

**Environment and Natural Resources Trust Fund
2014 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 146-F

Achieving Pollinator Landscapes with the Greatest Multiple Benefits

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

Total Project Budget: \$ 1,714,040

Proposed Project Time Period for the Funding Requested: 3 Years; July 2014 - July 2017

Summary:

We will identify new and reliable floral resources for bee pollinators on natural and agricultural lands for greatest multiple benefits, including bee and bird habitat, soil conservation, and water quality.

Name: Marla Spivak

Sponsoring Organization: U of MN

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Location

Region: Statewide

County Name: Statewide

City / Township:

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



PROJECT TITLE: Achieving pollinator landscapes with the greatest multiple benefits

I. PROJECT STATEMENT

1. Why? Pollinators help our crops so much that we tend to forget it is a two-way street—we must also help our pollinators. The current, widespread decline of pollinators has become critical and threatens their well-being and even their very existence. Neither native wild bees nor managed honey bees are secure. The causes of decline are not completely known, but many known causes can be combated. Loss of nesting sites, fewer flowers, increased disease, more insecticides, and other causes all combine. Fortunately, the present crisis for pollinators comes at a time when society recognizes the severity of the problem and is motivated to act to improve pollinator resources and environment. Improving conditions for pollinators will also improve conditions for birds and other wildlife, reduce soil erosion, improve water quality, and further beautify the landscape of our state.

2. Goals and outcomes. The goal is to provide new and reliable supplies of nectar and pollen for wild bees and honey bees, across the entire growing season in key beekeeping regions of Minnesota. We will focus on emerging opportunities to provide large supplies of nectar and pollen from our agricultural lands, without interfering with current agriculture. Nectar and pollen can come from winter-hardy crops, cover crops, grasslands and forage crops; each can provide major ‘win-win’ opportunities for farmers, communities, bees, and wildlife through new revenues and conservation benefits. This project will help create a new and critically needed interdisciplinary faculty position to lead and coordinate the research proposed here, and to help consolidate and accelerate the many other pollinator efforts that are ongoing and planned, including those concerned with managed bee populations in the state (U MN and Beekeeping Associations), surveying and compiling the state’s first database of wild pollinators (MNDNR), acquiring land and easements for pollinators (Pheasants Forever), reconstructing habitats and corridors for pollinator nesting and foraging (Nature Conservancy), enhancing rural farmland management (MDA, U MN), and educating and learning from the many stakeholders in this system. Outcomes include a statewide working group on pollination habitat and ecosystem services, led by a new faculty member, landscape maps and assessments, demonstration sites, best management practices, peer-reviewed scientific papers, and long-term plans for sustaining pollinators and helping Minnesota beekeepers. Results will help private land owners and public land managers. The project will provide examples for other states in our region to adapt and expand.

3. How? Supplies of food and habitat for pollinators must be enhanced by strategic changes in land-use. A new faculty member will lead a collaborative effort to: (1) Quantify bee pollinator abundance and diversity in landscapes enhanced for conservation and agriculture; (2) Quantify flower phenology, pollinator attractiveness, and nectar/pollen production by cover crops and grasslands in agricultural lands; (3) Evaluate risks for bees from insecticide use and residue in cover crops and grasslands in agricultural lands; (4) Assess native bees’ use of nesting sites and effects of harvesting in semi-natural grasslands; (5) Produce a data-driven decision-support system that can identify landscapes with the greatest multiple conservation benefits, including bee habitat, soil conservation, water quality improvement, and terrestrial bird habitat.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Bee surveys & honey production

Budget: \$577,859

Bee surveys in Activities 2-4 will be coordinated by new professor and post-doctoral researcher to ensure standard sampling and ID of bees to species. New forbs in all activities will be assessed for honey production.

Outcome	Completion Date
1. Coordination of bee surveys and bee identification (Activities 2-4)	2017
2. Documentation of new honey producing plants for MN beekeepers	2017
3. Contribution to first comprehensive survey of native bees in MN	2017



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2014 Main Proposal

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Activity 2: Habitat evaluation of pollinator-enhanced grassland ecosystems Budget: \$299,549

Improvements to grasslands used for conservation or production will be identified that benefit pollinators while providing conservation benefits such as wildlife habitat, water purification, carbon storage, and soil improvement.

Outcome	Completion Date
1. Identify forbs and grasses that provide a continuous nectar and pollen resources to pollinators including wild bees and managed honey bees.	2017
2. Identify plants and mixtures that provide nesting and overwintering sites for a diversity of native bees.	2017

Activity 3: Habitat evaluation of pollinator-enhanced agroecosystems Budget: \$680,443

Practical enhancements and modifications of existing agricultural systems will be identified that can benefit pollinators, while also improving wildlife habitat, water quality, and soil erosion.

