Environment and Natural Resources Trust Fund
2016 Request for Proposals (RFP)

Project Title: **ENRTF ID: 056-B**

On-Farm Prairie Filter Strips: Optimizing Water Quality Benefits

Category: B. Water Resources

Total Project Budget: $ 340,552

Proposed Project Time Period for the Funding Requested: 4 years, July 2016 to June 2020

Summary:

Establish a research and demonstration program to evaluate on-farm prairie filter strips – an innovative variation of buffer strips that economically and strategically protects water quality.

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Location

Region: Central, SW, SE

County Name: Big Stone, Blue Earth, Brown, Chippewa, Cottonwood, Dodge, Douglas, Faribault, Fillmore, Freeborn, Goodhue, Grant, Houston, Jackson, Kandiyohi, Lac qui Parle, Le Sueur, Lincoln, Lyon, Martin, McLeod, Meeker, Mower, Murray, Nicollet, Nobles, Olmsted, Pipestone, Pope, Redwood, Renville, Rice, Rock, Sibley, Stearns, Steele, Stevens, Swift, Traverse, Wabasha, Waseca, Watonman, Winona, Yellow Medicine

City / Township:

Alternate Text for Visual:

A prairie planting is shown at the edge of a corn field. Water quality data and a picture of the runoff show that even a small edge-of-field strip results in dramatically cleaner water.

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

PROJECT TITLE: On-farm prairie filter strips: Optimizing water quality benefits

I. PROJECT STATEMENT

We will evaluate and report the effectiveness of strategically located prairie filter strips to absorb phosphorus, sediment, and runoff water from the base of slopes in row crop fields and evaluate a tool for effective siting of these filter strips.

THE PROBLEM: Surface runoff from crop fields is impairing streams and lakes with eutrophication from excess phosphorus, with sediment impairing fish habitat and filling reservoirs, and with higher peak stream flows eroding streambanks. The low proportion of spring vegetation on the landscape limits spring transpiration, aggravating the extent of spring runoff, especially where sloping fields are prevalent, as in southeast Minnesota.

A SOLUTION: The "STRIPS" project is a system developed in central Iowa of using strips of native prairie vegetation (NPV) at the base of row-cropped slopes (footslopes) to filter and absorb water, sediment, and nutrients. While removing large acreages of cropland from production is not economically feasible, the Iowa "STRIPS" project has shown that small, well targeted areas of prairie vegetation for runoff filtration and infiltration can be very effective in moderating row crop runoff effects. Runoff volumes were reduced by over 50% and sediment and phosphorus losses by over 90% in replicated small field catchments, when the area of NPV at the footslope was 10% of the runoff contributing area compared to no filter strip (www.nrem.iastate.edu/research/STRIPs/). Iowa farmers are showing interest in the practice because it is targeted for effectiveness and removes little cropland from production.

THE NEED: To bring on-farm prairie filter strips to Minnesota, we first need to measure their effectiveness in our shorter growing season, learn if smaller (more affordable) strips are effective, and demonstrate their practicality on real farms. If adopted, prairie filter strips would increase the impact of state and federal cost-share and easement investments for water quality by targeting appropriate footslopes. The strips provide another tool for reaching water quality goals such as those in the state's Nutrient Reduction Strategy, and may increase pollinator and wildlife habitat in agricultural landscapes.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Establish research site and measure effectiveness of prairie filter strips. Budget: $250,914

Establish, monitor, and compare runoff water quality and quantity from cropped field catchments (3 to 20 ac) containing either 5% NPV, 10%, NVP, or no filter strip; replicated with 3 catchments per treatment. Start monitoring in year 2, after prairie plants have begun maturing. Measure runoff, phosphorus, and sediment losses. Analyze and report results. (Haverhill WMA in Olmsted County has been identified as a potential site.)

Outcomes	Completion Dates
1.A. Long-term research site(s) established of 9 cropped field catchments with treatment strips and monitoring equipment	03/2017
1.B. Water quality and quantity data collected for 2 years	10/2019
1.C. Two years of data interpreted and reported.	04/2020

Activity 2: Establish on-farm demonstrations and share lessons. Budget: $78,219

Working with partners in the ag community, engage farmers to establish footslope NPV filter strip demonstrations on three working farms. Track costs and benefits. Conduct field days at each site. Prepare outreach documents, building off Iowa materials and Minnesota lessons. Distribute at field days and electronically, targeting farmers. Report research and demonstration results in a UM Extension bulletin.

