Environment and Natural Resources Trust Fund

M.L. 2026 Approved Work Plan

General Information

ID Number: 2026-357

Staff Lead: Erin Barton

Date this document submitted to LCCMR: June 2, 2026

Project Title: Uniting Minnesota's Insect Record

Project Budget: $932,000

Project Manager Information

Name: George Weiblen

Organization: U of MN - Bell Museum

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Project Reporting

Date Work Plan Approved by LCCMR: June 17, 2026

Reporting Schedule: April 1 / October 1 of each year.

Project Completion: June 30, 2029

Final Report Due Date: August 14, 2029

Legal Information

Legal Citation: M.L. 2026, Chp. 104, Sec. 2, Subd. 06h

Appropriation Language: $932,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota, Bell Museum, to develop the first comprehensive list of Minnesota insect species, consolidate Bell Museum and other state insect collections, and integrate specimen records of statewide natural history collections with the Minnesota Biodiversity Atlas.

Appropriation End Date: June 30, 2029

Narrative

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.

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.

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

Activities and Milestones

Activity 1: Develop a comprehensive checklist of Minnesota insect species

Activity Budget: $161,000

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
Recruit and train student workers	August 31, 2026
Incorporate Cedar Creek insect taxonomy	February 28, 2027
Incorporate Cedar Creek insect records	May 31, 2027
Compile Minnesota insect literature	May 31, 2027
Release updated insect list for Cedar Creek Ecosystem Science Reserve	June 30, 2027
Software development converting digital tools	June 30, 2027
Test and troubleshoot digital tools	May 31, 2028
Identify knowledge gaps and seek taxonomic expertise	May 31, 2028
Release digital tools for species checklists	June 30, 2028
Compare and compile taxonomic lists	December 31, 2028
Publish and publicize Minnesota insect checklist	May 31, 2029
Release comprehensive Minnesota insect species list	June 30, 2029

Activity 2: Integrate and digitize major insect natural history collections

Activity Budget: $586,000

Activity Description:
We propose to integrate the University of Minnesota Insect Collection (UMSP) with the Bell Museum and digitize two additional insect collections, adding 83,000 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 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 18,000 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
Recruit and train UMSP student workers	September 30, 2026
Deliver UM Morris insect collection to UMSP for digitization (travel)	May 31, 2027
Release 13,000 UMSP insect records	June 30, 2027
Recruit and train SMM workers	July 31, 2027
Digitize 6,000 UM Morris insect records (travel)	September 30, 2027
Recruit and train UM Morris students to transcribe records (travel)	June 30, 2029
Release 6.000 UM Morris records and 18,000 SMM records (travel)	June 30, 2029

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

Activity Budget: $185,000

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
Recruit and train College of St. Scholastica student workers	June 30, 2027
Release 2,000 specimen records from College of St. Scholastica (travel)	June 30, 2027
Release 4,000 specimen records from Winona State University	June 30, 2028
Release 4,000 specimen records from Winona State University (travel)	June 30, 2028
Release 4,000 specimen records from Saint Mary's University and complete Winona State University insect	June 30, 2029
Release 4,000 specimen records from Saint Mary's University (travel)	June 30, 2029

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 Scholastica	Profesor	No
Austin Yantes	Winona State University	Professor	No
Joshua Lallaman	University of Saint Mary's	Professor	Yes

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

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 this project will be communicated to three primary audiences by different means. First, we will continue to promote the availability of images and records through the website, Bell Museum programming, and an interactive kiosk in the Touch & See Lab of the Bell Museum. We specifically target audiences including educators, naturalists (e.g. participants in the Minnesota Master Naturalist program), paraprofessionals and hobbyists (Minnesota Native Plant Society, Minnesota Herpetological Society, Minnesota Ornithologists' Union). These user communities become advocates for the Atlas, promoting its use in outdoor recreation, education, and natural resource management. We will continue to engage with the media through University News Service press releases in coordination with agency partners to mark major project milestones. Lastly, we will demonstrate the use of the Atlas to targeted user groups (DNR staff, MPCA staff, natural resource consulting agencies, state colleges, universities and K-12 educators, Master Naturalists) through email announcements, presentations, and workshop activities. The new Bell Museum in Saint Paul has increased public awareness of our state's official museum of natural history. The Atlas compliments our new facility by providing 24-7 access to the collections for virtual visitors across the state. The Environment and Natural Resources Trust Fund will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, web pages, publications, signage, and other communications per the ENTRF Acknowledgement Guidelines.