Outcome	Completion Date
1. Identify winter annual cover crops, perennials legumes, and agroforestry systems that provide season-long nectar and pollen resources to pollinators and bees	2017
2. Identify sequences of agricultural crops and native grasslands and their management to provide season-long nectar and pollen resources.	2017
3. Analysis of neonicotinoid residue in pollen and nectar from winter-hardy oilseed and cover crops (by USDA-ARS Gastonia Lab)	2017

Activity 4: Identification of sites where creating pollinator habitat will also strongly enhance soil, water and biodiversity conservation Budget: \$156,189

Computer modeling will be used to identify sites where creating pollinator habitat will also produce strongly beneficial effects on soil conservation, water quality improvement, and terrestrial bird habitat.

Outcome	Completion Date
1. Develop GIS data to identify land suitable for bee habitat plantings	2016
2. Prepare maps of pollinator habitat planting locations with multiple benefits	2016

III. PROJECT STRATEGY

A. Project Team/Partners. Marla Spivak, U of MN, is project leader, and will co-lead Activity 1 with new faculty member when hired. Participants are Clarence Lehman, U of MN (Activity 2), Nicholas Jordan (Activities 3 and 4), Frank Forcella, USDA-ARS Morris, Craig Sheaffer, U of MN, Gregg Johnson, U of MN, Donald Wyse, U of MN (Activity 3); David Mulla, U of MN (Activity 4).

B. Timeline Requirements

Our workplan will be carried out over a three-year time period, assuming funding in June 2014.

C. Long-Term Strategy and Future Funding Needs

The ultimate goal is to help create rural landscapes that support abundant pollinators and provide major new benefits for Minnesota farmers, rural communities, and all Minnesotans. This win-win strategy is based on widespread cultivation of winter-hardy cover crops and grasslands in agricultural areas, which can be done without interfering with current crop production. Enormous environmental benefits will result, with far-ranging effects on soil, water and biodiversity conservation and our state’s resilience to climate variability. Farmers can gain major new revenue from new technologies that enable farmers to process cover crops and grasses into high-quality animal feed. Minnesota beekeepers will benefit from new sources of nectar and pollen; our state is a leading producer of honey and pollination services. To pursue these many benefits, a statewide working group on pollination habitat and ecosystem services will be led by a new professor at the U of MN. Funds from this project will build on federal resources being used to pursue these goals, greatly expanding the scope of our efforts.

2014 Detailed Project Budget

Project Title: Achieving Pollinator Landscapes with the Greatest Multiple Benefits

INSTRUCTIONS AND TEMPLATE (1 PAGE LIMIT)

Attach budget, in MS-EXCEL format, to your "2014 LCCMR Proposal Submission Form".

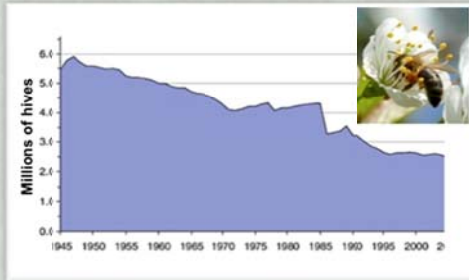
IV. TOTAL ENRTF REQUEST BUDGET - 3 years

BUDGET ITEM	Description	AMOUNT
Personnel: + 3% cost of living (Y2&Y3) (salary + fringe)	Project Coordinator - Asst. Professor, 1.0 FTE, 3 years, 33.11% fringe	\$ 329,144
	Bee Curator - Post Doc, 1.0 FTE, 3 years, 33.6% fringe	\$ 167,952
	Oil Crop Researcher - Post Doc, 1.0 FTE, 3 years, 33.6% fringe	\$ 167,952
	GIS Researcher - Research Fellow, 1.0 FTE, 2 years, 33.6% fringe	\$ 113,907
	GIS Researcher - Info Tech Prof, 0.2 FTE, 2 years, 33.6% fringe	\$ 22,781
	Habitat Evaluation - Research Specialist, 1.0 FTE, 3 years, 33.6% fringe	\$ 179,011
	Bee Pollen Researcher - Scientist, 0.10 FTE, 1 year, 33.6% fringe	\$ 7,880
	Agricultural Researcher - Scientist, 0.70 FTE, 3 years, 36.8% fringe	\$ 143,764
	Cover Crop Grad Student - Research Asst, 0.50 FTE, 2 years, 79.6% fringe	\$ 97,742
	Agricultural Grad Student - Research Asst, 0.50 FTE, 3 years, 79.6% fringe	\$ 102,452
	Bee Field Assistant - Undergrad (1), PT, 3 years, 7.4% fringe	\$ 25,495
	Pollinator Habitat Field Assistants - Undergrads (4), PT, 3 years, 7.4% fringe	\$ 61,413
	Agricultural Field Assistants - Undergrads (2), PT, 3 years, 7.4% fringe	\$ 29,877
	Contracts	None
Equipment/Tools/Supplies:	Field supplies (seed, stakes, fertilizer, trap nests, specimen preservation, insect nets etc.)	\$ 15,900
	Laboratory supplies (reagents for nectar analysis, reagents for pollen analysis, soil analysis supplies, etc.)	\$ 20,500
	Equipment/tools (camera, recorder, refractometers, radiometers, digital imager, honey bee electronic scales, software, computers)	\$ 14,500
Acquisition	None	\$ -
Travel: (within MN only)	Mileage - 0.565/mile	\$ 14,170
	Vehicle rental - \$100/day	\$ 18,500
	Lodging - \$100/day	\$ 30,000
	Per diems - \$77/day	\$ 23,100
Additional Budget Items:	Journal publication costs	\$ 6,000
	Design/printing Extension materials	\$ 12,000
	Neonicotinoid residue analysis	\$ 100,000
	GIS laboratory fees	\$ 8,000
	Training	\$ 2,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =		\$ 1,714,040

