equipment suppliers to find harvesting techniques that work in wet soils.

Outcome	Completion Date
1. Design/Redesign flood impoundments to be able to route all water through cells	August 2014
2. Construct treatment cells within flood storage pools	November 2014
3. Establish Cattail vegetation	June 2015
4. Operate Treatment Cells	June 2015
5. Harvest cattails	September 2015

Activity 2: Evaluate Potential Uses of Cattail Biomass

Budget: \$60,000

Description: We plan to contract with Dr. Dan Svedarsky at U. of Mn.-Crookston who is working on cattail utilization for bioenergy and with Dr. Dave Ripplinger NDSU Bioeconomics to evaluate the potential bioenergy economics. And, we will also evaluate the potential for green manure and cropland organic matter enhancement.



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Outcome	Completion Date
1. Evaluate the energy value of cattails and techniques to develop a market	June 2016
2. Evaluate the economics of utilization of cattails	June 2016

Activity 3: Drawdown and Vegetation Harvest

Budget: \$15,000

Description: Draw down treatment cells to allow for harvesting of cattails with modified agricultural equipment. Evaluate harvesting techniques including bailing or chopping techniques to see what techniques give us a marketable product

Outcome	Completion Date
1. Test various harvesting equipment	September 2015
2. Harvest and test nutrient removal completed	November 2015

Activity 4: Nutrient Monitoring

Budget: \$50,000

Description: Develop detailed monitoring system to track a nutrient budget. Nutrient sampling of the soils within the pool as well as water quality monitoring both above and below the treatment cells will be completed.

Outcome	Completion Date
1. Soil sampling within the pool area	September 2015
2. Water Quality sampling for nutrients at locations above and below the cells	
3. Specific, measureable outcome #3	

Activity 5: Outreach, Management and publications

Budget: \$43,500

Description: Management of contracts will be done by the project leader Jeff Lewis. The results of this work will be published to inform managers within the RRB and elsewhere about the success of this treatment technology. The results will also be shared and if successful the technique will be used in multiple locations in the RRB to reduce nutrient loads to the waterways.

Outcome	Completion Date
1. Develop contracts with partners to accomplish the project goals	August 2014
2. Attend meetings to discuss interim results	June 2017
3. Publish papers to summarize project findings	June 2017

III. PROJECT STRATEGY

A. Project Team/Partners

The project team will include Jeff Lewis RRBC as the project manager, Jon Roschlein Administrator, Bois de Sioux Watershed District ,in-kind, WSN Engineering contract to design and construct treatment cells, Dr. Dan Svedarsky U of Mn-Crookston contract to evaluate utilization potential and in-kind, and Dr. Dave Ripplinger contract to develop economic model and in-kind.

B. Timeline Requirements

We plan to design and construct the treatment cells during the first construction season, to establish the cattail vegetation if not already present that first growing season and potentially harvest the first season of cattails fall 2014, and to evaluate the nutrient removal first growing season. The utilization work will be done during the first winter. We plan to experiment with a variation of techniques during the second growing season with the goal of improving the nutrient capture.

C. Long-Term Strategy and Future Funding Needs

This project if successful will develop a new and additional tool to try and reduce the nutrient impairments common to the agricultural regions of our state. The RRB is currently in the process of developing a nutrient reduction strategy that will likely result in a goal of a significant nutrient reduction of somewhere around 50%. We need to develop new techniques if we ever want to be able to reach this potential goal. This tool if successful could be used on many existing and proposed flood retention reservoirs that currently exist or are being built in the RRB.

2014 Detailed Project Budget

Project Title: Nutrient Capture Through Water Management and Biomass Harvesting

INSTRUCTIONS AND TEMPLATE (1 PAGE LIMIT)

Attach budget, in MS-EXCEL format, to your "2014 LCCMR Proposal Submission Form".

(1-page limit, single-sided, 10 pt. font minimum. Retain bold text and DELETE all instructions typed in italics. ADD OR DELETE ROWS AS NECESSARY. If a category is not applicable write "N/A", leave it blank, or delete the row.)

