



# Environment and Natural Resources Trust Fund

## 2021 Request for Proposal

### General Information

**Proposal ID:** 2021-054

**Proposal Title:** Distribution and Movements of Fishers in Southern Minnesota

### Project Manager Information

**Name:** Michael Joyce

**Organization:** U of MN - Duluth - NRRRI

**Office Telephone:** (218) 788-2656

**Email:** joyc0073@d.umn.edu

### Project Basic Information

**Project Summary:** We will determine the distribution, status, and habitat use of fishers in the southern half of Minnesota to provide the information needed to manage fishers in this region.

**Funds Requested:** \$415,000

**Proposed Project Completion:** 2024-06-30

**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?**

Region(s): Central, SE, SW, Metro,

**What is the best scale to describe the area impacted by your work?**

Region(s): Metro, SE, Central, SW,

**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.**

The fisher population in Minnesota has declined by 50% over the last 20 years. Despite this decline, fishers have simultaneously expanded their range into the southern half of Minnesota, with verified sightings of fishers in the Twin Cities Metro and southeastern Minnesota increasing over the last 15 years. Although the increasing frequency of sightings suggests fishers are doing well in the southern half of Minnesota, there have never been studies conducted on fishers in this region. Consequently, it is not known whether these sightings represent a resident population or occasional dispersing fishers, or how fisher density and ecology in this region compares to fisher populations in northern Minnesota.

Given the apparent range expansion of fishers, land managers and natural resource professionals have expressed interest in learning more about fisher ecology in this region to allow them to better incorporate fisher needs into their management plans. Data on habitat selection and movement could enhance habitat management for fishers and help manage interactions with the public.

Data on survival, causes of death, and population density would provide essential baseline data for wildlife managers as they develop future conservation goals, evaluate the need for any protective conservation measures, or consider potential harvest seasons.

### **What is your proposed solution to the problem or opportunity discussed above? i.e. What are you seeking funding to do? You will be asked to expand on this in Activities and Milestones.**

We will evaluate the status of fishers in the southern half of Minnesota to address key knowledge gaps about fisher ecology in this region. We have assembled a large group of project partners representing diverse organizations. Partners will provide input and in-kind support on this project to help collect data that they and others can use to manage fishers.

We will work with our network of partners to conduct a large-scale fisher survey, deploy GPS collars on fishers in the southern half of Minnesota, and track movements and habitat selection of fishers in this region. We will use the data we collect to:

1. Describe fisher distribution and population status in 3 study areas in southern Minnesota
2. Evaluate fisher movements and habitat selection in southern Minnesota
3. Estimate population density of fishers in southern Minnesota
4. Provide the information needed to manage fishers in this region

This project will address key knowledge gaps and objectives identified by land managers in this region, ensuring that the results will have high management value. We anticipate this project would be of high public interest based on conversations we have had with the public regarding fishers in this region.

### **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 the first evaluation of fisher populations in the southern half of Minnesota. We will generate foundational data that county, state, and federal land managers will use to manage fishers in this region, including potential management for conservation or harvest. Because fishers appear to be doing better in this region than in northern Minnesota, where the population has declined by 50% over the last 20 years, comparison of results from this project to data collected from past and ongoing fisher research in northern Minnesota will provide further insight into causes of the fisher population decline.

## Activities and Milestones

### Activity 1: Determine status, distribution, and population density of fishers in the southern half of Minnesota.

**Activity Budget:** \$191,000

#### Activity Description:

We will use a non-invasive genetic survey to determine the distribution and status of fishers in three study areas across the southern half of Minnesota. One study area will be north of the Twin Cities Metro, one study area will overlap the Twin Cities Metro, and one study area will be in southeastern Minnesota. Fishers have previously been documented in all three study areas, but no previous study of fisher distribution or status has been conducted in any of the three study areas and fisher population status in this region is uncertain. The survey will be conducted in collaboration with numerous project partners to efficiently cover our study region. Non-invasive survey stations will collect hair from fishers and other wildlife. DNA from hair samples will be used to confirm fisher presence and identify individual fishers. Hair samples will also be used to describe fisher diets using stable isotopes (see Activity 2). Genetic identity of individual fishers will be used to estimate fisher population density using genetic mark-recapture techniques and to document large-scale movements of fishers across the Twin Cities Metro.

