Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-258

Proposal Title: Novel Floral Assessment Tools for Pollinator Habitat Management

Project Manager Information

Name: Julia Leone

Organization: Friends of the Mississippi River

Office Telephone: (651) 477-0919

Email: jleone@fmr.org

Project Basic Information

Project Summary: Position Minnesota at the forefront of data-driven habitat management by comparing novel assessments of the effects of prairie restoration practices on pollinators and developing a floral resource monitoring decision tool.

ENRTF Funds Requested: $298,000

Proposed Project Completion: June 30, 2030

LCCMR Funding Category: Small Projects (G)

Secondary Category: Fish and Wildlife (D)

Project Location

What is the best scale for describing where your work will take place?

Region(s): Metro

What is the best scale to describe the area impacted by your work?

Statewide

When will the work impact occur?

During the Project and In the Future

Narrative

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Minnesota conservation, agricultural, and rights-of-way sectors are investing heavily in pollinator habitat. As participation expands, partners must be able to choose effective restoration techniques, including seed mix diversity levels, document habitat conditions, demonstrate outcomes, and adapt management in ways that are credible, repeatable, and economical.

Two recent ENTRF-funded research projects advanced understanding of how restoration design and floral resources influence bumble bee communities (FMR), and demonstrated successful application of remote sensing monitoring statewide (MJV). At the same time, a new standardized national bee monitoring protocol was developed.

However, there is currently no consistent framework for evaluating prairie restoration effects on pollinator communities. Multiple approaches exist, including floral surveys, in-depth vegetation assessments, remote sensing, and direct surveys of pollinators. These methods vary widely in cost, expertise required, spatial scale, and the information they produce. Thus, not only do land managers face complex decisions when selecting how to evaluate restoration outcomes, they also lack methods to consistently compare their outcomes to those of other projects. Without clear guidance, habitat restoration risks being ineffectual, and habitat evaluation risks becoming inconsistent across programs, difficult to compare statewide, and burdensome for land managers.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

We will address this challenge by leveraging knowledge gained from previous ENTRF-funded projects to create a decision-support tool to guide pollinator habitat restoration and monitoring methods statewide. A novel partnership among FMR, MJV, and UMN will combine ENTRF-supported knowledge of how restoration design and floral resources impact pollinator communities, utilization of drone-based approaches for efficient pollinator habitat monitoring, and the ability to conduct detailed yet national-scale pollinator monitoring.

The project will deepen our understanding of the impacts of restoration seed mix diversity and evaluate four vegetation monitoring protocols—the established PRI meandering walk protocol, the Monarch Joint Venture IMMP protocol, the newly released native bee floral area protocol, and UAV-based remote sensing tools—to assess their effectiveness in quantifying pollinator habitat. By comparing these methods at 15 restored prairies across Minnesota, we will determine when remote sensing is sufficient, when field surveys are necessary, and how to effectively combine the two.

The project aims to provide practical guidance and tools for conservation practitioners, including a decision framework for efficiently monitoring and reporting on pollinator habitat, accounting for costs, effort, and required expertise. This work will support Minnesota's Pollinator Action Framework goals and help prioritize restoration investments for measurable conservation outcomes.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

This project will provide standardized, scalable methods for restoring and monitoring pollinator habitat quality. Outcomes include a decision framework to guide the use of remote sensing and field survey methods, recommended next steps for habitat restoration and enhancement, prototype standardized data structures, and an evaluation of how restoration seeding practices relate to pollinator and habitat outcomes.

Partners will receive training and tools to utilize these outcomes, enabling transparent, defensible documentation of habitat improvements.

Collectively, these outcomes will improve habitat management, support compliance, and allow Minnesota to measure and demonstrate progress toward Pollinator Action Framework goals, strengthening Minnesota's natural resource stewardship.

Activities and Milestones

Activity 1: Conduct bumble bee, butterfly, and vegetation surveys.

Activity Budget: $163,527

Activity Description:
We will select 15 restored prairie sites within the eastern broadleaf forest ecoregion of Minnesota, comprising a range of restoration ages, and including initial seed mix diversity levels of 20 to 70 species.

The University of Minnesota Native Bee lab will lead two years of bumble bee, butterfly, and field-based vegetation surveys, with support from FMR staff and interns. MJV will lead two years of remote-sensing and IMMP vegetation surveys. Field crews will survey each site three times during the Minnesota growing season for two years.

Field crews will survey pollinators by conducting standardized, timed, meandering walk surveys for bumble bees and Pollard transect and meandering walk surveys for butterflies. We will survey vegetation using four methods: the established prairie reconstruction initiative (PRI) meandering walk protocol, the Monarch Joint Venture integrated monarch monitoring program (IMMP) protocol, the newly released native bee floral area protocol (U.S. National Native Bee Monitoring Network), and novel UAV-based remote sensing models developed by Polli in collaboration with the Monarch Joint Venture.

