



Environment and Natural Resources Trust Fund

2024 Request for Proposal

General Information

Proposal ID: 2024-088

Proposal Title: Distribution and Population Status of Weasels in Minnesota

Project Manager Information

Name: Michael Joyce

Organization: U of MN - Duluth - NRRRI

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Project Basic Information

Project Summary: We will determine the distribution, relative density, and spatial occupancy patterns of 3 small weasel species in Minnesota to fill key knowledge gaps in weasel distribution and status in Minnesota.

Funds Requested: \$400,000

Proposed Project Completion: June 30, 2027

LCCMR Funding Category: Foundational Natural Resource Data and Information (A)

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?

In the Future

Narrative

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

There are 3 species of small weasels in Minnesota: the short-tailed weasel, the long-tailed weasel, and the least weasel. Least weasels are a species of special concern in Minnesota. All three weasel species are broadly distributed but relatively rare even where present. Consequently, little is known about the distribution and density of small weasel species in Minnesota. Monitoring rare and elusive species like weasels is challenging but critical for evaluating populations and directing management or conservation actions.

Recent studies suggest widespread declines of weasels throughout North America over the last several decades. In Minnesota, several lines of evidence highlight concerns for weasel populations:

- Both DNR winter track surveys and weasel harvest data suggest weasel population declines (see graphic).
- There are no or few recent records for long-tailed weasels in some areas where they were previously detected.
- There have only been a few confirmed least weasel sightings since 1967.

The DNR winter track survey cannot provide information on species distribution or species-specific population trends. Least weasels are not believed to be detected on current track surveys and are also not harvested so no harvest records exist. New methods are needed to collect data on distribution and population status of weasel species.

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 determine the distribution, habitat associations, and current relative abundance for weasel species across the state to provide foundational data to fill key knowledge gaps on weasels in Minnesota. The results will have high conservation and management value.

We will employ a large-scale camera survey to determine weasel distribution in Minnesota. Recent research has shown that camera surveys are an efficient, cost-effective and robust method for detecting and monitoring weasels and other rare mammal species. Additionally, weasels can often be identified to species using camera images. We will also solicit public sightings to augment our camera survey. We will use the data we collect and historical occurrence data to:

- 1) Summarize existing records of the least weasel and evaluate new methods to survey least weasels in Minnesota.
- 2) Determine the distribution of all 3 weasel species in Minnesota.
- 3) Identify factors influencing occurrence and relative abundance of each weasel species.

We expect our results will be of high interest and value to the public, including trappers and non-trappers. We will conduct public outreach to solicit sightings and disseminate project results, ensuring the public realizes the value of this project.

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 foundational data on weasel distribution that is of high value to wildlife managers. Given the recent decline of weasel species in Minnesota and North America, determining where weasels currently live in Minnesota is a critical first step to evaluating their status and evaluating causes of apparent population declines. Additionally, our data will provide a baseline that can be used to detect future changes in weasel populations because the methods we develop for this project could be used to monitor weasels in the future.

Activities and Milestones

Activity 1: Survey for least weasels using newly developed remote camera survey methods

Activity Budget: \$80,000

Activity Description:

Because the least weasel is a species of special concern and has rarely been detected in MN in the last 50 years, we will conduct surveys using newly developed methods specifically targeting least weasels. We will conduct surveys for two years in northwestern Minnesota in the area where most of the historical records of least weasels have come from. We will also summarize all historical occurrence records of least weasels and survey other areas with recent occurrence records, including any areas where we detect least weasels during broader-scale weasel surveys described in Activity 2. The camera survey method we will use is the weasel survey box, also known as the Mostela box. Weasel survey boxes have been shown to be effective at detecting least weasels and other species of weasel in the Netherlands and several eastern states. Within our survey areas, we will target microhabitat where other researchers have found least weasels most frequently in other areas. This survey will supplement surveys conducted by the Minnesota Biological Survey by surveying using a new method and surveying different areas.

