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

Project Title: **ENRTF ID: 155-F**

Bee Pollinator Habitat Enhancement - Phase 2

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

Total Project Budget: $ 387,085

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

Summary:

Our goal is to provide floral resources for pollinators in areas currently dominated by turfgrass, to protect and enhance Minnesota natural resources and support the nutritional needs of all bees.

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Sponsoring Organization: U of MN

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Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

The visual shows examples of native flowers, researched in Phase 1 of this project, that have potential to enhance mowed turf. It also shows Minneapolis Park area that could be enhanced with native flowers in turf.

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

PROJECT TITLE: Bee Pollinator Habitat Enhancement - Phase 2

I. PROJECT STATEMENT

Why: We received funding in 2013 to develop an innovative way of helping pollinators by florally enhancing turf areas that are not heavily used for human recreation. We identified some promising native floral species that withstand mowing pressure and continue to flower when seeded into hard-fescue (a northern adapted turfgrass with reduced resource input needs). As native species take several years to establish, we are requesting further funding to test new flowering species, and to verify that the flowering turf options we have developed enhance bee visitation while maintaining the function and aesthetics of mowed and manicured turf. While we will continue to showcase the bee lawns in public demonstration areas, it also is important to understand citizen's concerns about pollinators and flowering lawns as well as their ideas for how these lawns could be used to benefit their families, businesses, and communities.

Goal: Our goal is to provide a concrete way to support the nutritional needs of all bees. Bee pollinators, including honey bees and some of the 400 species of bees native to Minnesota, are in decline 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). Minnesota is leading the nation in legislative initiatives to help pollinators, and as a result, public awareness about the plight of pollinators is at an all time high. People are hungry for action-steps they can take to help.

Outcomes: The addition of native flowers into turf will provide nutritional resources for pollinators, and will reduce intensive inputs of water, fertilizers and pesticides. Flowering lawns could provide a natural buffer to water resources in areas where low-growing, more manicured looking lawns are preferred. Flowering lawns would beautify Minnesota, protect our natural resources, and help achieve important state and federal pollinator protection initiatives.

How: We propose 2 activities: 1) Quantify bee abundance and diversity, and floral blooms on lawns enhanced with native flowers compared to lawns containing only white clover; 2) Continue outreach activities through public demonstration plots, and evaluate key concerns and new ideas public and private landowners and landscape maintenance personnel have about using flowering lawns. Due to their location, our research plots also will serve as demonstration plots for public viewing. In this way, we combine research and outreach in a transparent and effective way.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Floral enhancement of urban lawns and pollinator community response **Budget: $226,306**

We will continue to test additional native flowering species that withstand mowing pressure in turf. To measure the effectiveness of flowering lawns to provide floral nutritional resources for bees, we will compare bee visitation on lawns enhanced with native floral species to visitation on traditional lawns containing only white clover. In collaboration with the Minneapolis Park and Recreation Board we will plant experimental plots of florally enriched turf in at least four different Minneapolis parks close to existing turf that currently contains clover. We will collect information on the number and diversity of bees and other pollinators on these paired plots. We also will compare the abundance of flowers throughout the season and how quickly the flowers re-bloom after mowing in each of the paired plots.

Outcome	Completion Date
1. Establish native flowering plant species in lawns at four Minneapolis parks.	November, 2016
2. Quantify number and diversity of bee pollinators on turf enhanced with native flowers	November 2018
3. Quantify floral abundance and rate of bloom after mowing	November, 2018
4. Collect additional data on pollinator visitation to common lawn flowers	June, 2019

Activity 2: Showcase flowering lawns through demonstration plots, and evaluate landowner concerns and ideas about using flowering lawns. **Budget: $160,709**

In Activity 1, we will establish large areas of florally enhanced turf at four parks in Minneapolis that are accessible by the public. We will add signage to each location giving visitors information about the current

research and our findings from Phase 1 of this project. This information will likely be accessed with a QR code or other location-enabled technology. We will utilize these plots to learn about park users — their concerns and ideas about pollinators and florally enhanced lawns. Additionally, we will conduct voluntary interviews of random park users with electronic tablet survey instruments. We will also invite stakeholders from Minnesota such as public land managers and maintenance personnel to visit the site for focus group interviews, so we can compare the unique challenges of implementation and management of these enhanced turf areas. All data from participants will be de-identified and we will carefully follow the protocols approved for these types of studies.