The resulting data will be the foundation for developing restoration recommendations and a decision framework for practitioners (See Activity 3).

Activity Milestones:

Description	Approximate Completion Date
Plot selection and set-up	April 30, 2028
Vegetation surveys (four methods) - year 1	October 31, 2028
Bumble bee and butterfly surveys - year 1	October 31, 2028
Vegetation surveys (four methods) - year 2	October 31, 2029
Bumble bee and butterfly surveys - year 2	October 31, 2029

Activity 2: Analyze data and compare remote-sensing and field-based vegetation survey methods

Activity Budget: $53,496

Activity Description:
The University of Minnesota and FMR will complete data entry and conduct analyses of pollinator responses to seed-mix diversity and restoration age, as well as analyses of field-based vegetation methods. MJV will lead curation and analysis of remote sensing data, including image processing, and all partners will collaborate on comparative analyses. The analyses we conduct will provide the information needed to develop scientifically sound recommendations and to present the costs, benefits, and trade-offs associated with different pollinator habitat monitoring protocols.

Activity Milestones:

Description	Approximate Completion Date
All field data entered	December 31, 2029
All remote-sensing data entered	December 31, 2029
All remote-sensing images processed	January 31, 2030
Data analyses complete	March 31, 2030

Activity 3: Develop a decision-making framework and a prototype remote sensing data repository for statewide sharing and summarization of pollinator habitat data.

Activity Budget: $51,071

Activity Description:
We will develop a decision-making framework for floral resource monitoring methods based on the results of our analyses. This decision-making framework will be developed following the principles of structured decision-making (SDM), such as those described by Nichols et al. (2024), Habitat management decisions for conservation: a conceptual framework. Stakeholders will be able to use this decision-making framework to identify the objectives of their habitat monitoring project, weigh the costs and benefits of different methods, and select the monitoring method that best meets their project goals and logistical reality. We will provide training to support learning and adoption of the methods, as well as recommendations or prototypes for data standardization and sharing (e.g., common data portals, statewide summarization tools).

MJV will expand its existing data framework by piloting a prototype that stores, shares, and summarizes statewide remote-sensing pollinator habitat data in alignment with national standards.

Activity Milestones:

Description	Approximate Completion Date
Complete development of decision-making framework	May 31, 2030
Pilot remote-sensing data repository prototype	June 30, 2030

Activity 4: Training & Dissemination

Activity Budget: $29,906

Activity Description:
MJV will train rights-of-way, agricultural, and conservation sector stakeholders to implement the most appropriate monitoring methods for their objectives and create or refine free virtual, asynchronous learning modules (building on those created by MJV during the previous phase of ENRTF-funded research).

We will produce a report and the previously described decision framework for floral resource monitoring (see Activity 3), which we will distribute to statewide conservation partners, including the MNDNR, BWSR, cities, counties, and nonprofits, shared through organizations such as the Metro Conservation Network (MCNet), and hosted publicly on FMR and MJV's websites. Results of this study will also be presented at relevant conferences, for example, Pollinator Friendly Alliance's Best Practices for Pollinators, the Entomological Society of America, Monarch Joint Venture, and MCNet annual meetings. Depending on the study's outcomes, results may be published in scientific journals such as Prairie Naturalist, Insect Science, Ecology and Evolution, Ecosphere, or Ecological Restoration.

Activity Milestones:

Description	Approximate Completion Date
Offer decision framework and protocol trainings to rights-of-way, agricultural, and conservation sector stakeholders (2+)	June 30, 2030
Disseminate decision framework for vegetation monitoring to Minnesota's restoration community	June 30, 2030
Complete research report	June 30, 2030

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Jennifer Thieme	Monarch Joint Venture (MJV)	Senior Science Manager	Yes
Daniel Cariveau	University of Minnesota, Twin Cities	Associate Professor	Yes

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.
The results of our study will be used to create a set of recommendations to improve current and future restoration projects and a decision framework that landowners, practitioners, and researchers can use to select appropriate pollinator habitat monitoring protocols that meet their objectives and align with state and national compliance and reporting standards.

The target audience for the results of this research will be land managers and habitat restoration professionals throughout the state of Minnesota. These professionals may be employed by federal and state agencies (MNDNR, BWSR, etc.), SWCDs, watershed districts, cities and counties, non-profits, tribal entities, native-led NGOs, for-profit restoration companies, the energy and rights-of-way sector, and academic institutions. More broadly, results will be applicable to anyone conducting bumble bee and pollinator habitat restoration.

