

Environment and Natural Resources Trust Fund

2026 Request for Proposal

General Information

Proposal ID: 2026-357

Proposal Title: Uniting Minnesota's Insect Record

Project Manager Information

Name: George Weiblen Organization: U of MN - Bell Museum of Natural History Office Telephone: (612) 624-3461 Email: gweiblen@umn.edu

Project Basic Information

Project Summary: We aim to develop the first comprehensive list of Minnesota insect species, unite the state insect collection with the Bell Museum, and integrate specimen records of statewide natural history collections.

ENRTF Funds Requested: \$1,037,000

Proposed Project Completion: June 30, 2029

LCCMR Funding Category: Fish and Wildlife (D)

Project Location

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

How many species are there in Minnesota? Plants, birds, fishes, and mammals are well-studied, but insects, Minnesota's most diverse group, lack a comprehensive list, even as studies suggest their declining abundance.

We propose to develop Minnesota's first complete insect list by uniting records scattered among collections in museums, colleges and universities. We focus on insects because they include agricultural and forest pests, vectors of human and veterinary disease, destructive exotic invaders, and rare or threatened species. They shape ecosystems as decomposers, herbivores, parasites, and prey. They are pollinators and indicators of soil and water quality. Naming all of Minnesota's insects is essential for documenting and managing their contributions – positive and negative – to Minnesota's natural resources.

Specimen collections are the basis for documenting Minnesota's insects but they are presently scattered, unavailable for comparison, or neglected. We aim to unify and preserve the state record in the Minnesota Biodiversity Atlas, a publicly available web application developed with ENTRF support. The Atlas is used for identification, mapping species distributions, making checklists, and accessing historic records. Over the past decade, it has grown from 400,000 to 2.2 million records across a network of 12 museums, educational institutions, and government agencies.

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 unify Minnesota biodiversity data and fill gaps in state-wide coverage by adding insect records, new institutional partners, and historical data.

1. We will use the Minnesota Biodiversity Atlas to develop the first comprehensive checklist of insect species by integrating disparate sources of information.

2. We will consolidate the University of Minnesota Insect Collection (UMSP) with the official state museum of natural history (Bell Museum) and digitize two other large insect collections (Science Museum of Minnesota, University of Minnesota-Morris).

3. We will protect and connect isolated natural history collections at several small colleges and universities (College of St. Scholastica, Winona State University, St. Mary's University).

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?

A statewide insect checklist, integrated biodiversity data, and institutional partnerships enhance our capacity to interpret, preserve and enjoy the diverse biological resources of our state. For example, integrating historical and contemporary records helps to model pest outbreaks and predict biotic responses to climate and land use change. It increases our capacity to track invasive species and prioritize management decisions. It also improves documentation of rare species and patterns of biodiversity to improve conservation decisions. Furthermore, an expanded, more complete Atlas provides teachers with extensive statewide data to enrich educational opportunities for K-12 and adult learners.

Activities and Milestones

Activity 1: Develop a comprehensive checklist of Minnesota insect species

Activity Budget: \$173,000

Activity Description:

We propose to use the Minnesota Biodiversity Atlas to develop the first comprehensive insect species checklist by integrating disparate information sources. Sources include existing localized surveys, scientific literature on specific taxonomic groups, records from data aggregators such as iNaturalist and the Global Biodiversity Information Facility, and newly digitized historic records from Activities 2 and 3.

Our first aim is to rescue a list of more than 1,200 insect species originally published in 1998 by entomologist John Haarstad on a long-defunct website. Haarstad's insect checklist for the Cedar Creek Ecosystem Science Reserve, which sits at the confluence of Minnesota's three major biomes, is comprehensive, providing a solid starting point for a statewide list. We will capture improvements in scientific knowledge and naming (taxonomy) since Haarstad's time by comparing his list with current literature. Tools are available for reviewing, updating, and integrating taxonomy, but they have yet to be combined into a single pipeline. We propose to develop a digital package of tools to automate the process and improve quality-control when merging lists. This will identify gaps in knowledge where there are plenty of records but no experts, highlighting opportunities for future research on poorly known Minnesota insects.

