

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

Project Title:

ENRTF ID: 154-F

Seeding Between the Lines: Permanent Habitat Within Rowcrops

Category: F. Methods to Protect, Restore, and Enhance Land, Water, and Habitat

Total Project Budget: \$ 179,400

Proposed Project Time Period for the Funding Requested: 3 years, July 2016 to June 2019

Summary:

Establishing prairie forbs and alfalfa as permanent cover strips in the bare soil between selected rows of corn/soy to create pollinator, monarch and gamebird habitat without removing land from production.

Name: Shawn Schottler

Sponsoring Organization: Science Museum of Minnesota - St. Croix Research Station

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Web Address

Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

Photos showing the configuration of the permanent habitat strips within a cornfield and what they might look like.

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



PROJECT TITLE: Seeding Between the Lines: Permanent Habitat Within Rowcrops

I. PROJECT STATEMENT

This project will test and demonstrate a new approach to creating perennial habitat for pollinators, monarchs, songbirds and gamebirds within an agricultural landscape without removing land from production. This method will take advantage of precision farming techniques, where equipment drives in the same field rows year after year, and establish strips of permanent vegetation in the bare ground between selected corn/soy rows.

The end product will be a suite of ~30-inch wide strips of perennial prairie forbs or alfalfa established in the bare space between every 24th row of an 80 acre corn/soy field on the Willow Lake Farm, near Windom Minnesota. This configuration means that **no land is taken out of production**, yet ~4% of the field is in perennial cover. We will evaluate which individual plant species or combination of species creates the most habitat value, the least crop yield loss, and are the most cost effective to implement. We will develop the techniques necessary for management of these species on a farm scale and provide a cost-benefit summary of the results.

The technology tested in this project could ultimately result in thousands of acres of perennial filter strips within a watershed, offering not only an expanded habitat component to the landscape, but also a significant potential water-quality benefit.

Grassland species such as native bees, monarch butterflies, meadowlarks, and pheasants continue to decline, and water-quality trends are not improving in many lakes and rivers. The common denominator linking these negative trends is the need for more perennial vegetation/cover crops on the landscape. Annual cover crops such as rye offer promising water-quality benefits but do not provide extended habitat value and require the farmer to incorporate several management steps and costs every year. Perennial cover crops would eliminate the additional management steps and provide full season habitat value. The challenge is to find ways to introduce perennial habitats into the agricultural landscape that do not take land out of production, are economically viable, and result in measurable benefits to water quality and grassland species.

Some prairie species may be highly compatible with the lifecycle of corn/soy. Long-lived, short stature species, such as Golden Alexander (*Zizia aurea*) that have low water and nutrient demands may thrive in the area between rows with minimal competition to the corn/soy. Perennial N-fixing legumes, including alfalfa, could offer the additional benefits of reducing fertilizer needs. Glyphosate-tolerant varieties of alfalfa offer particular promise due to the ease of adapting to existing herbicide treatments. Strips will be searched multiple times during the growing season to inventory songbird/game bird nesting, monarch production, and density of native bees (pollinators) as metrics of their habitat value.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Test the establishment and management of ~15 different prairie species and alfalfa as permanent cover strips within row crops **Budget \$65,000**

- Establish ~25, ½-mile long test strips of permanent cover within a 80 acre field where perennial prairie species and alfalfa are planted and maintained (including shielding from herbicide applications) in the bare soil between every 24th row of corn/soy.
- Evaluate ~15 native prairie forbs (flowers) and alfalfa for their ability to be established and survive as perennial inter-row cover crops that have minimal impact on the adjacent row corn/soy grain yields. Criteria for candidate species would be: long-lived; shade tolerant, nitrogen-fixing, low water consumption, minimal competition with the corn/soy, and non-invasive.
- Design and build a custom 30" seed drill that can ultimately be piggybacked to a traditional corn planter.