IV. TOTAL ENRTF REQUEST BUDGET [Insert # of years for project] years

BUDGET ITEM <i>(See "Guidance on Allowable Expenses", p. 13)</i>	AMOUNT
Personnel: Project Director (Lewis) .25 FTE salary and fringe (\$26,000 x 3) who will provide overall coordination of project, project reporting, and publication of results. Outreach director (Thvedt) .25 FTE salary and fringe (\$21,000 x 3) who will provide technical support for materials, publications and outreach program efforts.	\$141,000
Contracts: Dr. Dan Svedarsky - U of M - Crookston To evaluate potential uses for cattail biomass (\$45,000); Dr. Dave Ripplinger - NDSU - To develop economic model for cattail biomass utilization (\$15,000); WSN Engineering To design, construct and vegetate treatment cells (\$274,500)	\$ 334,500
Equipment/Tools/Supplies: <i>In this column, list out general descriptions of item(s) or item type(s) and their purpose - one row per item/item type.</i>	\$ -
Acquisition (Fee Title or Permanent Easements): <i>In this column, indicate proposed number of acres and name of organization or entity who will hold title.</i>	\$ -
Travel: Extensive project travel within the targeted watershed region with additional trips during the grant period throughout Northwest Minnesota to support regional project efforts within the Red River Watershed (\$1,000 x 3).	\$3,000
Additional Budget Items: <i>In this column, list any additional budget items that do not fit above categories. List by item(s) or item type(s) and explain how number was reached. One row per type/category.</i>	\$ -
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 478,500

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State \$ Being Applied to Project During Project Period: Additional funds for this project will be requested from the State of North Dakota and Province of Manitoba.	\$ -	<i>Pending</i>
Other State \$ Being Applied to Project During Project Period: <i>Indicate any additional state cash dollars (e.g. bonding, other grants) to be spent on the project during the funding period. For each individual sum, list out the source of the funds, the amount, and indicate whether the funds are secured or pending approval.</i>	NA	NA
In-kind Services During Project Period: Red River Basin Commission, Bois de Sioux Watershed District, Dr. Dan Svedarsky, U of M Crookston, Dr. Dave Ripplinger, NDSU (These are pending and exact service amounts have not been determined)	\$ -	<i>Pending</i>
Remaining \$ from Current ENRTF Appropriation (if applicable): <i>Specify dollar amount and year of appropriation from any current ENRTF appropriation for any directly related project of the project manager or organization that remains unspent or not yet legally obligated at the time of proposal submission. Be as specific as possible. Describe the status of funds in the right-most column.</i>	NA	NA
Funding History: <i>Indicate funding secured prior to July 1, 2014, for activities directly relevant to this specific funding request, including past ENRTF funds. State specific source(s) of funds.</i>	NA	NA

North Ottawa Impoundment



Location: Bois de Sioux Watershed District, Minnesota

Client: Bois de Sioux Watershed District

Completed in the spring of 2010, this flood control and natural resource enhancement project for the Bois de Sioux Watershed District was funded by local, state, and federal dollars.

The primary purpose of the North Ottawa Impoundment Project is to provide flood relief on Judicial Ditch 2 (JD2), Judicial Ditch 12 (JD12), Rabbit River, Bois de Sioux River, and the Red River of the North. Secondary goals include wildlife management, stream flow augmentation, water quality enhancement, and public recreation.

Located on JD2 and JD12 drainage systems, the North Ottawa Impoundment project empties into the Rabbit River about five miles and 10 miles downstream, respectively.

The impoundment provides flood relief by controlling outflows so they do not contribute to flood damages downstream. In general, gates are closed during any downstream flood event and reopened after the flood at a rate that will not cause downstream damages. The downstream areas of concern include land and communities adjacent to the local ditch systems, the Rabbit River, the Bois de Sioux River, and the Red River.

The Red River Basin Commission (RRBC) is a charitable, not-for-profit organization designed to help facilitate a cooperative approach to water management within the Basin and is a well-established forum for identifying, developing, and implementing solutions to cross-boundary issues.

The RRBC is led by 42 directors representing the diversity of this multi-jurisdictional Basin and is comprised of local, state, provincial, and First Nations government representation, the environmental community, and at-large members. It maintains offices in Moorhead, MN and Winnipeg, MB, and is dedicated to innovation in the management of the Red River Basin's water resources.

The mission of the RRBC 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.

Jeff Lewis, Assistant Executive Director, is the proposed Project Manager for this project. Mr. Lewis has worked for the RRBC since January of this year. Prior to this, Mr. Lewis, worked for the State of Minnesota for 33 years as a hydrologist for the Department of Natural Resources then as a manager for the Minnesota Pollution Control Agency (MPCA). He is a forest hydrologist by training and has a Bachelor of Science degree in Forestry and a Master of Science degrees in water resources from the University of Minnesota. He has experience in wetland research and management. He has managed water quality programs at the MPCA as well as major clean-up programs. He managed an annual budget of up to 50 million dollars per year in his last position at MPCA. He has been responsible for many successful projects including most recently the 25 million dollar investigation and clean-up of PFCC contamination at the Washington County Landfill near Lake Elmo.