Outcomes	Completion Dates
2.A. Three on-farm demonstration sites established.	03/2017
2.B. Field days and outreach documents completed and distributed.	08/2019

Activity 3: Evaluate a tool for strategically siting the prairie strips **Budget: $11,418**

The value of on-farm prairie filter strips comes from strategically selecting the right sites on the landscape, and positioning them in a field for greatest effectiveness. The Ag Conservation Planning Framework (ACPF) is a desktop tool that may be useful for quickly identifying effective sites, and communicating with landowners. We will test whether the ACPF is practical for siting NPV footslope filter strips by using it to analyze two or more small (e.g. 40 sq mi) agricultural watersheds.

Outcomes	Completion Dates
3.A. Two or more watersheds mapped for potential footslope filter strip sites.	12/2018
3.B. Evaluations completed of the use of the ACPF for mapping potential sites.	12/2019

III. PROJECT STRATEGY

A. Project Team/Partners

Partial funding from ENRTF:

- Ann Lewandowski (UM Water Resources Center) will provide project coordination.
- Dr. Chris Lenhart (grant-funded research hydrologist, UM Dept of Bioproducts and Biosystems Engineering) is the research leader.
- Land Stewardship Project (LSP) staff – identify and support farmer cooperator(s), engage farmers in the learning process, participate in refining research and communication needs. (LSP already has some experience exploring the use of prairie filter strips and discussing them with farmers.)

Contributed time:

- Faye Sleeper (UM Water Resources Center), Project Manager.
- DNR, Supervisor – consider using farmed land on the Haverhill Wildlife Management Area as a research site.
- Megan Lennon and Dan Shaw (Board of Water and Soil Resources) – provide advising and coordination in relation to BWSR activities.
- Heidi Peterson (MN Department of Agriculture) – provide advising and coordination with related MDA activities.

B. Project Impact and Long-Term Strategy

The ultimate project impact is improved water quality through the adoption of footslope prairie strips on Minnesota farms (assuming we show it is cost effective). Our strategy is to design this project as a foundation for other activities beyond this project, which could include:

- Long term monitoring of the established research site to measure impacts after the prairie plantings fully mature, and under various weather patterns.
- Assessing ancillary benefits, including habitat for pollinators. (Interested partners have been identified.)
- Creating a statewide program like the Iowa "STRIPS" program to promote adoption.
- Conversations with state NRCS staff to create a new practice standard to allow for cost share.

Future funding will be needed from LCCMR and other partners to complete these activities.

C. Timeline Requirements

We request a project end date of June 2020 (4 years) to accommodate the time to establish prairie strips in fall 2016 through 2017, monitor for two growing seasons (2018 and 2019), and analyze and report results winter of 2019/2020. Demonstration sites will be established in 2016-2017, with field days in 2018 and 2019.

2016 Detailed Project Budget

Project Title: On-farm prairie filter strips: optimizing water quality benefits

IV. TOTAL ENRTF REQUEST BUDGET for 4 years

BUDGET ITEM	AMOUNT
Personnel: Dr. Chris Lenhart, Research leader (20 % FTE for 3.75 yrs = **$78,051.79**) Ann Lewandowski (20% FTE for 3.75 yrs = **$53,680.97**), Project coordinator (75% goes towards salary, 25% towards benefits)	$ 131,733
Professional/Technical/Service Contracts: Research sites installation (9 sites @ $2,000 = **$18,000**) Local technician to collect data, maintain equipment. Individual to be determined; local or state agency staff near the site with monitoring experience (2 years X 400 hrs X$35/hr = **$28,000**) Demonstration site establishment and management (Three sites. $2000 to establish strips, $2,000 to landowner for maintenance time, $1250 to conduct field day = $5250 for each site. X3 sites = **$15,750**) GIS Technician to test the strips siting tool (60 hrs @ $100 = **$6,000**) Land Stewardship Project contract for farmer engagement, outreach, developing partnership with at least two cooperators for demonstration sites, and helping deliver field day events **$17,000**	$ 84,750
Equipment/Tools/Supplies: Edge-of-field monitoring equipment for 9 sites -- H-flume (9@$2,000), water level probe (9@$2,500), Isco auto-samplers (9@3,500), software ($390), cables/connections (9@$500), solar panels (9@$300), batteries (9@$65), rain guages (3@$750), shelters (9 @ $1,500) = **$95,925**) Supplies: Preparation and photocopying of field day and outreach materials	$ 95,925 $ 1,000
Travel: Project coordinator and research manager to visit research and demo sites. Per diem for two, plus mileage at University rates. 6 trips per year @ $200 X 3 years = **$3,600**.	$ 3,600
Lab analysis: Phosphorus and sediment analysis of the reseach site water samples = $27.25/sample X 864 samples (6 events/yr X 8 samples/event X 9 sites X 2 years) = **$23,544**	$ 23,544
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 340,552