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 unification of Minnesota's largest insect collection with the Bell Museum and digitization of other statewide collections will support long-term stewardship, sustainability, and accessibility of critical natural resource information. Unifying close to five million scientific specimens under the official state natural history museum aligns with our statutory mission, achieves greater administrative efficiency, and unlocks funding opportunities at a different scale. The Bell Museum and the University of Minnesota Libraries are also committed to sustaining access to biodiversity records. This project is a strategic investment that can leverage new sources of external support including philanthropy.

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

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Michael Milligan		Database project manager ($113,172 annual salary with 0.025 FTE/year)			36.6%	0.09		$12,000
Timothy Whitfeld		Off-site digitization manager ($84,118 annual salary with 0.10 FTE/year)			36.5%	0.05		$6,000
Robin Thomson		Insect digitization manager ($82,400 annual salary with 0.5 FTE/year)			36.6%	1.5		$179,000
University of Minnesota-Twin Cities students		Undergraduate assistants to checklist assembly ($15.71 hourly rate for approximately 750 hours)			0%	0.36		$12,000
University of Minnesota-Twin Cities students		Undergraduate assistants to insect digitization ($15.71/hr for approximately 1060 hours per year)			0%	2.4		$50,000
Cristian Beza-Beza		Insect taxonomist ($120,000 annual salary with 0.05 FTE/year)			36.6%	0.15		$26,000
Matthew Meshulam		Database developer ($106,007 annual salary with 0.15 FTE/year)			36.6%	0.45		$69,000
Anna Fowler		Data manager ($62,234 annual salary at 0.9 FTE/year)			32.3%	2.7		$223,000
University of Minnesota-Twin Cities graduate student		Checklist and software development ($30/hr, approximately 500 hours per summer for two years)			23.2%	0.24		$19,000
University of Minnesota-Morris students		Undergraduate assistants to insect digitization ($16.66/hr)			0%	0.6		$22,000
							Sub Total	**$618,000**
Contracts and Services								
Minnesota Supercomputing Institute services	Internal services or fees (uncommon)	Data hosting & server support				0		$6,000
Science Museum of Minnesota	Subaward	Digitizing 18,000 insect specimens: full-time assistant ($21.65/hr), curator (0.07 FTE/year, $106,518/yr), collections manager (0.0374		X		2.73		$230,000