Outcome	Completion Date
1. Plant and manage strips of permanent cover in the bare space between every 24 th corn row	July 2017
2. Evaluate suitability of species as perennial cover strips, compatible with row crops	June 2019
3. Construct and demonstrate a planter for seeding the perennial strips	May 2017

Activity 2: Evaluate benefits of inter-row perennial cover strips to pollinators, monarchs, songbirds and gamebirds.

Budget: \$ 74,400

- Survey all strips for grassland nesting birds. Systematically walk all strips twice during the nesting season to locate nesting songbirds, pheasants and waterfowl. Mark nests and return to evaluate success.
- Estimate native bee density in representative segments of perennial strips and compare to non-planted inter-row areas
- Calculate potential monarch butterfly recruitment by counting caterpillars and chrysalides on all milkweeds.

Outcome	Completion Date
1. Quantify gamebird and songbird recruitment resulting from inter-row cover strips	June 2019
2. Estimate number of bees per acre utilizing cover strips	June 2019
3. Quantify number of Monarch butterflies produced per cover strip	June 2019

Activity 3: Technology transfer: cost analysis, implementation recipes and field tours

Budget: \$ 40,000

Outcome	Completion Date
1. Implementation Recipes: Summarize species and management techniques that optimize habitat value and minimize yield loss.	May 2019
2. Cost Analysis: Determine cost of establishment, management, and yield loss associated with each perennial strip type.	March 2019
3. Feasibility and Benefit analysis: Estimate incentives required for adoption of the perennial strip technique and compare to the estimated habitat value.	June 2019
4. Dissemination: Host two field tours, and on-farm agro-ecology summit sharing results with farmers and resource managers.	May 2019

III. PROJECT STRATEGY

A. Project Team/Partners

Tony Thompson, owner and operator of Willow Lake Farm near Windom Minnesota, is the co-investigator on this project and has offered his farm as the test site for this project. Mr. Thompson will assist with field design, planting of the cover strips, habitat evaluation and yield monitoring. **Mr. Thompson was awarded the 2011 Siehl prize for Excellence in Agriculture and is providing a \$22,500 cash match from this award to assist with funding a summer intern.**

B. Project Impact and Long-Term Strategy

This project completes the initial stages of a new paradigm for cover crops, and should stimulate future test plots and long-term evaluation of perennial cover crops.

C. Timeline Requirements

The project will require three years to complete

2016 Detailed Project Budget

Project Title: Seeding Between the Lines. Permanent Habitat Within Rowcrops

IV. TOTAL ENRTF REQUEST BUDGET 3 years

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel: - Schottler, Senior Scientist. Project Coordination: Planting, vegetation management, method development, measurement of habitat value, and cost-benefit analysis. 40% FTE for 3 years; Salary =70%, Benefits=30% (\$120,100K)	\$ 120,100
Professional/Technical/Service Contracts: -Task Based Contract with Willow Lake Farm Staff: Project Design, Planting, Field Management, Equipment Design, Field Tours, Hosting Agro-Ecology Summit:~ 500 hrs over 3 years (20K)	\$ 20,000
Equipment/Tools/Supplies: Prairie seed (\$2,500), fuel (\$500), herbicide shields and field supplies (\$2,500)	\$ 5,000
Travel: -20 trips from St. Paul to Windom 310 miles round-trip. (6200 miles x \$0.53miles = \$3300) -Field season lodging for summer intern: (500/month x 4 months x 3 years = \$6000)	\$ 9,300
Additional Budget Items: Design and fabrication of custom planter for 30inch strips	\$ 25,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 179,400

