

**Environment and Natural Resources Trust Fund
2012-2013 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 002-A

Bee Lawns: A Unique Way to Help Pollinators

Topic Area: A. Fisheries & Wildlife Research

Total Project Budget: \$ 282,574

Proposed Project Time Period for the Funding Requested: 3 yrs, July 2013 - June 2016

Other Non-State Funds: \$ 0

Summary:

We will research if "bee lawns" can replace traditional turfgrass in areas of limited human traffic, which will reduce chemical inputs, and help bee pollinators by providing critical floral resources.

Name: Marla Spivak

Sponsoring Organization: U of MN

Address: 219 Hodson Hall, 1980 Folwell Ave
St. Paul MN 55108

Telephone Number: (612) 624-4798

Email spiva001@umn.edu

Web Address www1.umn.edu

Location

Region: Statewide

County Name: Statewide

City / Township:

<input type="checkbox"/> Funding Priorities	<input type="checkbox"/> Multiple Benefits	<input type="checkbox"/> Outcomes	<input type="checkbox"/> Knowledge Base
<input type="checkbox"/> Extent of Impact	<input type="checkbox"/> Innovation	<input type="checkbox"/> Scientific/Tech Basis	<input type="checkbox"/> Urgency
<input type="checkbox"/> Capacity Readiness	<input type="checkbox"/> Leverage	<input type="checkbox"/> Employment	<input type="checkbox"/> TOTAL <input type="checkbox"/> %

PROJECT TITLE: Bee Lawns: A Unique Way to Help Pollinators

I. PROJECT STATEMENT

The goal of our proposed research is to develop an innovative way of helping bee pollinators while enhancing the environment and protecting natural resources. We are seeking options for turf areas that are not used for human recreation but are still maintained by mowing and intensive inputs of water, fertilizers and pesticides. Planting bee lawns would reduce these inputs and provide low-growing floral areas, which would beautify Minnesota and provide a creative model for a simple yet effective way to help pollinators and protect our natural resources.

Bee pollinators (honey bees, *Apis mellifera*, and over 400 species of native bees) are in trouble. Bee health is failing across MN and the nation due to a scarcity of bee-friendly flowers leading to nutritional deficiencies, chronic exposure to pesticides, and debilitating diseases, and parasites (Spivak et al., 2011). Bees play a key role in American agriculture through pollination; the U.S. grows more than one hundred crops that either need or benefit from pollinators with an economic value estimated at \$20 billion in 2000. The Upper Midwest states, including MN, ND and SD, are the top honey producing states in the nation. Commercial beekeepers transport their colonies to our region for the summer months for honey production after fulfilling pollination contracts in other parts of the nation. People are taking action to rectify the decline of pollinators by becoming beekeepers, reducing pesticide exposure to bees, and planting flowers to support the nutritional needs of all bees. Seed mixtures and designs for bee-friendly flower gardens are becoming prevalent across the nation. We propose to research the potential multiple benefits of a unique type of landscape - bee lawns - to support pollinators and reduce intensive inputs.

Turfgrass makes up a significant part of the urban landscape but provides no nutritional resources for pollinators. Some turf areas, such as those in out-of-play roughs on golf courses, cemeteries, large commercial properties and boulevards, are rarely used by people and primarily serve an aesthetic purpose. There is recent interest in the use of lower-input grasses in these turf areas as a way to reduce inputs of water, fertilizer, and pesticides (Watkins et al., 2011). Many of these areas may also be useful as bee lawns; i.e., a low-input turf area that also contains low-growing flowering plants that can be utilized by important bee pollinators. These low-growing flowering plants would need to have characteristics that contribute positively to a sustainable landscape that maintains turf function (slow vertical growth rate, contribution of nitrogen due to nitrogen fixation, ability to vegetatively reproduce in a perennial system, positive aesthetics in urban settings). Bee lawns would provide a natural buffer to water resources in areas where low-growing, more manicured looking lawns are preferred. Although this idea is novel, the use of non-turfgrass species in lawns is not. In the mid-20th century and before, white clover seed was often included in lawn seed mixtures in order to decrease the need for nitrogen fertilization. Before bee lawns can be recommended, we must research the correct grass-flower combination that would fulfill the requirements of a bee lawn (produces flowers useful to pollinators, contributes nitrogen or other benefits, maintains function and aesthetics of the turf).

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Bee Lawn Evaluation Trials

Budget: \$232,574

We propose to evaluate a series of grasses in mixtures with low-growing flowering plants that can sustain growth within the turf, tolerate mowing and continue flowering after occasional mowing. We will evaluate low-input grasses (Chewings fescues, hard fescue, sheep fescue, tall fescue, and prairie junegrass - a native grass currently being improved for turf use at the University of Minnesota) in mixtures with a series of low-growing, flowering legumes (alfalfa, Kura clover, birdsfoot trefoil, white clover) and native flowering plants (e.g., lanceleaf coreopsis, field mint (*Mentha arvensis*), and blue-eyed grass (*Sisyrinchium angustifolium*)). The turf evaluation trial will be established in late summer 2012 on the St. Paul campus of the Univ. MN and at the MN Landscape Arboretum. A total of at least 25 turfgrass-flowering plant combinations will be included (we will select mixture combinations and ratios based on input from industry and university contacts familiar with these flowering species); plots will be planted in four replications in a randomized complete block design. Data will be collected through fall 2015 on overall turf quality, floral abundance, amount and type of bee visitation (honey bee and native bees), freedom from turfgrass diseases, and the ratio of grass to floral mixture over the years. Data will be analyzed to determine the top-performing mixtures.

