

Environment and Natural Resources Trust Fund

2026 Request for Proposal

General Information

Proposal ID: 2026-015

Proposal Title: Fisher Survival, Reproduction, and Health in Southern Minnesota

Project Manager Information

Name: Michael Joyce Organization: U of MN - Duluth - NRRI Office Telephone: (218) 788-2656 Email: joyc0073@d.umn.edu

Project Basic Information

Project Summary: We will determine survival, reproduction, and disease exposure of fishers in southern Minnesota to evaluate population viability and vulnerability to changing conditions and provide critical data to guide fisher management.

ENRTF Funds Requested: \$788,000

Proposed Project Completion: December 31, 2029

LCCMR Funding Category: Fish and Wildlife (D)

Project Location

What is the best scale for describing where your work will take place? Region(s): Metro, SE, SW, Central,

What is the best scale to describe the area impacted by your work? Region(s): Metro, SE, SW, Central,

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.

Before our initial ENRTF-funded project, very little was known about fisher ecology and status in southern Minnesota. This project will build on what we learned during that project to address additional knowledge gaps that are critical for conservation and management of fishers in southern Minnesota. Although our initial project found that fishers are doing well in parts of southern Minnesota, several important questions and concerns remain:

- Causes of mortality for fishers in southern Minnesota are different from northern Minnesota.
- Robust fisher survival data are available for northern Minnesota but not for southern Minnesota.

• Several fishers appear to have died from disease during our study, but prevalence of established and emerging diseases is unknown.

• Fishers can now be legally harvested in southern Minnesota, which could affect survival rates and population dynamics.

- Annual reproductive rates vary, but the causes of this variation are poorly understood.
- Larger sample sizes collected over a longer time are needed to understand survival and population

viability and guide harvest management.

The public continues to express strong interest regarding fishers in southern Minnesota. Additional funding would allow us to address public interests and concerns related to fishers in this region while providing valuable data to guide fisher harvest management.

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 fisher survival, reproduction, and health in the southern half of Minnesota to address key knowledge gaps about fisher population ecology in this region. Our results will allow us to better understand current population performance (survival and reproduction), key sources of mortality, and how changes to these parameters could influence population viability.

We will conduct prey surveys, evaluate exposure to diseases and parasites, deploy GPS collars on fishers, and track GPS-collared fishers to document mortality and reproductive rates. We will use the data we collect to:

- 1. Determine the abundance of prey resources
- 2. Determine current fisher survival rates and key sources of mortality
- 3. Evaluate variation in reproduction and causes of that variation
- 4. Determine prevalence of established and emerging diseases and parasites

5. Conduct a population viability analysis to understand how future changes in survival from harvest or diseases could influence population dynamics.

We have discussed this project with MN DNR furbearer biologist John Erb to ensure it will address key knowledge gaps and that results will have high management value. This project will provide valuable data on population vital rates and health that are critical for harvest and population management by the MN DNR.

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 3 valuable outcomes that promote the conservation and management of Minnesota's natural resources. First, it will provide valuable information on fisher population performance and viability in southern Minnesota. The data generated by this project will be used to conserve and manage fishers in southern Minnesota. Second, we will collect additional data on fisher habitat use and diet, providing data that allows land managers to

manage for fisher habitat and prey. Third, information on exposure to diseases and parasites will allow wildlife managers to consider whether and how emerging diseases could influence fisher population dynamics.

Activities and Milestones

Activity 1: Evaluate survival and reproduction of fishers in the southern half of Minnesota.

Activity Budget: \$620,650

Activity Description:

Estimating annual survival and reproductive output for fishers requires large sample sizes and long-duration studies to ensure all sexes and age classes are represented and that natural variation in the population is incorporated. We will deploy GPS collars on 50 fishers and monitor study animals to estimate survival and reproduction across a broader area than our initial project. Data will be combined with data from our initial project to obtain sample sizes needed for robust survival and reproduction rates. When study animals die, we will determine cause of death. Additionally, we will locate reproductive dens and monitor dens to count litter sizes. We will use a remote camera survey in the fall to quantify availability of prey such as tree squirrels, small mammals, and rabbits and estimate fisher diet composition by analyzing both scats and stable isotopes. We will use these data to evaluate whether variation in prey availability and diet are related to differences in reproductive output. Finally, we will conduct a population viability analysis to determine current viability and simulate future changes in survival and reproduction from various harvest management, environmental change, and disease outbreak scenarios to determine vulnerability of fishers to future changes.