Recommendations and the decision framework will be disseminated through written reports, newsletters, and trainings. Reports will be distributed to statewide conservation partners, including the MNDNR, BWSR, cities, counties, and nonprofits, shared through organizations such as the Metro Conservation Network (MCNet), and hosted publicly on FMR and MJV's websites. MJV will train rights-of-way, agricultural, and conservation sector stakeholders to implement the most appropriate monitoring methods for their objectives and create virtual, asynchronous learning modules. Results of this study will also be presented at relevant conferences, for example, Pollinator Friendly Alliance's Best Practices for Pollinators, the Entomological Society of America, Monarch Joint Venture, and MCNet annual meetings. Depending on the study's outcomes, results may also be published in scientific journals such as Prairie Naturalist, Insect Science, Ecology and Evolution, Ecosphere, or Ecological Restoration.

All dissemination products will acknowledge the Environment and Natural Resources Trust Fund through use of the trust fund logo or attribution language.

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?
Dissemination and implementation are key components of this project. We will share our results and decision framework with land managers via networks like UMN Extension, the Metro Conservation Network, and MJV's state and national partners network. Training will be provided to onboard interested stakeholders to recommended monitoring methods. MJV will continue to offer remote sensing training in Minnesota and expand their pollinator data repository while maintaining securely funded infrastructure. Additionally, FMR will apply findings, including seeding best practices,

across over 40 active restoration projects supported by the Minnesota Outdoor Heritage Fund, Community Partners Legacy grants, and local partners.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Urban Pollinator And Native American Cultural Site Restoration	M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 08l	$213,000
Assessing Restorations for Rusty-Patched and Other Bumblebee Habitat	M.L. 2023, , Chp. 60, Art. 2, Sec. 2, Subd. 03a	$75,000
Remote Sensing for Pollinator Habitat	M.L. 2024, , Chp. 83, Art. , Sec. 2, Subd. 03x	$180,000

Project Manager and Organization Qualifications

Project Manager Name: Julia Leone

Job Title: Pollinator Biologist

Provide description of the project manager's qualifications to manage the proposed project.
Dr. Julia Leone is a Pollinator Biologist with Friends of the Mississippi River and holds a PhD in Conservation Biology from the University of Minnesota. She has over 12 years of experience handling various insect taxa, including butterflies, bumble bees and other wild bees. She has logged over 2000 pollinator survey hours, including over 800 hours surveying butterflies in Minnesota and over 800 hours of non-destructive visual Minnesota bumble bee surveys. Dr. Leone has conducted multiple pollinator research projects, including two previous ENRTF-funded projects, and published four peer-reviewed journal articles on pollinator management. Dr. Leone has trained field technicians, land managers, and groups of volunteers in pollinator survey methods and butterfly and bumble bee identification. She has attended numerous seminars and webinars on butterfly, bumble bee, and Bombus affinis research, survey methods, and identification. Dr. Leone holds a recovery permit for the federally endangered rusty patched bumble bee and has assisted the Minnesota Department of Natural Resources with Bombus affinis nest surveys at multiple sites.

Organization: Friends of the Mississippi River

Organization Description:
Friends of the Mississippi River (FMR) engages people to protect, restore, and enhance the Mississippi River in the Twin Cities region.

Our work focuses on water quality and watershed health, land protection and restoration, and community and youth education and engagement. Our four programs include:

Land Conservation: We work with landowners, government agencies and residents to protect critical lands and improve climate resilience through technical assistance, management planning, and habitat restoration.

Water: Water quality remains one of the most pressing concerns for the Mississippi River. FMR activates people and builds partnerships and coalitions to influence public policies that impact the health of drinking water, the river and more.

Stewardship & Education: FMR connects people from diverse communities to the river through 100+ volunteer stewardship and education events annually, helping thousands of local residents protect water and wildlife. We're also fostering the next generation of environmental stewards through school- and community-based environmental education programming and an environmental career pathways program targeting BIPOC and underserved youth.

