

**Environment and Natural Resources Trust Fund
2010 Request for Proposals (RFP)**

LCCMR ID: 036-A3

Project Title:

Reduction of Phosphorus Exported From Bungo Creek Watershed

LCCMR 2010 Funding Priority:

A. Water Resources

Total Project Budget: \$ \$242,300

Proposed Project Time Period for the Funding Requested: 3 years, 2010 - 2013

Other Non-State Funds: \$ \$0

Summary:

Identify sources of phosphorus exported from riparian areas along Bungo Creek through hydrology, historical aerial, GIS, soil and owner survey studies so reduction actions can be formulated, implemented and demonstrated.

Name: Ronald Meyer

Sponsoring Organization: Pine River Watershed Alliance

Address: Box 822
Crosslake MN 56442

Telephone Number: (218) 543-6246

Email: rnsmeier@tds.net

Fax: _____

Web Address: _____

Location:

Region: Central

County Name: Cass

City / Township: Bungo Township

_____ Knowledge Base	_____ Broad App.	_____ Innovation
_____ Leverage	_____ Outcomes	
_____ Partnerships	_____ Urgency	_____ TOTAL

MAIN PROPOSAL

PROJECT TITLE: Reduction of phosphorus exported from Bungo Creek Watershed.

I. PROJECT STATEMENT

The project will reduce the Phosphorus export from the Bungo Creek into the Whitefish Chain of 14 lakes in Crow Wing County. The Whitefish Area Property Owners Association (WAPOA) has done testing over the past ten years that shows phosphorus from Bungo Creek and the Pine River to be the primary cause of reduction in water quality of the Whitefish Chain of Lakes. Because the levels of phosphorus haven't reached the level of impaired water, funding for corrective action has not been available through the MPCA. The Whitefish Chain is in the Mississippi Headwaters with approximately 2,800 cabins and homes in a very high value residential and recreational area contributing over half the real estate tax base of Crow Wing County.

Comprehensive chemical and physical monitoring of Bungo has shown that phosphorus entering and transported by creek waters is distributed along its length and cannot be attributed to point sources. As a result, a comprehensive historical land use study involving soil sampling, aerial imaging back to the 1930's, land use GIS surveys and modeling is indicated to identify distributed phosphorus sources. PRWA has partnered with the University of Minnesota to do the initial hydrology studies on Bungo. PRWA supplied grant monies, volunteers and access of private land by working with local residents and the University provided three continuous monitoring stations, related equipment and technical support. When land use studies from this project proposal are completed, specific changes to present land use practices will be identified and implemented. Hydrology studies will again be conducted to estimate the effectiveness of the land use practice changes.

The goal of the project is not to just monitor water quality but to make specific changes in land practices that improve the water quality of the Whitefish Chain.

II. DESCRIPTION OF PROJECT RESULTS

Result 1: Data search, collection and analysis. **Budget:** \$ 56,000.

Creek hydrology data will be partitioned to define the effect of snow melt, precipitation and wetland surges on phosphorus export from the creek. A survey of related research on similar phosphorus control projects will be conducted to provide model data and eliminate duplication of effort. Aerial land use imagery for the last 70 years will be acquired and analyzed to reveal changes in land use patterns that may suggest residual phosphorus sources. The entire budget is analytical labor.

Deliverable	Completion Date
1. Hydrology analysis report, related research bibliography and land use report.	January 2011

Result 2: Minnesota Phosphorus Source Assessment Tool modeling. **Budget:** \$42,500.

Necessary data for this tool will be acquired from public data bases including land use and cover data from the DNR Data Deli, cropland data from the Farm Service agency, septic system and feedlot data. The tool provides an estimate of the relative contributions of phosphorus to surface waters in a watershed. Eighty seven per cent of the budget is labor for data collection and modeling.

Deliverable	Completion date
1. Minnesota Phosphorus Assessment Tool relative contribution report.	April 2011

Result 3: Critical area soil sample test "ground truthing". **Budget:** \$ 41,000.

In order to validate model estimates, to establish "ground truth" and provide data for Result 4, actual soil samples will be taken and given a standard soil test in a certified laboratory. Stratified random sampling of land uses in the watershed will be employed. Analytical results will be correlated with model predictions for phosphorus loss. Sixty three percent labor and the remainder soil tests and travel.

Deliverable	Completion Date
1. Report of soil test results correlated with model estimates.	August 2011

Result 4: Minnesota Phosphorus Index modeling. **Budget:** \$15,000.

This model provides estimates of the risk of phosphorus loss from specific agricultural fields to surface waters. The model is uniquely tuned to Minnesota climate, soils, landscapes and land use practices. Data input involves erosion rates, manure application rates, soil test phosphorus levels and distances between field and surface water. Three methods of phosphorus transport considered are sediment bound phosphorus in rain runoff, transport of soluble phosphorus in rainfall runoff and soluble phosphorus in snow melt. One of these transport methods is usually more dominant and may provide the most effective method reductions. Eighty seven per cent of budget is modeling labor.

Deliverable	Completion Date
1. Report of Minnesota Phosphorus Index dominant phosphorus transport methods.	October 2011

Result 5: Phosphorus reduction recommendations and implementation. **Budget:** \$ 87,800.

Based on the modeling results, land use scenarios and soil test results, recommendations will be developed by University of Minnesota scientists from the College of Food, Agriculture and Natural Resource Sciences to reduce phosphorus export from specific areas expected to achieve significant reductions. The recommendations will consider reduced fertilizer application rates, improved application methods, crop changes, conservation tillage, buffer strips and catch basins. Implementation of these recommendations will be combined with a major program to educate the farmer/rancher community and county soils personnel to reduce phosphorus export to the areas surrounding the creek. These recommendations will also be applicable to four other creeks along the South Fork of the Pine, which export lesser but still significant amounts of phosphorus, and will be facilitated by county SWCD and NRCS staff. Phosphorus reductions will be confirmed by a hydrology survey of the creek waters. Sixty eight per cent of budget is labor, 10 percent water analysis and maint.