Activity Milestones:

Description	Approximate Completion Date
Summarize historical least weasel occurrences	March 31, 2025
Summarize data from the first year of the study	June 30, 2025
Conduct two years of least weasel surveys	December 31, 2025
Summarize data from the second year of the study	June 30, 2026
Summarize all public sightings	June 30, 2027

Activity 2: Determine the distribution, relative abundance, and spatial occurrence patterns of weasel species throughout Minnesota

Activity Budget: \$320,000

Activity Description:

We will evaluate the distribution and relative abundance of all weasel species using camera trapping and occurrence data. Camera traps will be deployed in a large-scale survey throughout Minnesota to document weasel presence, identify weasels to species, and evaluate factors that influence presence and relative abundance. The survey will include sites in all ecological sections in Minnesota and include 350-400 unique sites. We will use our camera data to calculate annual and regional weasel population indices that will be compared across three survey years. We will evaluate two methods of camera survey for weasels: 1) placing baited cameras at important microhabitat features, and 2) using weasel survey boxes, where the camera is enclosed in a box. Both survey methods have been used to efficiently detect and identify weasels to species. Based on pilot testing, we expect to collect several million images from camera surveys. We will use a dynamic occupancy modeling framework to analyze data. Occurrence records will be solicited from the public to augment our surveys. Studies conducted elsewhere have shown that public sightings can provide valuable occurrence data for weasels. We will target weasel trappers, cat-owners whose cats may occasionally kill weasels, and the general public.

Activity Milestones:

Description	Approximate Completion Date
Develop outreach materials and the mechanism to obtain public sightings of weasels	December 31, 2024
Conduct the first year of surveys and summarize the data	June 30, 2025

Conduct the second year of surveys and summarize the data	June 30, 2026
Conduct the third year of surveys, analyze all data, write technical reports	June 30, 2027

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. Michael Joyce	UMD-NRRI	Project manager overseeing all aspects of this project including coordinating field work, data management, analysis, and reporting.	Yes
Dr. Ron Moen	UMD-NRRI	Providing input and support on the project, including design, field work, data-analysis, and writing.	Yes
Dr. John Erb	MN DNR	Providing input and in-kind support on the project, including design, field work, data-analysis, and writing.	No
Dr. Roger Powell	North Carolina State University (emeritus)	Providing input and in-kind support on the project, including design, field work, data-analysis, and writing.	No

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 will use newly developed methods to generate foundational data on weasel species distribution, habitat associations, and population trends. This project will yield independent data to further evaluate the MN DNR winter track survey results for weasels while also providing more detailed data than are available from that survey. Minnesota DNR furbearer biologist Dr. John Erb is a partner on this project, ensuring data will be incorporated into weasel management in Minnesota. The survey methods we use could be implemented in the future to continue to track weasels or conduct additional surveys for the least weasel.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Den Boxes for Fishers and other Nesting Wildlife	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03i	\$190,000
Bobcat And Fisher Habitat Use And Interactions	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 03i	\$400,000
Distribution and Movements of Fishers in Southern Minnesota	M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 03f	\$340,000

Project Manager and Organization Qualifications

Project Manager Name: Michael Joyce

Job Title: Wildlife Ecologist

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

Dr. Joyce is a Wildlife Ecologist at the Natural Resources Research Institute. He has over 12 years of wildlife research experience, including radiotelemetry, habitat analyses, and use of remote cameras to survey and monitor carnivores. Michael is working on and managing two ENRTF-funded projects and is project manager for another currently being considered for funding as part of the FY23 RFP. He has worked extensively on wildlife research projects in Minnesota over the last decade.

EDUCATION:

Ph.D., 2018. University of Minnesota, Integrated Biosciences.

M.S., 2013. University of Minnesota, Integrated Biosciences.
B.S., 2008. University of Wisconsin-Madison, Molecular Biology.

RECENT PUBLICATIONS:

Velander, T.B., M.J. Joyce, A.M. Kujawa, R.L. Sanders, P.W. Keenlance, and R. Moen. 2023. A dynamic thermal model for predicting internal temperature of tree cavities and nest boxes. *Ecological Modelling* 478:110302.

Alston, J.M., M.J. Joyce, J.A. Merkle, R.A. Moen. 2020. Temperature shapes movement and habitat selection by a heat-sensitive ungulate. *Landscape Ecology* 35(9):1961-1973.

Joyce, M., J. Erb, B. Sampson, R. Moen. 2019. Detection of coarse woody debris using airborne light detection and ranging (LiDAR). *Forest Ecology and Management* 433 (pp 678-689).