Activity Milestones:

Description	Approximate Completion Date	
Summarize all field data (survival, reproduction, diet, prey abundance) from the first study year	June 30, 2027	
Summarize all field data (survival, reproduction, diet, prey abundance) from the second study year	June 30, 2028	
Deploy GPS collars on 50 fishers over 3 capture seasons	March 31, 2029	
Summarize all field data (survival, reproduction, diet, prey abundance) from the third study year	June 30, 2029	
Complete fisher population viability analysis	December 31, 2029	
Evaluate the relationship between prey availability, diet, and reproduction	December 31, 2029	

Activity 2: Evaluating exposure of fishers to diseases and parasites

Activity Budget: \$167,350

Activity Description:

Diseases and parasites could contribute to mortality either directly (by causing death) or indirectly (by reducing overall health and making them more susceptible to other causes of mortality). Currently, there are very few data on disease or parasite prevalence for fishers in Minnesota or across the region. We will collect samples from live-trapped fishers to test for exposure to a variety of common diseases and parasites. We will conduct thorough veterinary necropsy on any GPS-collared fishers that die during monitoring to obtain valuable data on cause of death and collect samples to allow us to evaluate the potential role of disease and parasite exposure on health and mortality. We will also evaluate whether disease and parasite exposure in Minnesota fishers varies by region. To accomplish this, we will also collect samples to assess disease and parasite exposure from fishers harvested by trappers in northern Minnesota. These results will be compared to samples collected from southern Minnesota fishers. Sampling live-caught and post-mortem fishers from to evaluate disease and parasite exposure patterns, including variability in disease and parasite exposure by age, sex, and region to incorporate into population viability analyses.

Activity Milestones:

Description	Approximate Completion Date
Establish field sample collection protocols for disease and parasite testing.	November 30, 2026
Submit all samples collected the first year of the study to service labs for testing.	June 30, 2027

Submit all samples collected the second year of the study to service labs for testing.	June 30, 2028
Submit all samples collected the third year of the study to service labs for testing.	June 30, 2029
Describe disease and parasite exposure of fishers by region in Minnesota	October 31, 2029

Project Partners and Collaborators

Name	Organization	Role	
			Funds
Dr. Michael	UMD-NRRI	Project manager overseeing all aspects of this project including coordinating field	Yes
Joyce		work, data management, analysis, and reporting.	
Dr. Seth	MN Zoo	Providing input and support on the project and overseeing the disease and	Yes
Stapleton		parasite work on the project.	
Dr. Anne	MN Zoo	Providing input and support on the project. Dr. Rivas will provide expertise and	Yes
Rivas, DVM		help coordinate disease and parasite sample collection, submission to service	
		labs, and analysis.	

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 proposal is part of a larger effort to understand fisher ecology in Minnesota and builds off previous projects funded by the ENRTF and the Minnesota DNR. We will share project results and data with the Minnesota DNR and other partners throughout the project to ensure they can be used to guide fisher management. We will also publish results in peer-reviewed journals and conduct outreach to disseminate results to the public. Future work to monitor and manage the fisher population and harvest in southern Minnesota after this project is completed would be conducted by the Minnesota DNR.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
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
Changing Distribution of Flying Squirrel Species in Minnesota	M.L. 2023, , Chp. 60, Art. 2, Sec. 2, Subd. 03e	\$186,000
Distribution and Population Status of Weasels in Minnesota	M.L. 2024, , Chp. 83, Art. , Sec. 2, Subd. 03I	\$400,000

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 14 years of wildlife research experience working on carnivore ecology, including several past studies on fishers. Michael is working on and managing four ENRTF-funded projects and is project manager. He has worked extensively on wildlife research projects in Minnesota over the last 14 years.

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 - NRRI

Organization Description:

The Natural Resources Research Institute (NRRI) is an applied research and economic development engine for the University of Minnesota research enterprise. NRRI 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. NRRI collaborates broadly across the University system, the state and the region to address the challenges of a natural resource based economy.

NRRI researchers have extensive experience in managing large, interdisciplinary projects. NRRI'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. Ineli	% Bene	# FTE	Class ified	\$ Amount
				gible	fits		Staff?	
Personnel								
Michael Joyce		Project Manager / Principal Investigator			26.8%	0.35		\$41,486
Research		Coordinates field and lab work			24.4%	1.93		\$162,399
Scientist								
Seasonal		Conducts field, lab, and office work			6.9%	3.5		\$170,679
wildlife								
technician								
Masters		Complete MS thesis on project			18.8%	0.88		\$66,080
graduate								
student								
Undergraduate		Conducts field, office, and lab work to support the			0%	0.81		\$30,893
research		project						
assistant								
							Sub Total	\$471,537
Contracts and								
Services								
Minnesota Zoo	Subaward This sub-award is for the Minnesota Zoo to aid in					0.39		\$117,350
		understanding disease and parasite exposure in						
		fishers to evaluate population health. Specifically,						
		they will help collect and submit samples for						
		disease/parasite testing (costs for testing included						
		in sub-award) and help analyze, interpret, and						
		report results.						44.500
IBD	Service	Analysis of diet samples at stable isotope laboratory				0.3		\$4,500
	Contract	(375 samples @ \$12/sample)				0.00		642.000
	Service	Radiotelemetry flights to search for missing GPS-				0.03		\$12,000
	Contract	contared lishers who have dispersed from their						
		capture location. Telemetry lights can more easily						
	Service	Iridium or GlobalStar satellite service to remotely				0.03		\$3.500
100	Contract	download fisher locations off satellite collars (male				0.05		\$3,500
	contract	fishers only)						
Garmin	Service	Safety communication unit (InReach) for remote		x		0		\$500
	Contract	field staff enabling staff to work safely in remote				Ŭ		\$300
		settings without cell phone reception.						