Activity Milestones:

Description	Approximate Completion Date
Release updated insect species list for Cedar Creek Ecosystem Science Reserve	June 30, 2027
Release digital tools for species checklists	June 30, 2028
Release comprehensive Minnesota insect species list	June 30, 2029

Activity 2: Integrate and digitize major insect natural history collections

Activity Budget: \$654,000

Activity Description:

We propose to integrate the University of Minnesota Insect Collection (UMSP) with the Bell Museum and digitize two additional insect collections, adding 100,000 records to the Minnesota Biodiversity Atlas. Since 1879, the UMSP has been administered by the Entomology Department and is not affiliated with the Bell Museum. The isolation of the state's largest specimen collection from its official natural history museum is an inefficient arrangement that places the collection at budgetary risk. We propose to remedy this situation by transferring the operation of UMSP to the museum.

At the same time, UMSP will prioritize three ecologically important groups: 20,000 mayflies, 15,000 stoneflies, and 25,000 dragonflies and damselflies for record capture (digitization). Mayflies and stoneflies are a critical component of the food chain, and nymphs are highly intolerant of water pollution. Dragonflies and damselflies are key predators of other aquatic insects and excellent indicators of habitat quality.

We also request support for the Science Museum of Minnesota to digitize 20,000 insects and a new partnership with University of Minnesota-Morris. The size of Morris' natural history collections affords opportunity to capture 20,000 insects as well as 5,000 plant and 1,000 vertebrate records.

Activity Milestones:

Description	Approximate Completion Date
Release 20,000 UMSP insect records and 6,000 University of Minnesota-Morris biodiversity records	June 30, 2027
Release 30,000 insect records from UMSP, Science Museum of Minnesota, and University of	June 30, 2028
Minnesota-Morris	
Release 40,000 insect records from UMSP, Science Museum of Minnesota, and University of	June 30, 2029
Minnesota-Morris	

Activity 3: Preserve and connect small, isolated natural history collections

Activity Budget: \$210,000

Activity Description:

Natural history collections of small colleges and universities often contain records of disproportionate value because they tend to include specimens from local vicinities that are not represented in larger collections. Such records help to fill gaps in knowledge of historic and current species distributions, and have significant educational value in teaching and learning where access to larger museums is limited. These small collections also tend to be at greater risk of deterioration or loss because they are housed at institutions that lack the capacity to curate them.

We propose to preserve and connect isolated natural history collections at small colleges and universities. New partnerships will add 10,000 records of insects and other organisms to the Atlas from College of Saint Scholastica (2,000), Winona State University (4,000), and Saint Mary's University (4,000). We also request support for Winona State University to inventory and plan for preservation of a significant and currently unmanaged insect collection (approx. 50,000). The inventory will include specimen counts by taxonomic groupings, an overall estimated quantity of specimens, and an assessment of what proportion meets standards for museum preservation.

Activity Milestones:

Description	Approximate Completion Date
Release 2,000 specimen records from College of St. Scholastica	June 30, 2027
Release 4,000 specimen records from Winona State University	June 30, 2028
Release 4,000 specimen records from Saint Mary's University and complete Winona State University	June 30, 2029
insect	