		FTE/year, $69,935/yr), registrar (0.0475 FTE/year, $93,642/yr), IT (0.0975 FTE/year, $25,776 total), supplies ($9000): barcodes, imaging station (see justification).						
St. Scholastica	Subaward	Digitization of 2,000 specimens by undergraduate assistants at St. Scholastica ($16.66/hr at 500 hrs) plus supplies for curation of natural history collections ($4000: barcodes, poly fiber fill, unit trays, 6-pack wood drawers, foam, insect-specific preparation supplies including pins, glue, points, etc.)				0.25		$12,000
Winona State University	Subaward	Digitization of 8,000 insect specimens: undergraduate assistants at Winona State University and St. Mary's University ($16.66/hr for 770hrs, $16.66/hr at 500 hrs), supplies ($10,000: shared imaging station, 1D/2D barcodes, mounting supplies - archival paper/glue, tweezers, etc.), off-site digitization manager ($2,500).		X		0.4		$25,000
							Sub Total	**$273,000**
Equipment, Tools, and Supplies								
	Tools and Supplies	Boxes and storage containers	Materials for specimen imaging, repair and storage					$4,000
	Tools and Supplies	QR codes for UMSP; two dedicated computer workstations for ENTO; Bartender software subscription or similar, printer, archival paper for labels, toner at archival paper $35/ream, $140 laser jet toner, $1200 printer; Bartender software or similar ($780)	Specimen label printing and specimen digitization	X				$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 or equivalent; camera storage case; 512 gb SD card; Ring light; Light box, var. sizes available; White foam; Mac cable adaptor or equivalent; Barcode scanner; Adobe Lightroom Classic or equivalent; dedicated computer workstation; Kaiser Rs-1 stand/camera mount or equivalent; Lights/arms; bubble level.	Digital imaging of specimens and labels	X				$4,000
							Sub Total	**$19,000**
Capital Equipment								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	Two 2-day trips to/from each off-site project location (Duluth, Morris, Winona) per year (18 trips in total): 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 off-site project location to Bell Museum & two persons from Bell Museum to/from each off-site location per year (18 trips in total). $187 lodging plus meals for greater MN, $206 for metro	Training for project staff					$15,000
							Sub Total	**$21,000**
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 Total	**$932,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Contracts and Services - Science Museum of Minnesota	Subaward	Digitizing 18,000 insect specimens: full-time assistant ($21.65/hr), curator (0.07 FTE/year, $106,518/yr), collections manager (0.0374 FTE/year, $69,935/yr), registrar (0.0475 FTE/year, $93,642/yr), IT (0.0975 FTE/year, $25,776 total), supplies ($9000): barcodes, imaging station (see justification).	The imaging station includes a camera, light-box, barcode scanner, and a dedicated desktop computer with a software package for capturing digital images of specimens during the full term of the project. The lifetime of these electronics with advancing technology and depreciation is three years such that the expenditure will have no resale value at the end of the project. Each desktop PC is entirely dedicated to digital image processing and will not be used for any other activity.
Contracts and Services - Winona State University	Subaward	Digitization of 8,000 insect specimens: undergraduate assistants at Winona State University and St. Mary's University ($16.66/hr for 770hrs, $16.66/hr at 500 hrs), supplies ($10,000: shared imaging station, 1D/2D barcodes, mounting supplies - archival paper/glue, tweezers, etc.), off-site digitization manager ($2,500).	The imaging station includes a camera, light-box, barcode scanner, and a dedicated desktop computer with a software package for capturing digital images of specimens during the full term of the project. The lifetime of these electronics with advancing technology and depreciation is three years such that the expenditure will have no resale value at the end of the project. Each desktop PC is entirely dedicated to digital image processing and will not be used for any other activity.
Equipment, Tools, and Supplies		QR codes for UMSP; two dedicated computer workstations for ENTO; Bartender software subscription or similar, printer, archival paper for labels, toner at archival paper $35/ream, $140 laser jet toner, $1200 printer; Bartender software or similar ($780)	2 dedicated computers workstations running the camera and barcode scanner is needed for continuous operation. Depreciation over 3 years of grant is such that there will be no resale value at the close of the grant. Computers for workstations are not covered by University indirect costs (unrecovered cost-sharing).
Equipment, Tools, and Supplies		UMSP supplies: OLYMPUS TG-6 Red Underwater camera or equivalent; camera storage case; 512 gb SD card; Ring light; Light box, var. sizes available; White foam; Mac cable adaptor or equivalent; Barcode scanner; Adobe Lightroom Classic or equivalent; dedicated computer workstation; Kaiser Rs-1 stand/camera mount or equivalent; Lights/arms; bubble level.	A dedicated computer workstation running the camera and barcode scanner is needed for continuous operation by rotating part-time student workers. Unlike office computers assigned to each staff member, dedicated workstations are not covered by University indirect costs (unrecovered cost-sharing).

Non ENRTF Funds

Category	Specific Source	Use	Status	$ Amount
State				
In-Kind	University of Minnesota	Unrecovered indirect costs (54% of $727,000 UMN direct costs with indirect charged to the first $25,000 of each of three subawards)	Pending	$392,000
In-Kind	University of Minnesota	Salary and benefits for PI Weiblen at 5% per year for 3 years with 3% inflation per year (base salary of $138,000)	Pending	$30,000
In-Kind	University of Minnesota	Salary and benefits for co-PI Thomson at 50% per year for 3 years with 3% inflation per year (base salary of $82,000)	Pending	$179,000
			State Sub Total	**$601,000**
Non-State				
In-Kind	Science Museum of Minnesota	Unrecovered indirect costs (49% of $230,000 subaward)	Pending	$113,000
			Non State Sub Total	**$113,000**
			Funds Total	**$714,000**

Total Project Cost: $1,646,000

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

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

We reduced scope in Activity 2 in proportion to the difference between the original budget and the recommended total.

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

N/A

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 project:

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

N/A