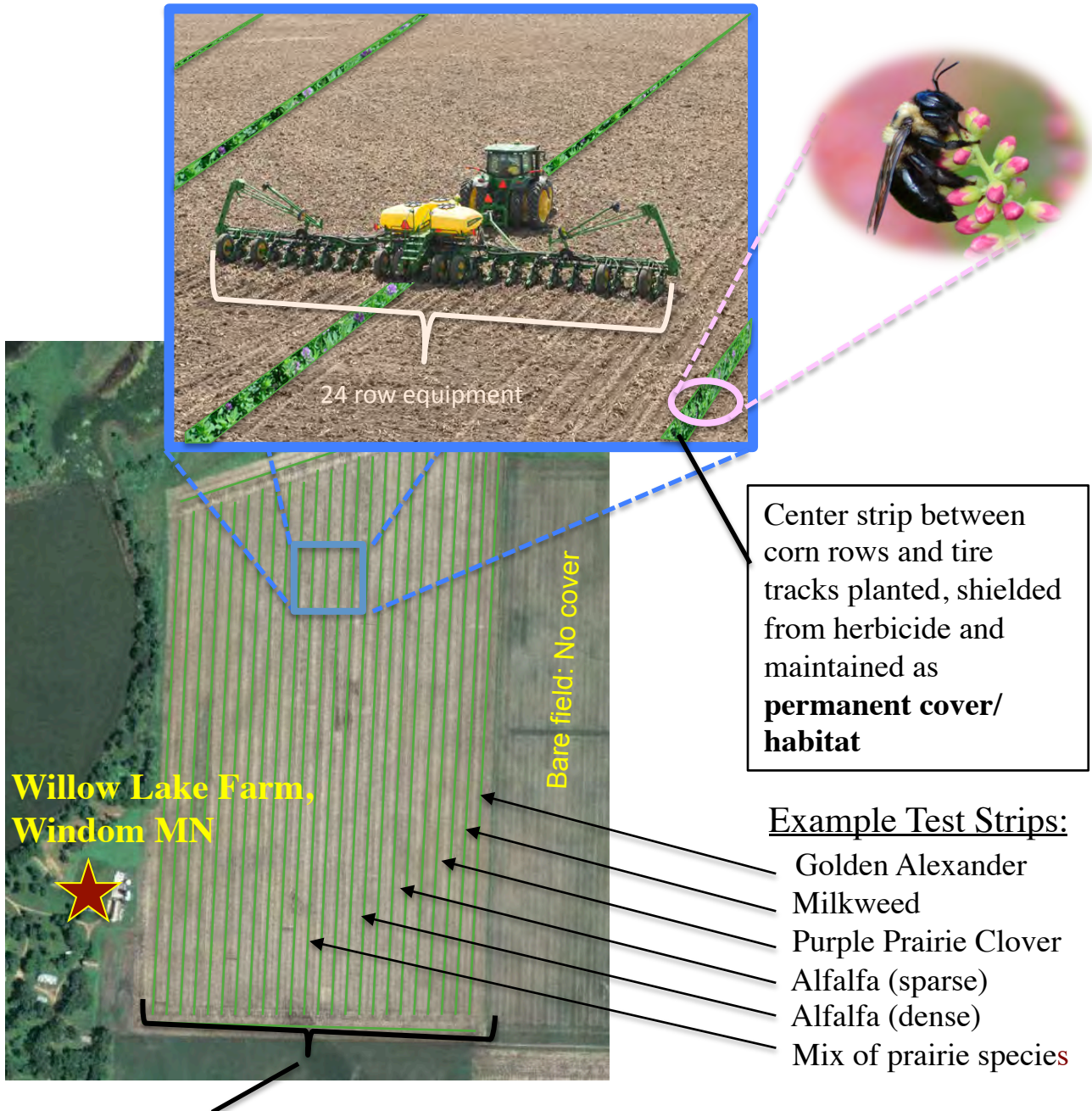
V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
Other Non-State \$ To Be Applied To Project During Project Period: Tony Thompson, owner and operator Willow Lake Farm where this project will be conducted, was awarded the <i>Siehl Prize for Excellence in Agriculture</i> in 2011. Mr. Thompson is dedicating \$22,500 from this prize as a <u>cash match</u> to the project. Funds will be used to help support a field season intern: (Field Season Intern. \$15/hr x 500 hr/yr x 3 years = \$22,500)-Provided as <u>cash match</u> from Tony	\$ 22,500	<i>Secured</i>
Other State \$ To Be Applied To Project During Project Period:	\$ -	
In-kind Services To Be Applied To Project During Project Period: Farm Equipment: Tractors, tillage equipment, sprayers etc., provided by Willow Lake Farm Support services from Science Museum of Minnesota 43% of direct costs (68K)	\$ 68,000	
Funding History:	\$ -	
Remaining \$ From Current ENRTF Appropriation:	\$ -	