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
George Weiblen	Bell Museum, University of Minnesota-Twin Cities	Principal Investigator	No
Anna Fowler	Bell Museum, University of Minnesota-Twin Cities	Data Manager	Yes
Timothy Whitfeld	Bell Museum, University of Minnesota-Twin Cities	Digitization Coordinator	Yes
Cristian Beza- Beza	Department of Entomology, University of Minnesota-Twin Cities	Insect Taxonomist	Yes
Robin Thomson	Department of Entomology, University of Minnesota-Twin Cities	Insect Digitization Coordinator	Yes
Michael Milligan	Minnesota Supercomputing Institute, University of Minnesota-Twin Cities	Database Project Manager	Yes
Matthew Meschulam	Minnesota Supercomputing Institute, University of Minnesota-Twin Cities	Database Developer	Yes
Catherine Early	Science Museum of Minnesota	Curator	Yes
Dakota Rowsey	Science Museum of Minnesota	Collections Manager	Yes
Charlie Iverson	Science Museum of Minnesota	Registrar	Yes
Amber Schlater	College of Saint Scholastica	Professor	No
Pam Freeman	College of Saint Scholastica	Professor	No
Kaya Zelazny	College of Saint	Profesor	No
Austin Yantes	Winona State University	Professor	No
Joshua Lallaman	University of Saint Mary's	Professor	Yes

Miriam Gieske	University of	Professor	No
	Minnesota-		
	Morris		
Heather Waye	University of	Professor	No
	Minnesota-		
	Morris		
Tracey	University of	Professor	No
Anderson	Minnesota-		
	Morris		

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?

The specimens and records of the official state natural history museum are essential resources for state agencies, professionals, researchers, educators and the public. The Bell Museum has a statutory obligation to preserve these resources on behalf of state agencies and academic partners. The Digital Repository of the University of Minnesota Libraries (DRUM), where project data are archived, sets the highest standard for format-independent, archival preservation of digital data. The Bell Museum is committed to the pursuit of philanthropic gifts, professional service contracts, and federal funding to sustain these activities.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Minnesota Biodiversity Atlas - Phase 3	M.L. 2023, , Chp. 60, Art. 2, Sec. 2, Subd. 03s	\$797,000

Project Manager and Organization Qualifications

Project Manager Name: George Weiblen

Job Title: Science Director

Provide description of the project manager's qualifications to manage the proposed project.

George Weiblen is the Science Director of the Bell Museum and a curator of plants. As a Distinguished McKnight University Professor, he holds tenure in the Department of Plant and Microbial Biology and teaches in the College of Biological Sciences. He attended the Minneapolis public schools and earned a Bachelor's Degree from Reed College in Portland, Oregon. He received his Masters and PhD degrees from Harvard University in 1999 and he was a research associate of the National Museum of Natural History, Smithsonian Institution, Washington, DC (2001-2010).

Weiblen has co-authored more than 100 peer-reviewed scientific articles. His work has been supported by more than 30 grants and contracts totaling over \$6 million dollars from sources including the National Science Foundation, the National Institutes of Health, the Minnesota Department of Agriculture, and the Environment and Natural Resources Trust Fund. He was recognized as a University of Minnesota President's Community Engaged Scholar for his efforts in public engagement and science communication. He served on the team that designed and developed the new Bell Museum and the Minnesota Journeys main exhibit on the St. Paul campus of the University. He and his colleagues developed the Minnesota Biodiversity Atlas with support from ENTRF.

Organization: U of MN - Bell Museum of Natural History

Organization Description:

We are Minnesota's official natural history museum, established by the legislature in 1872 and held in trust by the University of Minnesota. For over 150 years, the museum has preserved and interpreted our state's rich natural history and served learners of all ages. Additionally, our scientific collections contain over one million specimens, representing every county in Minnesota and various locales around the globe. Collections are a source for Minnesota's biodiversity record, scientific research, and teaching materials for all levels of education. As Minnesota's state natural history museum, The Bell ignites and sustains curiosity for nature and the universe. The Bell envisions a hopeful future where all are inspired by nature and empowered by science.

We nourish a lifelong love for nature and the sciences through interactivity, discovery, awe-inspiring experiences, and the arts and humanities. We embrace deeper understanding of the world through research, collections, and broad collaborations. We empower people to connect with Minnesota's unique place in the world by making science meaningful, relevant, and accessible. We value our visitors, partners, and the experiences we create together, which enrich and extend our learning and service. We strive for excellence in all that we do, guided by honesty, transparency, and accountability.