					Sub Tota	\$137,850 I
Equipment, Tools, and Supplies						
	Equipment	50 GPS collars for fishers (50 @ ~\$2,050 ea)	To collect location, survival, diet, and reproductive data from fishers. We need data from ~50 fishers to obtain robust estimates of survival, causes of mortality, health, and reproduction.			\$102,430
	Tools and Supplies	Supplies for conducting prey surveys (remote cameras, SD cards, batteries, bait/lure, prey collection supplies)	Measuring annual and spatial variation in prey availability is necessary to evaluate whether and how prey availability influences survival and reproduction in southern Minnesota. This data would help the DNR manage the fisher population in the future.	X		\$4,500
	Tools and Supplies	Supplies for live-capture, anesthesia, and GPS collar deployment on fishers (bait, lure, pharmaceuticals, batteries, etc.)	Essential tools and equipment for safely trapping and radio-collaring fishers.			\$8,500
	Tools and Supplies	Supplies for radio-tracking fishers (receivers, antenna, coaxial cables, sample collection vials, batteries for remote cameras)	Field tracking is critical to document mortality, identify reproductive dens and estimate litter sizes, and collect diet samples.			\$7,860
	Tools and Supplies	Supplies for processing diet samples (scats and stable isotopes)	Supplies are required to determine diet composition from field-collected samples and understand how diet influences survival and reproduction in fishers.			\$2,823
					Sub Tota	\$126,113
Capital Expenditures						
					Sub Tota	-
Acquisitions and Stewardship						
					Sub Tota	-

Travel In Minnesota					
	Miles/ Meals/ Lodging	Travel for field work on survey prey, live-capture, and monitoring study animals including mileage (75%) and lodging for technician, PI, staff, and graduate student.	Travel is essential to survey prey and live-trap/collar fishers and track them to determine survival and reproductive rates.		\$52,000
				Sub Total	\$52,000
Travel Outside Minnesota					
				Sub Total	-
Printing and Publication					
				Sub Total	-
Other Expenses					
		Shipping	Shipping diet samples to the stable isotope service lab		\$500
				Sub Total	\$500
				Grand Total	\$788,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or	Description	Justification Ineligible Expense or Classified Staff Request
	Туре		
Contracts and	Service Contract	Safety communication unit (InReach)	This safety communication service cost is important for ensuring field staff can work
Services - Garmin		for remote field staff, enabling staff	safely in remote areas, especially within the Whitewater WMA where cell phone
		to work safely in remote settings	reception is limited.
		without cell phone reception.	
Equipment, Tools,		Supplies for conducting prey surveys	Remote cameras are considered telecommunication devices, which are generally
and Supplies		(remote cameras, SD cards,	ineligible. Remote cameras are used as field survey equipment, allowing us to detect and
		batteries, bait/lure, prey collection	measure animal presence and abundance without being present.
		supplies)	

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 federally negotiated rate for research of 54% 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	\$375,651
			Non State Sub Total	\$375,651
			Funds	\$375,651
			Total	

Total Project Cost: \$1,163,651

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component File: <u>86f4f0e9-af4.pdf</u>

Alternate Text for Visual Component

Flow chart showing the impact of reproduction and prey communities on population recruitment plus diseases and parasites, predators, harvest by humans, and vehicle mortality on the survival, mortality, and health on population dynamics and viability in southern Minnesota. Text describes the key components and management implications of the project....

Supplemental Attachments

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

Title	File
UMD SPA Authorization Letter	ddbc6fd9-3bc.pdf
Sub Award Budget	<u>4cb571ba-295.docx</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? 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:

Michael Joyce (NRRI), Seth Stapleton (MN Zoo), Anne Rivas (MN Zoo), Julie Christopherson (NRRI), Julia Nawrocki (NRRI), Michael McMahon (NRRI), Adam Mortensen (NRRI/UMD).

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