Environment and Natural Resources Trust Fund

M.L. 2024 Approved Work Plan

General Information

ID Number: 2024-158

Staff Lead: Lisa Bigaouette

Date this document submitted to LCCMR: June 5, 2024

Project Title: New Small Mammal Monitoring Methods for Minnesota

Project Budget: $199,000

Project Manager Information

Name: Ron Moen

Organization: U of MN - Duluth - NRRI

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Project Reporting

Date Work Plan Approved by LCCMR: June 20, 2024

Reporting Schedule: June 1 / December 1 of each year.

Project Completion: December 31, 2026

Final Report Due Date: February 14, 2027

Legal Information

Legal Citation: M.L. 2024, Chp. 83, Sec. 2, Subd. 03n

Appropriation Language: $199,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota for the Natural Resources Research Institute in Duluth to develop camera trapping methods as a new tool to collect foundational data and fill key knowledge gaps in the status of small mammal species in Minnesota.

Appropriation End Date: June 30, 2027

Narrative

Project Summary: We will develop camera trapping methods for small mammals, a new tool in the toolbox to to fill key knowledge gaps in status of Minnesota mammal species.

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

Why monitor shrews, mice, voles, and squirrels in Minnesota?

1. Biology. Small mammals support fox, bobcat, coyote, hawk, and owl populations.
2. Economics. Mice eat weed seeds, insect pests, and agricultural crops.
3. Human health. Mice are associated with diseases (Lyme disease, Hantavirus).
4. Legal. Management actions may help recover Threatened or Endangered species populations.
5. Management. Species in Greatest Conservation Need (SGCNs) need to be monitored for species evaluations and the Minnesota State Wildlife Action Plan (SWAP).

Small mammals are usually monitored by trapping. Trail cameras are a time- and cost-effective method to enhance monitoring and evaluate status of small mammals. Why consider trail cameras?

1. Cameras will work better than traps in some situations.
2. Camera sampling can cost much less than trapping for similar data.
3. Cameras also increase efficiency by identifying locations to trap (or not trap).

Additional work is needed to evaluate and develop protocols for using camera technology to monitor populations of small mammals like mice, voles, and shrews.

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 evaluate technology and develop protocols for using camera technology to monitor populations of small mammals like mice, voles, and shrews. We will test this protocol at sites throughout Minnesota by deploying camera traps in multiple habitats across Minnesota (see map in graphic) to identify when and how to best include camera traps in management. The new method uses down-pointing trail cameras (aka camera traps). Pictures from a pilot project funded by NRRI (see proposal graphic) show how the technique works. Comparing snap trap captures to camera trap captures under standard conditions will also make it possible to use legacy data on small mammal presence and relative abundance.

In the pilot project animal pictures were often taken within 4 hours of camera deployment. With snap traps or live traps, capture rate is often less than 15% and traps are deployed for 3 to 4 days. Two mouse species comprised almost 8,000 of the 9,000 mice trapped over 20 years in a project coordinated by the 1854 Treaty Authority! 72% of trap transects had only 1 or 2 species in snap trapping we did in 2021 and 2022. Multiple species can be detected with long camera trap deployments.

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?

Outcome 1: Develop and validate a new and improved protocol for small mammal monitoring. This new technique will not replace trapping, it will be a new tool for collecting foundational data on small mammals in Minnesota.

Outcome 2: Document rare and Species of Special Concern (SSC) mammals in Minnesota non-invasively. We will deploy down-pointing cameras in locations where SSCs have been captured by traditional trapping techniques (see map).

At a higher level, our desired outcome is to demonstrate that the down-pointing camera technique can efficiently and economically collect baseline data for management, legal, or ecological reasons.

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 and test a new small mammal monitoring method in Minnesota

Activity Budget: $50,000

Activity Description:
In our pilot project we demonstrated that the down-pointing camera technique is a new tool to help monitor small mammal populations. Operationally, we need additional protocol development to test equipment setup (e.g., distance to bait, camera box type, alternative baits, box entrance size and shape) that can be done in the Duluth area.

At sampling sites, we will deploy an array of cameras to detect small mammal species that are present. We deploy cameras for 2 to 4 weeks, and then identify species (or possible species) that are present from pictures. In these deployments we will evaluate array size (how many cameras to deploy) and duration of deployment. We will also calculate the cost of deployment types, which will enable us to estimate the trade-off between equipment, labor, and travel costs for each deployment and data quality. Capturing and handling animals is not necessary, but evaluating pictures can be labor intensive. Logistically, in Activity 1 we would deploy camera arrays in at least 25 sites.

Activity Milestones:

Description	Approximate Completion Date
Develop standard protocol and deploy down-pointing cameras in northern Minnesota.	November 30, 2024
Disseminate preliminary results (year 1) to managers and the public via outreach and media	April 30, 2025
Finish development of technique protocol and begin year 2 data analysis	November 30, 2025
Disseminate preliminary results (year 2) to managers and the public via outreach and media	April 30, 2026
Technical report on protocol description, analyze data, and submit paper to peer-reviewed journal	May 31, 2026
Complete all analyses and update technical report on protocol development	December 31, 2026

Activity 2: Implement new small mammal monitoring method in Minnesota

Activity Budget: $149,000

Activity Description:
In Activity 2 we will implement the new technique in different habitat types and detect mammal species present in other parts of Minnesota. The Minnesota Biological Survey has trapped small mammals in every county in Minnesota over the past 35 years. We will obtain general locations for some of the sites where the MBS has captured small mammal species (especially rare and SGCN species) using traditional monitoring methods and deploy down-pointing cameras. We will also use sites where we have captured rare and SGCN species (e.g., smoky shrews, rock voles, see graphic). Logistically, during this activity we plan to deploy cameras in at least 10 sites (an array of 3 cameras at each site) in each month, with 60 camera deployments per year, and at least 45 cameras active at any given time. Activity 2 will provide new data to the MBS on mammal species distribution and relative abundance that was collected with this technique, and will also make it possible to calculate the scientific and economic benefits of incorporating this new technique into existing sampling methods.