Seeding Between the Lines: Permanent Habitat Within Rowcrops

What it could look like....



- 80 acre field with ½-mile long, ~30 inch wide habitat strips
- Planted in the bare space between every 24th corn/soy row
- Evaluate 15 prairie species and alfalfa for establishment, habitat value, suitability with row-cropping and cost effectiveness



Project Manager Qualifications: Shawn P. Schottler

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Research and Restoration Expertise

As a scientist and restoration specialist, my studies focus on quantifying the relationship between land use, water quality and habitat in agricultural watersheds. My two principal areas of expertise are: a) the use of lake sediment records to understand changes in sources and transport of sediment and nutrients from agricultural watersheds, and b) methods to increase floristic diversity and structure in prairie reconstructions.

I have over 25 years of experience conducting prairie reconstructions, restoration management and floristic diversity studies. To facilitate these prairie restorations efforts, I have established and continue to operate seed production orchards for over 60 species of native prairie plants. Management (e.g. weed control) in these orchards has provided me with an extensive understanding of how different herbicides have selective activity for different prairie species. This knowledge will be critical to the LCCMR project proposed here as we try to find ways to exploit the herbicide compatibility of some prairie species with the conventional weed control methods used in a corn and soy rotation.

Affiliations

1997-present: Senior Scientist, St. Croix Watershed Research Station, Science Museum of Minnesota
1998- present: Owner-operator of Gentian Farm, Native Prairie Seed Orchards

Education

1996. Ph.D., Environmental Engineering. University of Minnesota, Minneapolis, MN
1989. B.S., Geotechnical Engineering, University of Minnesota, Minneapolis, MN

Selected Publications

- Schottler, S. P., Port J. and DeGolia, T., 2008, Influence of floristic diversity on songbird nesting preferences in a suite of adjacent reconstructed grasslands, *Ecological Restoration*, v. 26 (3), 195-197.
- Schottler, S. P., Port J. and DeGolia, T., 2008, An efficient method for quickly surveying pheasant nesting site preferences, *Ecological Restoration*, v. 26 (3), 198-199
- Peters, M. and Schottler, S. P. 2011. The role of forb seeding rate in enhancing floristic diversity in prairie reconstruction. IN *Proceedings of the Twenty-Second North American Conference*. Williams, D. and Smith, D., editors. 2010 Aug 1-5, Cedar Falls, IA. Cedar Falls: University of Northern Iowa.

Organization Description

The Science Museum of Minnesota (SMM) is a private, non-profit 501(c)3 institution dedicated to encouraging public understanding of science through research and education. The St. Croix Watershed Research Station the environmental research center of the SMM with the mission to foster, through research and outreach, "a better understanding of the ecological systems of the St. Croix River basin and watersheds worldwide." The SCWRS supports an active year-round program in environmental research and graduate-student training, guided by a dedicated in-house research staff with direct ties to area universities and colleges. It collaborates closely with federal, state, and local agencies with responsibility for managing the St. Croix and upper Mississippi rivers and is a full partner with the National Park Service for resource management in parks of the western Great Lakes region. Its research has played a central role in setting management policy for the St. Croix and Mississippi rivers, for establishing water-quality standards for Minnesota lakes and for developing long-term monitoring plans for the National Park Service.