Budget Summary

Category /	Subcategory	Description	Purpose	Gen.	%	#	Class	\$ Amount
Name	or Type			Ineli	Bene	FTE	ified	
				gible	fits		Staff?	
Personnel								
Michael Milligan		Database project manager (\$113,172 annual salary			36.6%	0.09		\$12,000
		with 0.025 FTE/year)						
Timothy		Off-site digitization manager (\$84,118 annual			36.5%	0.05		\$6,000
Whitfeld		salary with 0.10 FTE/year)						
Robin Thomson		Insect digitization manager (\$82,400 annual salary with 0.5 ETE (year)			36.6%	1.5		\$179,000
University of		Undergraduate assistants to checklist assembly			0%	0.36		\$12,000
Minnesota-Twin		(\$15.71 hourly rate for approximately 750 hours)			0,0	0.00		<i><i><i>q</i>12,000</i></i>
Cities students		(+ /						
University of		Undergraduate assistants to insect digitization			0%	2.16		\$73,000
, Minnesota-Twin		(\$15.71/hr for approximately 1500 hours per year)						. ,
Cities students								
Cristian Beza-		Insect taxonomist (\$120,000 annual salary with			36.6%	0.15		\$26,000
Beza		0.05 FTE/year)						
Matthew		Database developer (\$106,007 annual salary with			36.6%	0.45		\$69,000
Meshulam		0.15 FTE/year)						
Anna Fowler		Data manager (\$62,234 annual salary at 1.00 FTE/year)			32.3%	3		\$262,000
University of		Checklist and software development (\$30/hr,			23.2%	0.24		\$19,000
Minnesota-Twin		approximately 500 hours per summer for two						
Cities graduate		years)						
student								
University of		Undergraduate assistants to insect digitization			0%	0.6		\$22,000
Minnesota-		(\$16.66/hr)						
Morris students								
							Sub	\$680,000
							Total	
Contracts and								
Services	Comico	Data hasting 0 segments				0		¢c.000
iviinnesota	Service	Data nosting & server support				U		\$6,000
Supercomputing	Contract							
institute								
Science	Subaward	Specimen digitization involving a full time				0 75		\$255 000
Museum of	Subawalu	assistant curator (0.07 ETE parvoar), collections				0.25		\$235,000
Minnesota		assistant, curator (0.07 FTE per year), conections						
winnesold	1	I manager (0.07 FTE per year), registrar (0.0475 FTE		1	1	1	1	1

		per year), IT professional (0.0975 FTE per year), a digital imaging station, and barcode labeling supplies					
St. Scholastica	Subaward	Specimen digitization by undergraduate assistants (\$16.66/hr at 500hrs) plus supplies for curation of natural history collections			0.25		\$12,000
Winona State University	Subaward	Specimen digitization by undergraduate assistants (\$16.66/hr for 770 hours) \$16.66/hr at 500hrs), supplies for curation of natural history collections and \$2,500 salary for off-site digitization manager (St. Mary's University)			0.4		\$25,000
						Sub Total	\$298,000
Equipment, Tools, and Supplies							
	Tools and Supplies	Boxes and storage containers	Materials for specimen imaging, repair and storage				\$4,000
	Tools and Supplies	Barcode labels and printed specimen tags	QR codes for UMSP; 2 laptops for ENT; Bartender subscription, printer, archival paper for labels, toner at archival paper \$35/ream, \$140 laserjet toner, \$1200 printer; Bartender software \$780 one time				\$7,000
	Tools and Supplies	QR codes for labelling insect specimens at Morris. \$230/roll of 10,000 labels at 30,000 labels total; barcode reader	QR codes for labelling insect specimens				\$1,000
	Tools and Supplies	Barcodes for labelling plant specimens at Morris. Minimum order 6,000 at \$0.12/label; barcode reader	Barcodes for labelling planet specimens				\$1,000
	Tools and Supplies	Supplies for mounting plants to include archival mounting and label paper, archival glue, glue tape, fragment packets, tweezers, scissors, etc.	Supplies for mounting plants to include archival mounting and label paper, archival glue, glue tape, fragment packets, tweezers, scissors, etc.				\$2,000
	Tools and Supplies	UMSP supplies: OLYMPUS TG-6 Red Underwater camera; camera storage case; 512 gb SD card; Ring light; Light box, var. sizes available; White foam; Mac cable adaptor; Barcode scanner; Adobe Lightroom Classic; Computer; Kaiser Rs-1 stand/camera mount; Lights/arms; bubble level	Digital imaging of specimens and labels				\$4,000