Joyce, M. 2018. Evaluating American marten habitat quality using airborne light detection and ranging (LiDAR) data. PhD Dissertation, University of Minnesota.

Joyce, M., A. Zalewski, J. Erb, R. Moen. (2017). Use of resting microsites by members of the Martes Complex: the role of thermal stress across species and regions. *The Martes complex in the 21st Century: Ecology and Conservation*.

Green, R., M. Joyce, S. Matthews, K. Purcell, J. Higley, A. Zalewski. (2017). Guidelines and techniques for studying the reproductive ecology of wild fishers, American martens, and other members of the Martes complex. *The Martes complex in the 21st Century: Ecology and Conservation*.

Organization: U of MN - Duluth - NRRRI

Organization Description:

The Natural Resources Research Institute (NRRRI) is an applied research and economic development engine for the University of Minnesota research enterprise. NRRRI employs over 130 scientists, engineers and technicians to deliver on its mission to deliver integrated research solutions that value our resources, environment and economy for a sustainable and resilient future. NRRRI collaborates broadly across the University system, the state and the region to address the challenges of a natural resource based economy.

NRRRI researchers have extensive experience in managing large, interdisciplinary projects. NRRRI's role is as an impartial, science-based resource that develops and translates knowledge. Projects include characterizing and defining resource opportunities, minimizing waste and environmental impact, maximizing value from natural resources and maintaining/restoring ecosystem function.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Michael Joyce, Researcher		Project Manager			26.9%	0.51		\$55,929
Ron Moen, Researcher		Co-Investigator			26.9%	0.15		\$27,147
Anna Mangan, Researcher 3		Planning and coordination of field work and data analysis			24.24%	1.05		\$72,472
Masters Graduate Student		Completes MS thesis on project			19.41%	0.39		\$20,703
Temporary Technician		Conducts field work and helps analyze remote camera data			7.64%	1.5		\$67,578
Undergraduate Research Assistant		Field work preparation and analysis of remote camera data			0%	2.1		\$65,571
							Sub Total	\$309,400
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
	Tools and Supplies	Remote cameras and supplies (200 cameras @ \$175/camera plus cable locks, SD cards, and AA batteries)	Essential for conducting remote camera surveys for weasels to document weasel presence and spatial associations					\$45,000
	Tools and Supplies	Supplies to build weasel survey boxes, a newly developed method for surveying weasels.	We will use weasel survey boxes to survey for 3 weasel species across Minnesota					\$7,600
	Tools and Supplies	Other supplies for remote camera surveys (bait, lure, GPS batteries, etc.)	Supplies are essential for conducting surveys to determine the distribution and relative abundance of 3 weasel species in Minnesota.					\$3,000
							Sub Total	\$55,600

Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Travel for field work to deploy and pickup remote cameras at survey sites and for characterization of site characteristics. Includes mileage (75%) and lodging for technician, researchers and graduate student. Mileage will be reimbursed at the University of Minnesota rate.	Collect field data to assess weasel distribution and relative abundance across Minnesota.					\$35,000
							Sub Total	\$35,000
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								
							Sub Total	-
							Grand Total	\$400,000

Classified Staff or Generally Ineligible Expenses

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

Category	Specific Source	Use	Status	Amount
State				
In-Kind	Minnesota Department of Natural Resources	John Erb, MNDNR Wildlife Research Scientist, will provide 120 hours of in-kind support for this project over the course of 2 years, at a value of \$6,000	Secured	\$6,000
			State Sub Total	\$6,000
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	\$220,000
			Non State Sub Total	\$220,000
			Funds Total	\$226,000

Attachments

Required Attachments

Visual Component

File: [03218858-62e.pdf](#)

Alternate Text for Visual Component

The graphic shows the three species of weasel native to Minnesota; a graph of the Minnesota DNR winter track survey results for weasel from 1995 through 2016, which shows a declining trend; a weasel survey box; a map of the ecological sections in Minnesota; and a list of activities....

Optional Attachments

Support Letter, Photos, Media, Other

Title	File
UMD SPA Transmittal Letter	47832de9-7d3.pdf
MN DNR In-Kind Letter	8519d085-fd0.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

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

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 design, construction, or renovation of a building, trail, campground, or other capital asset costing \$10,000 or more?

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?

No