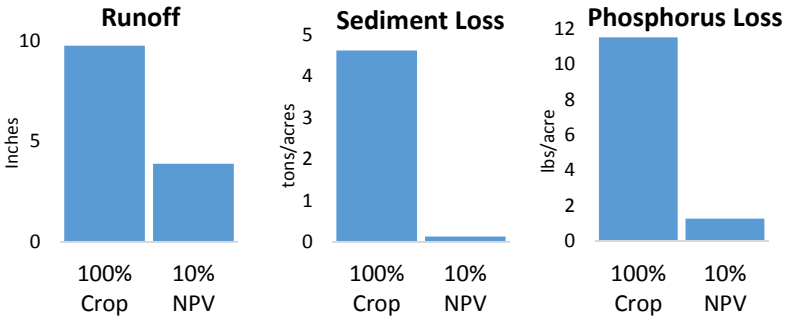
V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ To Be Applied To Project During Project Period:	$0	N/A
Other State $ To Be Applied To Project During Project Period:	$0	N/A
In-kind Services To Be Applied To Project During Project Period:	$0	N/A
Funding History:	$0	N/A
Remaining $ From Current ENRTF Appropriation:	$0	N/A

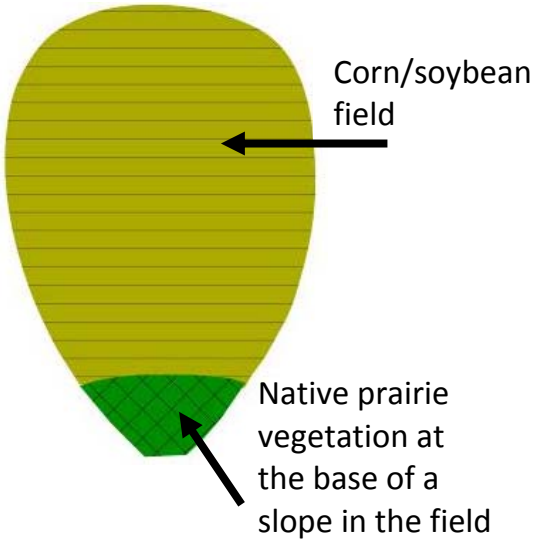
If strategically placed, small in-field patches of native prairie vegetation (NPV) can dramatically improve water quality, and provide prairie habitat.

100% crop | 90% crop 10% prairie | 100% prairie

Iowa data showed dramatic reductions in sediment and phosphorus loss.



Averages for Apr-Oct, 2008-2011.
Sediment loss is 2008-2010. Cropland is no-till corn/soy.



We will:

- measure effectiveness in Minnesota's shorter growing season,
- learn if the strips can be smaller (more affordable),
- demonstrate them on real farms.

Project Manager Qualifications and Organization Description

Project manager qualifications and responsibilities

Research Lead:

Chris Lenhart, Hydrologist, Ph.D. Research Professor (grant funded), UM Dept. of Bioproducts & Biosystems Engineering

- Currently leading several research projects in hydrology, geomorphology and watershed management at the University of Minnesota.
- Author & co-author of numerous publications on hydrology, restoration and stream geomorphology.
- Taught classes in hydrology, wetlands, soils and plant ecology at MSU-Mankato and UM.

Project Management and Administration:

Faye Sleeper, Project Manager, Associate Director, UM Water Resources Center (WRC)

- Overall project management.
- Extensive background in water resources, policy development and the human aspects of water resources management.
- Prior to joining the WRC she managed the Minnesota Pollution Control Agency's impaired waters programs, nonpoint financial assistance programs, and the basin/watershed activities.

Ann Lewandowski, Project Coordinator, Research Fellow (grant funded).

- Will coordinate all project activities, complete project reporting requirements, and contribute to the education and evaluation activities.
- Has developed education materials, coordinated research and outreach projects, and delivered technical training for agricultural and conservation professionals in positions with the USDA-NRCS and the UM.
- M.S., Geography, UM, with an emphasis in soils and natural resource science.

Organization description and mission

The University of Minnesota Water Resources Center facilitates interdisciplinary research, education, and outreach on water resources. It hosts the Water Resources Science graduate program with faculty affiliates across many UM Departments. In collaboration with UM Extension as well as state and federal agency partners, it develops and delivers outreach and professional education programs on agricultural practices, storm-water management, on-site sewage treatment, and other topics. Current or recent related projects include the Watershed Specialist Training program, the USDA Conservation Reserve Readiness Program for the Midwestern region, and Conservation Applications of LiDAR training. The WRC hosted and chaired the Lake Pepin and Minnesota River TMDL Science Advisory Panels.