Outcome	Completion
1. <i>Top-performing bee lawn turf-floral mixtures will be identified, based on criteria listed above.</i>	Fall 2015

Activity 2: Public Demonstration Plots

Budget: \$50,000

Beginning in spring 2014, the best combinations of grass-flower mixtures, based on results of Activity 1 the previous summer, will be use in larger-scale plantings for public viewing and education. We will identify three possible demonstration sites during summer 2013, including the Minnesota Landscape Arboretum (350,000 annual visitors) where the mixtures can be viewed by the public. The two other demonstration sites will be selected based on a solicitation from those stakeholders involved in the Bee Squad program (see below).

Outcome	Completion
1. <i>Public demonstration plots planted and viewed</i>	Summer 2016
2. <i>Fact sheets, brochures and planting recommendations made and publicized through University of Minnesota Yard and Garden News, Bee Squad, Xerces Society web sites and educational programs</i>	Summer 2016

III. PROJECT STRATEGY

A. Project Team/Partners:

Marla Spivak, Professor in Entomology, University of MN: PI will oversee research and outreach, administration of funds, supervise employees and co-advise graduate student; requesting funds. Eric Watkins, Assoc. Professor in Horticultural Science will co-advise graduate student, assist with plot establishment, data collection and analysis for Activity 1 and give presentations to stakeholder groups associated with research results from both Activities. Dr. Watkins’ research program focuses on the improvement of turfgrasses for use as low-input turf in cold climates; requesting funds. Mary Meyer, Professor, Horticultural Science, will provide public education and demonstrations at Arboretum for Activity 2; requesting funds. Eric Mader, Adjunct Asst. Extension Prof and Pollinator Program Director, Xerces Society for Invertebrate Conservation, will offer native plant species suggestions and create education materials, deliverable to audiences in MN and nationwide; providing in-kind support –see attached letter.

B. Timeline Requirements:

Activity 1 will run three summers (through 2015). Extension and public education for Activity 2 will begin in 2014 and will continue after LCCMR funding ends, using Extension funds and Bee Squad profits.

C. Long-Term Strategy and Future Funding Needs

The Bee Squad, a fee-based program, will be launched by Dr. Marla Spivak within the University of Minnesota Bee lab in April, 2012 to provide hands-on assistance to urban beekeepers in the Twin Cities area (www.beelab.umn.edu). The goals of the program in 2012 are to: 1) provide personalized, hands-on training for new and experienced beekeepers during key times over the beekeeping season; 2) provide full beekeeping service for home and land owners that want bee hives on their property but do not want the responsibility of managing the bees (e.g., the Bee Squad will maintain a hive for President and Karen Kaler at Eastcliff); and 3) collect information on bee health in the Twin Cities area to feed into national bee health databases and educational programs. Beginning in 2014, we will add programming to provide landscape designs and assistance in planting bee-friendly gardens to increase the availability of habitat for honey bees and native bees. In 2015, we hope to add recommendations for planting bee lawns. Through the Bee Squad program at the University of MN, the exceptional educational opportunities through the MN Landscape Arboretum, and the excellent national reputation of the Xerces Society for leading changes in public practice and policy to protect pollinators, we expect that bee lawns will be promoted through the state and nationally.

References:

Spivak M, Mader E, Vaughan M, Euliss, NH Jr. 2011. The plight of bees. *Environ. Sci. Technol.* 45: 34-38.
 Watkins ES, Fei D, Gardner J, Stier S, Bughrara D, Li C, Bigelow L, Schleicher B, Horgan, Diesburg K. 2011. Low-input turfgrass species for the north central United States. *Appl. Turf. Sci.* doi:10.1094/ATS-2011-0126-02-RS.

2012-2013 Detailed Project Budget

INSTRUCTIONS AND TEMPLATE (1 PAGE LIMIT)