Outcome	Completion Date
1.Develop outreach content describing florally-enhanced lawns and how they can help pollinators	March 2017
2. Place signs with outreach information at research sites in four parks in Minneapolis, and on Park Board website.	May 2017
3. Quantify number of distinct concerns and intensity of the concern by demonstration site park visitors, potential adjacent private land owners, and public park land managers.	September 2018
4. Develop presentations and suggestions for mitigation of these concerns that could be used by park managers in Minnesota who want to increase their use of florally-enhanced lawns in public parks, including improved educational materials, clear signage, web & social media info easily accessed and utilized by park managers, homeowners, and other stakeholders	June, 2019

III. PROJECT STRATEGY

A. Project Team/Partners

Marla Spivak, Professor in Entomology, UMN is project manager, will co-advise a new graduate student for Activity 1, and will be responsible submitting project reports. **Eric Watkins,** Associate Professor in Horticultural Science will co-advise the graduate student for Activity 1 and assist in project design and implementation. **Kristen Nelson**, Professor in Forest Resources, and in Fisheries, Wildlife, and Conservation Biology, UMN is natural resource sociologist who will advise a second graduate student in Objectives 3 and 4 of Activity 2, and assist with project design and implementation. **MaryLynn Pulscher**, Environmental Education Supervisor, Minneapolis Park & Recreation Board will provide coordination for park site selection including input from park maintenance, recreation, natural resources, and special event staff, help secure any permits, work through signage requirements and placement, and keep the Board informed of these efforts. Spivak, Nelson, Watkins and Pulscher will contribute in-kind expenses and time to the project, funded by other sources.

B. Project Impact and Long-Term Strategy

Our long-term strategy is to provide more floral resources for pollinators in areas currently dominated by turfgrass, which will protect and enhance Minnesota natural resources and potentially provide a natural buffer to water resources. Graduate student, Ian Lane, funded in Phase 1, will defend his Master's degree in spring 2016. His findings will provide the basis for new graduate student research outlined here in Activity 1. The inclusion of ML Pulscher from Mpls Parks, Dr. Nelson and a second graduate student to assist with Activity 2 will allow us to identify public and landscape personnel concerns, and effectively disseminate research findings and implementation instructions through websites and social media. Phase 2 will complete this project, and we anticipate widespread implementation by Minnesotans that want to take concrete steps to help our pollinators.

C. Timeline Requirements

We will need three field seasons, starting in 2016, to complete this work. The findings from Phase 1 will provide the basis research in Activity 1 on the native flowering species that will fare best in mowed turf conditions and the best methods for converting existing lawns to the native flowering species. In spring 2016 we will establish the paired plots in four Minneapolis parks, and begin quantifying bee activity and floral abundance in 2017 and 2018. A second graduate student will design the methods for park user surveys and focus groups interviews in late 2016 and conduct surveys and focus groups with viewers, private landowners, and public land managers in 2017 and 2018. All outreach materials developed and student research completed by June 2019.

2016 Detailed Project Budget

Project Title: Bee Pollinator Habitat Enhancement - Phase 2

IV. TOTAL ENRTF REQUEST BUDGET 3 years

BUDGET ITEM *(See "Guidance on Allowable Expenses", p. 13)*	**AMOUNT**
Personnel:	$ -
M. Spivak, E. Watkins, and K. Nelson, partial summer salary support (all are on 9 mo. Appointments) + fringe + 3% inflation. Spivak, 0.5 mo: $6,395 + $2,161. Watkins, .5 mo: $4,130 + $1,396, Nelson, 0.5 mo: $4,956 + $1,675	$ 64,021
Master's level graduate student for Activity 1, to be co-advised by Spivak and Watkins in Entomology and Horticultural Science, respectively. Salary: $19,987; Health benefits 18.49% = $3,518; Tuition = $15,458. Total/ year $38,963 + 3% increase yearly for 3 years.	$ 116,047
PhD level graduate student for Activity 2, Objectives 3 and 4, to be advised by K. Nelson in Fisheries, Wildlife, and Conservation Biology. $22,012 salary + 18,289 fringe (academic year and summer salary, fringe benefits and tuition + 3% inflation) 0.50 FTE	$ 126,363
Partial salary support for E. Watkins' technician, Andrew Hollman, who will assist with planting, maintenance and data collection: $7,449 + 41.3% $3,076 = $10,525.	$ 32,532
One full-time summer undergraduate to assist with field work in Activity 1, maintenance and educational displays, $4,500/ year for 3 years, and one part time summer advanced undergraduate to assist with Activity 2, $2,400 ($12/hr, 20/hrs x10 wks)	$ 25,222
Equipment/Tools/Supplies:	
Supplies for demo sites (seed, fertilizer for establishment, biodegradable germination blankets, etc.), $8000/ year. (few blankets if any needed, mainly seed and fert)	$ 2,400
Travel:	
Vehicle expenses to visit Mpls Park research plots during summer months; help defray costs of UMN leased vehicle mileage and gas = $3000/ year.	$ 9,000
Additional Budget Items:	
Educational and Outrach Materials: signs, website work, brochures, handouts, pubs, press releases, fact sheets, online updates, references, making your own Flowering Lawn, etc	$ 10,000
Survey research $500/ year mailings, data analysis, info materials, website additions	$ 1,500
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 387,085