Deliverable	Completion Date
1. Phosphorus reduction recommendations document.	September 2011
2. Recommended reductions implemented	June 2012
3. Phosphorus reduction confirmation report	October 2012

III. PROJECT STRATEGY

A. Project Team/Partners

Adkins, Rhonda. Minnesota Pollution Control Agency. Pine River Watershed Manager

Dorsey, Edward. University of Minnesota College of Food, Agriculture and Natural

Resource Sciences. Instrumentation and computer software expert.

Research Associate, (to be named later). University of Minnesota College of Food, Agriculture and

Natural Resource Sciences. Computer modeling and nutrient management expert.

Meyer, Ronald. Pine River Watershed Alliance, Chairman and Program Manager

Moncrief, Dr. John. University of Minnesota College of Food, Agriculture and Natural Resource

Sciences. Principal Investigator and soils expert.

Nelson, Joel. University of Minnesota, Information Systems

Sumption, John. Cass County Environmental Services Manager

Wiens, Mel. Crow Wing River Basin Forage Council. Agricultural educator.

Zamora, Dr. Diomdies. University of Minnesota Extension Service, Brainerd, Forestry

B. Timeline Requirements

The activities described above are sequential and dependent upon previous results. The hydrology and land use studies of Result 1 will be conducted concurrently. Soil sampling of Result 3 needs to be done during the summer as shown. Task 5 reduction recommendations need to be completed during the 2011 winter in order to be ready for the summer growing season.

C. Long-Term Strategy. This study is designed to improve water quality, not just monitor it, through specific changes in land use practices. This model and improvement techniques will be transferable to Home Brook which is responsible for the impairment of Lake Margaret, Gull Lake Chain, in Cass County.

Project Budget

IV. TOTAL PROJECT REQUEST BUDGET 2 1/2 years

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel:	\$ -
Research Associate at 80 % FTE for 2 1/4 years as the main investigator	\$ 108,000
Instrumentation Scientist at 40% FTE for two years	\$ 60,000
IT Specialist - GIS 20% for two years`	\$ 30,000
Contracts:	\$ -
Soil analysis. 400 samples x \$20 each for nutrient analysis by U of M Soils Lab.	\$ 8,000
Water analysis. 40 samples/week x 20 weeks x \$11 each by RMBE labs.	\$ 8,800
GIS Services- Soil & Landscape Analysis Lab (Ortho Rectification of Images)	\$ 5,000
Equipment/Tools/Supplies:	\$ -
Equipment maintenance/replacement as reqd.and repair. Three ISCO 3700 Samplers, ISCO 4150 Data Loggers and velocity/pressure sensors.	\$ 12,500
Acquisition (Fee Title or Permanent Easements):	
Travel:	-
10 trips x 4 days ea., 340 mi., \$.52/mi., \$150 for 2 rooms, \$35 food ea./day Cass for soils surveys, soil sampling, GIS location maping and confonformation.	\$ 10,000
Additional Budget Items:	
TOTAL PROJECT BUDGET REQUEST TO LCCMR	\$ 242,300

V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
Other Non-State \$ Being Applied to Project During Project Period: A grant request will be submitted to the Larsen Foundation to allow an earlier start before July 2010.	\$ 10,000	Pending
Other State \$ being applied to Project During Project Period: A grant request will be submitted to the University of Minnesota Central Region Sustainable Development Partnership which could allow an earlier start.	\$ 10,000	Pending
In-kind Services During Project Period: Professor John Moncrief as Principal Investigator responsible for project technical direction	\$ 32,500	
Ron Meyer as Program Manager responsible for overall program plans, goal tracking, monthly program reviews and program reporting.	\$ 10,000	
Jack Wallschlaeger as Field Manager responsible for Farmer/ Rancher interface, land access arrangements and property owner relations.	\$ 7,500	
Remaining \$ from Current Trust Fund Appropriation (if applicable): .		
Funding History: Funding received in 2008 for initial Hydrology Survey from the Central Region Partnership (10k), the Larsen Foundation (10k) and the Pine River Watershed Foundation (10k).	30,000	

Program Manager Qualifications and Organization Description

Program Manager, Ronald Meyer, is Chair of the Pine River Watershed Alliance (PRWA) and a retired Medtronic executive with a history of successful technical programs including the Bungo Creek Hydrology Program and the Natural Resources Program for the Whitefish Area Property Owners Association (WAPOA). Mr. Meyer in conjunction with Professor John Moncrief of the University of Minnesota's College of Food, Agriculture and Natural Resources has guided the technical effort on the successful Bungo Hydrology Project.

WAPOA has initiated and funded the formation of the PRWA to deal with watershed wide issues impacting the Whitefish Chain, like the phosphorus loading from the Pine River and Bungo Creek. PRWA was started in 2005, incorporated in 2008 and received 501c3 status in March of 2009. Besides the Bungo Creek Program, PRWA has been actively involved with Crow Wing County Commissioners in the establishment of the Crow Wing County Sanitary Sewer District and has partnered with MN Waters in the creation of the Legislative Forum held in Walker MN in the summer of 2008 and repeated for the MN Senate Environmental Committees in St. Paul in the winter of 2009.

PRWA is presently involved in discussions with the MPCA to use Clean Water Legacy money to do hydrology studies throughout the watershed. The data base developed will be very similar to the initial hydrology work done on Bungo Creek. This base of scientific data will be used to measure improvements in water quality throughout the watershed when improved land use practices are implemented across the watershed.