Attach budget, in MS-EXCEL format, to your "2012-2013 LCCMR Proposal Submit 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 (See list of Eligible and Non-Eligible Costs, p. 11)	AMOUNT
Personnel:	
M. Spivak and E. Watkins partial summer salary support (both are on 9 mo. Appointments) + 7% FICA (retirement not included). Spivak, 0.5 mo: \$6,566 + \$460. Watkins, 1 mo: \$7,160 + \$501.	\$ 45,396
Master's level graduate student, to be co-advised by Spivak and Watkins in Entomology and Horticultural Science, respectively. Salary: \$19,497; Health benefits 18.49% = \$4,003; Tuition = \$13,244. Total/ year \$36,745 + 3% increase yearly for 3 years.	\$ 114,389
Partial support for technician, G. Reuter, who will assist with data collection and analysis, and with extension and educational efforts about findings to the public: \$7,500 salary/year + 41.3% benefits \$3,098 = \$10,598/ year + 3% increase yearly for 3 years. E. Watkins requests partial salary support for technician, Hollman, who will assist with planting, maintenance and data collection: \$7,449 + 41.3% \$3,076 = \$10,525.	\$ 65,289
Part-time summer intern to assist with maintenance and educational displays, \$4,500/ year for 3 years.	\$ 13,500
Contracts: <i>In this column, list out proposed contracts. Be clear about whom the contract is to be made with and what services will be provided. If a specific contractor is not yet determined, specify the type of contractor sought. List out by contract types/categories - one row per type/category.</i>	\$ -
Equipment/Tools/Supplies:	
Supplies for demo sites (seed, fertilizer for establishment, biodegradable germination blankets, etc.), \$8000/ year.	\$ 24,000
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: <i>Be specific. Only in-state travel essential to completing project activities can be included.</i>	\$ -
Additional Budget Items:	
Educational Materials (signs, website work, brochures, handouts, pubs, press releases, fact sheets, online updates, references, making your own Bee Lawn, etc)	\$ 12,000
Open House Bee Lawn Days (educational tours onsite, St Paul campus and Landscape Arboretum). Promotion and signs, adding information to website, writing press releases, developing handouts to show the research being done and giving attendees a take home page with information on how to make their own bee lawn and grass seed or flower seed.	\$ 8,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 282,574

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State \$ Being Applied to Project During Project Period: The Xerces Society, in kind support for Eric Mader.	\$ 2,000	Secured
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>	\$ -	Indicate: Secured or Pending
In-kind Services During Project Period: Cost share on Marla Spivak (5%), Eric Watkins (5%), and Mary Meyer (1%)	\$ 41,762	Secured
Remaining \$ from Current ENRTF Appropriation (if applicable): <i>Specify dollar 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>	\$ -	Indicate: Unspent? Not Legally Obligated? Other?
Funding History: <i>Indicate funding secured prior to July 1, 2013, for activities directly relevant to this specific funding request. State specific source(s) of funds.</i>	\$ -	

Project Manager Qualifications/Organization

Marla Spivak, Project Manager: will oversee research and outreach, administration of funds, supervise employees and co-advise graduate student; requesting funds. My goals are to protect the health of bee pollinators and to promote sustainable beekeeping practices. My combined Research, Teaching and Extension appointment allows me explore basic questions related to honey bee behavioral ecology, neuroethology, and mechanisms of disease resistance, and to translate results directly to students, beekeepers and the public.

Awards, Honors:

- MacArthur Fellow, John D and Catherine T. MacArthur Foundation, 2010-2015
- Humboldt State Univ. and University of Kansas, Distinguished Alumni Award, 2012
- McKnight Distinguished Professor, University of Minnesota 2009

Relevant Funding:

- Spivak, M. 2009-2012. USDA/EPA “Influence of mid-continent land-use trends on floral diversity and pollen availability to sustain bee health, diversity and ecosystem services” \$499,044
- vanEngelsdorp, et al Penn St: 2011-2016. USDA-NIFA. “Bee Informed Platform (BIP): A nationwide network for monitoring and maintaining honey bee health and pollination services”; \$5.1 M; Spivak portion \$200,000.
- Spivak M. 2007-2012. National Science Foundation "Colony Level Immunity Benefits and Behavioral Mechanisms of Resin Collection by Honey Bees" \$371,416 + \$20,000 supplement
- Delaplane, K et al. Univ GA, 2008-2012. USDA – NIFA. Protection of Managed Bees CAP. "Sustainable Solutions to Problems Affecting Honey Bees: (K.). \$4M; Spivak portion: \$217,988.

Eric Watkins: Assoc. Professor in Horticultural Science will co-advise graduate student, assist with plot establishment, data collection and analysis for Activity 1 and give presentations to stakeholder groups associated with research results from both Activities. Dr. Watkins’ research program focuses on the improvement of turfgrasses for use as low-input turf in cold climates. A major focus of his research is breeding native grasses such as prairie junegrass (*Koeleria macrantha*) for use as low-input turf. requesting funds.

Relevant Funding

- Watkins, E, B. Horgan, and A. Hollman. 2010-2014. Developing salt-tolerant sod mixtures for use as roadside turf in Minnesota. Mn/DOT Minnesota Local Road Research Board. \$176,516.
- Watkins, E., B. Horgan. 2012-2015. Adaptation and management of fine fescues for golf course fairways. United States Golf Association. \$74,133.
- Watkins, E., and N. Ehlke. 2009-2011. Expanding the potential of native turfgrass seed production. Minnesota Turf Seed Council. \$20,000.
- Watkins, E., J. Kerns, C. Yue, B. Horgan, and M. Meyer. 2009-2011. Alternative turfgrass species as a pest management strategy. Pest Management Alternatives Program-USDA CSREES. \$179,494.

Organization: The Department of Entomology is part of the University of Minnesota