V. OTHER FUNDS *(This entire section must be filled out. Do not delete rows. Indicate "N/A" if row is not applicable.)*

SOURCE OF FUNDS	**AMOUNT**	**Status**
Other Non-State $ To Be Applied To Project During Project Period: *Indicate any additional non-state cash dollars secured or applied for 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.*	N/A	*Indicate: Secured or Pending*
Other State $ To Be Applied To Project During Project Period: *Indicate any additional state cash dollars (e.g., bonding, other grants) secured or applied for 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.*	N/A	*Indicate: Secured or Pending*
In-kind Services To Be Applied To Project During Project Period: *Indicate any additional in-kind service(s) secured or applied for to be spent on the project during the funding period. For each type of service, list type of service(s), estimated value, and indicate whether it is secured or pending. In-kind services listed must be specific to the project.* **1% cost share for M. Spivak, E. Watkins and K. Nelson, each year**	$ 9,517	*Secured*
Funding History: *Indicate funding secured but to be expended prior to July 1, 2016, for activities directly relevant to this specific funding request, including past and current ENRTF funds. State specific source(s) of fund and dollar amount.* **Bee Pollinator Landscape Enhancement, ENRTF funds to M. Spivak and E. Watkins in 2013.**	$ 200,000	Secured
Remaining $ From Current ENRTF Appropriation: *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. Indicate the status of the funds.* **Bee Pollinator Landscape Enhancement, ENRTF funded to M. Spivak and E. Watkins 2013. Project will be completed and funds spent by end date in 2016.**	$102,000 from 2013	*Unspent*

Bee Pollinator Habitat Enhancement – Phase 2

Flowering Lawns

M. Spivak, E. Watkins, K. Nelson, UMN
and Minneapolis Park Board

Outcomes:

- Support bee health and nutrition
- Reduce intensive inputs on turf – water, fertilizer, pesticides
- Protect and enhance Minnesota natural resources

Example of existing, non-native flowering turf along Minneapolis Parks
Ground Rounds Scenic Byway

Trifolium repens – White Clover, non-native, commonly found in lawns

Activities:

1) Quantify bees and floral blooms on lawns enhanced with native flowers compared to lawns containing only white clover
2) Continue outreach activities through public demonstration plots, and evaluate public concerns about and ideas for using flowering lawns

From Phase 1: Native flowers with potential to enhance mowed turf

Prunella vulgaris
Self-heal

Astragulus crassicarpus
Canadian milkvetch

Symphyotrichum lateriflorum
Calico aster

Project Manager Qualifications/Organization

Marla Spivak, Project Manager
Distinguished McKnight Professor, Entomology
Department of Entomology; University of Minnesota
spiva001@umn.edu wwwbeelab.umn.edu

I (M. Spivak) will oversee research and outreach, ensure that all progress reports are submitted on time and that funds are administered correctly and responsibly. I will co-lead the project with Drs. Eric Watkins (Department of Horticulture) and Kristen Nelson (Dept Fisheries and Conservation Biology). 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 bee health, and to translate results directly to students, beekeepers and the public.

Recent Awards, Honors:
MacArthur Fellow, John D and Catherine T. MacArthur Foundation, 2010-2015
Humboldt State Univ. and University of Kansas, Distinguished Alumni Awards, both in 2012
McKnight Distinguished Professor, University of Minnesota 2009

Examples of Current Funding:
MN Environment and Natural Resources Trust Fund: "Enhancing Pollinator Landscapes", 2014-2017, $864,000.
National Science Foundation IOS: "Resin to Propolis: Biological origins and role in honey bee social immunity and health." 2012-2015, $869,769
NRCS: (PI: Xerces Society for Invertebrate Conservation: total award "$997,000) "Next steps in pollinator conservation: operations and maintenance, organic habitat restoration, expanding seed mix choices, and assessing conservation effectiveness" (matched by funds from Gen.Mills). 2012-2015. $100,000
MN Environment and Natural Resources Trust Fund: "Bee Pollinator Habitat Enhancement" 2013-2016 $200,00
USDA-NIFA (PI: D. vanEngelsdorp, Penn St: "Bee Informed Platform (BIP): A nationwide network for monitoring and maintaining honey bee health and pollination services" 2011-2016 $5.1M (my portion $200,00)

Organization:
M. Spivak and E. Watkins will supervise a new graduate student (Masters level) for Activity 1, and will plan and coordinate all research proposed in Activity 1, including coordinating with MaryLynn Pulscher of the Minneapolis Parks Board to find areas to plant experimental plots. K. Nelson will supervise a second graduate student (PhD level) who will focus on Objectives 3 and 4 of Activity 2. Outreach and education components of this project will be coordinated by all personnel involved.