				Sub Total	\$19,000
Capital Expenditures					
				Sub Total	-
Acquisitions and Stewardship					
				Sub Total	-
Travel In Minnesota					
	Miles/ Meals/ Lodging	Two 2-day trips to/from each project site per year: Vehicle at \$65/day plus \$0.59 per mile; Roundtrip Duluth-St. Paul at 300 miles; Roundtrip Winona-St. Paul at 240 miles; Roundtrip Morris-St. Paul at 340 miles	Training for project staff		\$6,000
	Miles/ Meals/ Lodging	Two days x two persons from each project site to Bell Museum & two persons from Bell Museum to/from each project site per active year. \$187 lodging plus meals for greater MN, \$206 for metro	Training for project staff		\$15,000
	Miles/ Meals/ Lodging	UMN Morris student travel to UMN Twin Cities 48.23/night per person AND meals at est. \$2500/10 weeks	UMN Morris student travel to UMN Twin Cities		\$18,000
				Sub Total	\$39,000
Travel Outside Minnesota					
				Sub Total	-
Printing and Publication					
				Sub Total	-
Other Expenses					
		Shipping costs	Cost associated with shipping specimens and supplies between project sites		\$1,000
				Sub Total	\$1,000

			Grand	\$1,037,000
			Total	

Classified Staff or Generally Ineligible Expenses

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

Category	Specific Source	Use	Status	Amount
State				
In-Kind	University of Minnesota	Unrecovered indirect costs (54% of \$807,000 UMN direct costs with	Pending	\$436,000
		indirect charged to the first \$25,000 of each of three subawards)		
In-Kind	University of Minnesota	Salary and benefits for PI Weiblen at 5% per year for 3 years with 3%	Pending	\$30,000
		inflation per year (base salary of \$138,000)		
In-Kind	University of Minnesota	Salary and benefits for co-PI Thomson at 50% per year for 3 years with	Pending	\$179,000
		3% inflation per year (base salary of \$82,000)		
			State Sub	\$645,000
			Total	
Non-State				
In-Kind	Science Museum of Minnesota	Unrecovered indirect costs (49% of \$255,000 subaward)	Pending	\$125,000
			Non State	\$125,000
			Sub Total	
			Funds	\$770,000
			Total	

Total Project Cost: \$1,807,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component File: 2576a93e-6da.pdf

Alternate Text for Visual Component

"Uniting Minnesota's Insect Record in the Minnesota Biodiversity Atlas with statewide natural history collections". Graphic includes a map of Minnesota with partner logos, a pie chart highlighting the unknown number of Minnesota insect species, and Atlas features including searching records, mapping species distributions, and identifying specimens using digital images....

Supplemental Attachments

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

Title	File
letter of commitment Winona State University	<u>5e479f5c-140.pdf</u>
letter of commitment Saint Marys University	0c91bfbf-0e5.pdf
letter of commitment Science Museum of Minnesota	e1db0cf2-6df.pdf
UMN Letter of Approval	<u>d4d1c94e-61d.pdf</u>

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 UMN Policy on travel 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?

No

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:

Jen Olson (Bell Museum, University of Minnesota-Twin Cities

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

Yes, I understand