Activity Milestones:

Description	Approximate Completion Date
Deploy down-pointing cameras focusing sampling in NW and Central Minnesota	November 30, 2025
Disseminate preliminary results (year 1) to managers and the public via outreach and media	April 30, 2026
Deploy down-pointing cameras focusing sampling in southern Minnesota	September 30, 2026
Disseminate preliminary results (year 2) to managers and the public via outreach and media	November 30, 2026

Complete all analyses and project technical reports	December 31, 2026

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. Michael Joyce	UMD-NRRI	Co-investigator. Will provide input and support on all aspects of this project and will work with project manager to oversee all aspects of this project.	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.

I expect that results of this project will be used in the following ways:

1. Given to MN DNR (Minnesota Biological Survey) in the form of technical reports. I will work closely with MBS personnel during the project because of the direct management implications of developing and implementing a new method to monitor small mammals, and because we will be comparing traditional methods with the new camera-based method on sites MBS has surveyed or is surveying.
2. Given to site-specific locations (e.g., state parks, state forests, research areas) as technical reports.
3. Interactions with media. In the past all of my research projects have appeared in newspapers, on TV, on radio, and on websites as a way of sharing results with the public. If I am not contacted by media, I will develop press releases with NRRI media team. This project will generate pictures that will be of interest to the general public.
5. Data will be permanently archived at NRRI and could be available to others depending on a data sharing agreement and intended use.

Attribution language will follow ENRTF management 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?

This project is unique because it develops a new technique to monitor populations of small mammal species in Minnesota. It is a tool that could be used in future MBS efforts in the appropriate situations. Down-pointing cameras won't replace trapping, but are another tool in the toolbox that would be economically efficient. Specifically, we have designed this project to address key knowledge gaps and provide information that will help inform the status of mouse, vole, and shrew species as the DNR reviews species statuses as part of the next State Wildlife Action Plan update.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Ron Moen, Research Scientist/Professor		Project Manager			26.9%	0.2		$33,735
Michael Joyce, Research Scientist		Co-Investigator			26.9%	0.22		$25,012
Wildlife Technician		Field and office work			24.24%	0.63		$31,057
M.S. Graduate Student		Conducting field work, data management, data analysis, and writing. The student will contribute to all aspects of this project.			19.4%	0.2		$12,023
Seasonal Wildlife Technician		Conducts field and office work			7.64%	0.72		$35,881
Undergraduate research assistant		Conducts field and office work			0%	0.72		$22,292
							Sub Total	**$160,000**
Contracts and Services								
							Sub Total	**-**
Equipment, Tools, and Supplies								
	Tools and Supplies	Camera traps (60 @ estimated $175) and platform setup supplies for each camera	To conduct camera trap surveys for small mammals					$12,000
	Tools and Supplies	Supplies for doing camera surveys (batteries, bait, locks/straps, etc.)	To conduct camera trap surveys for small mammals					$7,000
							Sub Total	**$19,000**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**

Travel In Minnesota								
	Miles/ Meals/ Lodging	Travel for fieldwork, including mileage (75%) and lodging for technician, researcher, and undergraduate research assistant. Mileage will be reimbursed at the approved U of M travel rate. Lodging is estimated between $90 and $110 per night, less if camping is possible. Some trips will involve longer-distance travel and require overnight expenses (camping or motel) and food expenses.	Collect field data for project					$18,000
							Sub Total	**$18,000**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
	Publication	Page charges for publication in peer-reviewed journal	Publication in peer-reviewed journal establishes credibility of research results					$2,000
							Sub Total	**$2,000**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$199,000**

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				
			State Sub Total	**-**
Non-State				
In-Kind	UMN unrecovered indirect costs are calculated at the UMN negotiated rate for research of 55% modified total direct costs.	Indirect costs are those costs incurred for common or joint objectives that cannot be readily identified with a specific sponsored program or institutional activity. Examples include utilities, building maintenance, clerical salaries, and general supplies. (https://research.umn.edu/units/oca/fa-costs/direct-indirect-costs)	Secured	$109,450
			Non State Sub Total	**$109,450**
			Funds Total	**$109,450**

Attachments

Required Attachments

Visual Component

File: aaf734da-eaa.pdf

Alternate Text for Visual Component

The visual component shows example pictures of many small mammal species, including the jumping mouse (rarely captured in traps). We also show a map of counties in Minnesota sampled by MBS by date - 2/3 of sampling is over 10 years old. Technique testing would be throughout Minnesota....

Supplemental Attachments

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

Title	File
UMN Transmittal Letter	462dc6a2-52b.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

No changes were needed other than minor changes requested by LCCMR staff (Mike Campana)

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 agree travel expenses must 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 agree to the Commissioner's Plan.

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