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State \$ Being Applied to Project During Project Period:	\$ -	NA
CFANS	\$ 110,000	
CBS	\$ 110,000	
Other State \$ Being Applied to Project During Project Period:	\$ -	NA
In-kind Services During Project Period: 3% cost of living increase	\$ -	Indicate: Secured or Pending
Dr. Marla Spivak, 5% effort, 3 years, 33.11% fringe	\$ 25,484	Secured
Dr. Nicolas Jordan, 3% effort, 3 years, 33.6% fringe	\$ 13,181	Secured
Dr. Clarence Lehman, 3% effort, 3 years, 33.6% fringe	\$ 11,055	Secured
Dr. Donald Wyse, 3% effort, 3 years, 33.6% fringe	\$ 17,224	Secured
Dr. Craig Sheaffer, 3% effort, 3 years, 33.6% fringe	\$ 18,909	Secured
Dr. Gregg Johnson, 3% effort, 3 years, 33.6% fringe	\$ 10,158	Secured
Dr. David Mulla, 3% effort, 2 years, 33.6% fringe	\$ 18,768	Secured
Dr. Frank Forcella, USDA Salary/fringe 5%	\$ 19,500	Secured
Funding History:	\$ -	NA

Achieving pollinator landscapes with the greatest multiple benefits



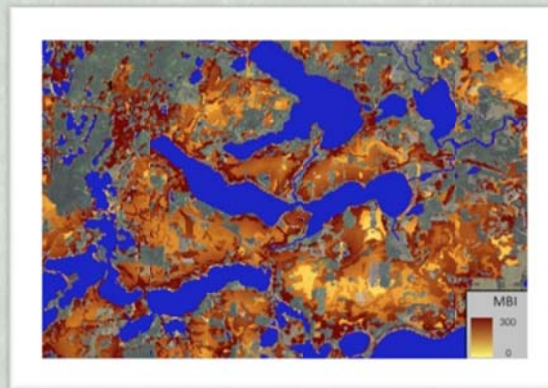
Bees are in drastic decline. More bee habitat is critically needed. Prairie restoration is creating bee habitat in the key Minnesota beekeeping areas, but much more is needed.



We can provide excellent bee habitat in our agricultural lands without interfering with current crop production, using winter-hardy and cover crops that are great for bees, and provide many other benefits. We'll identify sets of these crops that provide season-long resources for bees while ensuring protection from pesticide residues.



Restored grasslands and forage crops provide bee habitat, new revenue, soil and water conservation, and resilience. We'll identify key species that provide season-long resources for bees.



We'll use computer models to find sites where we can create new bee habitat *and* provide the greatest benefits for farmers, communities, and wildlife. Dark red areas in map show where adding bee habitat will provide the greatest conservation 'bang for the buck'.

Project Manager Qualifications/Organization

Marla Spivak, Project Manager
Distinguished McKnight Professor, Entomology
Department of Entomology; University of Minnesota
spiva001@umn.edu www.beelab.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 a new faculty member when hired. General activities will include coordinating bee surveys for all activities and ensuring that statewide bee survey is initiated and curated in an organized fashion. My specific activities will include assessing forbs in different areas as honey producing plants. I will work with MN Beekeepers to place honey bee colonies near plantings in this project, monitoring honey production and pollen collection from different forbs. I will initiate and then co-lead with new faculty member a statewide working group on pollinator habitat and their ecosystems services by facilitating collaborations among Pheasants Forever, DNR, MDA, TNC, and beekeeping associations throughout Minnesota.

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, nutrition, disease resistance and mechanisms of social immunity, 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

Current Funding:

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). 2012-201. \$100,000
MN Environment and Natural Resources Trust Fund: “Bee Lawns: A unique way to help pollinators” 2013-2016 \$200,00
National Fish and Wildlife Foundation – Wells Fargo Environmental Solutions for Communities 2012: “Bee Squad: Pollinator Education and Stewardship (MN)” 2013-2014 \$75,000
USDA/EPA “Influence of mid-continent land-use trends on floral diversity and pollen availability to sustain bee health, diversity and ecosystem services” 2009-2013 \$499,044
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 new faculty member will supervise a postdoctoral research associate for Activity 1, who will coordinate the bee surveys and curation. C. Lehman will oversee a research specialists and field assistants in Activity 2. N. Jordan, F. Forcella, C. Shaeffer, G. Johnson and D. Wyse will oversee students and personnel in Activity 3, and D. Mulla and N. Jordan will be responsible for Activity 4. All participants will meet at least quarterly to organize efforts, and broader collaborators (DNR, PF, TNC, bee associations) will meet annually.