Land Use & Planning: Within local river communities, FMR supports grassroots advocacy and assists decision-makers to ensure that the values of public access, scenic views, equity and environmental quality are respected during planning and development processes.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
1 Pollinator biologist		Research design, protocols, survey and research management, field training, analysis, reporting, and dissemination			25%	0.39		$38,232
1 Accountant		Financial management, accounting expenses related to project invoicing and grant tracking			25%	0.03		$1,770
1 Conservation Director		Project oversight, reporting, dissemination			25%	0.03		$4,800
2 Seasonal interns		Assist with field trainings, plot set-up, data entry and management, summary statistics, dissemination, stipend-based.			0%	0.28		$9,311
							Sub Total	**$54,113**
Contracts and Services								
University of Minnesota Native Bee Lab	Subaward	Conduct pollinator and vegetation field surveys, data entry, and analysis. Personnel: $167,703 (one graduate student, 4 technicians - 2 per summer) Equipment, Tools, and Supplies: $500 (Survey supplies such as nets, hand lenses, vials, counters) Travel in MN: $3263 ($0.72/mile * 2250 miles) Printing: $192 (480 datasheets/maps)				2.34		$171,658
Monarch Joint Venture	Subaward	Personnel: $58,928 (remote sensing & vegetation surveys, analysis, framework development, dissemination) Equipment, Tools, and Supplies: $7195 (Drone fee $1.05/acre, drone image processing fee $0.57/image, SD cards, charging cords, first aid) Travel in MN: $3263 ($0.72/mile * 2250) Printing: $144 (180 datasheets)				0.84		$70,473
							Sub Total	**$242,131**
Equipment, Tools, and Supplies								

	Tools and Supplies	Hand lenses, photography jars, counters, clipboards, sharpies, poles, pin flags, flagging tape, first aid kit	Tools and supplies to assist in field trainings and plot set-up for survey of bees, butterflies, and vegetation					$500
							Sub Total	**$500**
Capital Equipment								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	Mileage reimbursement at the current IRS rate of $0.725/mile and assuming 750 miles of travel for two field-seasons.	Mileage to field sites for one training and plot setup at each site per year, survey fieldwork assistance					$1,088
							Sub Total	**$1,088**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
	Printing	Printing of training materials, protocols, site maps, and project reports for partners, 420 pages at $0.40/page	Training materials will support field crews, including instruction on survey protocols; maps will orient crews to field sites. Reports will be shared with partners and practitioners to increase adoption of decision framework.					$168
							Sub Total	**$168**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$298,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
Cash	Outdoor Heritage Fund ML26	OHF funding for staff time for vegetation surveys, plot set-up, and contracted funds for prairie habitat management at the Hastings Sand Coulee SNA, 2027-2029.	Pending	$87,000
Cash	Outdoor Heritage Fund ML27	OHF funding for staff time to conduct habitat surveys and plot set-up, contracted funds for prairie habitat management at study site William H. Houlton Conservation Area.	Pending	$35,000
Cash	Outdoor Heritage Fund, M.L. 2024 Chapter 101, Art. 1, Sec. 2	OHF funding for staff time for vegetation surveys, plot set-up, and contracted funds for prairie habitat management at the Hastings Sand Coulee SNA in 2027 and 2028.	Secured	$28,000
			State Sub Total	**$150,000**
Non-State				
Cash	3M Cottage Grove	Annual funds to support vegetation surveys, plot set-up, and contracted prairie habitat management at study site 3M Cottage Grove.	Pending	$10,000
Cash	Flint Hills Resources Pine Bend Bluffs	Annual funds to support vegetation surveys, plot set-up, and contracted prairie habitat management at study site Flint Hills Resources Pine Bend Bluffs.	Pending	$15,000
Cash	Friends of the Mississippi River members and donors	Funds to supplement staff time.	Secured	$40,000
Cash	Monarch Joint Venture	Unrecovered indirect costs.	Secured	$10,570
			Non State Sub Total	**$75,570**
			Funds Total	**$225,570**

Total Project Cost: $523,570

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: 6604b246-7a9.pdf

Alternate Text for Visual Component

A map with a metro-subset of potential prairie restoration study sites and three photos, each with a corresponding caption: 1) study effects of seed mix diversity on pollinators, 2) compare monitoring methods using UAVs and in-field vegetation surveys, and 3) develop decision-making framework to support restoration practitioners. Partner logos....

Financial Capacity

Title	File
FMR MN Sec of State cert of good standing	f829c064-2df.pdf
FMR FY 2024-2025 AG report with audited stmnts	ae11b4fc-f4c.pdf
FMR FY 2024-2025 990	a2c5e008-c52.pdf

Board Resolution or Letter

Title	File
FMR Board Resolution_signed	ef8b00c9-21a.docx

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
Dr. Woodard_support_letter	0592009f-b33.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I understand the Commissioner's Plan applies.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

Yes

Does the organization have a fiscal agent for this project?

No

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing $10,000 or more or large-scale stream or wetland restoration?

No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?

No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Friends of the Mississippi River: Julia Leone, Alex Roth. Monarch Joint Venture: Jennifer Thieme, Alex Carroll. University of Minnesota Native Bee Lab: Daniel Cariveau.

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

N/A