#### Activity Milestones:

Description	Completion Date
Conduct annual surveys to determine fisher distribution	2024-04-30
Estimate fisher population density using genetic capture-recapture techniques	2024-05-31
Evaluate large-scale movements of fishers in this region	2024-06-30

### Activity 2: Determine movements, habitat use, and diet of fishers in in the southern half of Minnesota.

**Activity Budget:** \$224,000

#### Activity Description:

The ability of fishers to persist in the southern half of Minnesota will depend on their ability to use fragmented forests, and we do not currently know how much viable fisher habitat exists in this region. We will deploy GPS collars on 36 fishers across this region. We will use GPS location data from study animals to describe fisher movements and habitat use in our study areas to understand what habitats fishers are using, how they move in the fragmented, human-dominated forests in the southern half of Minnesota, and how many fishers this area could support. We will summarize home range sizes and overlap, survival and causes of mortality, and activity patterns of fishers we radio-collar for comparison to fisher ecology from northern Minnesota. We will also document reproduction of females and estimate litter sizes. Finally, we will collect hair samples from live-captured fishers and use fisher hair samples collected in Activities 1 and 2 along with samples from potential prey to describe fisher diets using stable isotope analysis. Activity 2 will provide valuable baseline data on fisher ecology in the southern half of Minnesota that would be used to manage fishers in this region.

#### Activity Milestones:

Description	Completion Date
Deploy GPS collars on 36 fishers over 2 capture seasons	2023-04-30
Collect and analyze diet samples from radio-collared fishers and prey	2024-03-31
Describe fisher reproductive habitat and litter sizes in southern Minnesota	2024-05-31
Describe fisher habitat use and movements in our study region	2024-05-31



## Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. Caitlin Potter	Cedar Creek Ecosystem Science Reserve	Providing input on survey design and help oversee surveys at Cedar Creek Ecosystem Science Reserve.	No
Dr. John Erb	MN DNR	Providing input on all aspects of the project.	No
Dr. Roger Powell	North Carolina State University (retired; lives in Ely, MN)	Providing input and in-kind support on the project, including field work, data-analysis, and writing.	No
Scott Hagen	Dakota County	Providing input and data from their ongoing fisher monitoring on Dakota County lands.	No
John Moriarty	Three Rivers Park District	Providing input and support on the project, with an emphasis on helping design surveys on Three Rivers Park District lands.	No
Dr. Seth Stapleton	Minnesota Zoo	Providing input and support on the project and will assist with field work in Dakota County.	No
Nancy Duncan	National Park Service	Providing input and in-kind support on the project. Will conduct surveys at Mississippi NRRRA.	No
Steven Hogg	Three Rivers Park District	Providing input and support on the project, with an emphasis on helping design surveys on Three Rivers Park District lands.	No
Neil Smarjesse	National Park Service	Providing input and in-kind support on the project. Will conduct surveys at Mississippi NRRRA.	No
Dr. Michael Joyce	UMD-NRRI	Project manager overseeing all aspects of this project including coordinating field work, data management, analysis, and reporting.	Yes

## 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 be funded?**

This proposal is part of a larger effort to understand fisher ecology in Minnesota. This project will generate foundational data on fishers that DNR and others can use to manage fishers in an area that fishers have not occupied since the early 1900s. This project will complement ongoing and future research on fishers in Minnesota (ENRTF-funded fisher den box project; bobcat-fisher interaction project tentatively selected for funding by LCCMR last year). Examining fisher ecology in an area where they appear to be doing well may provide insight into the fisher population decline in northern Minnesota.

## 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

## Project Manager and Organization Qualifications

**Project Manager Name:** Michael Joyce

**Job Title:** Wildlife Ecologist/Researcher 5

**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, University of Minnesota Duluth. He has ~9 years of wildlife research experience on telemetry and habitat analyses using LiDAR and other spatial data. Michael is working on and managing one current ENRTF-funded projects (2019 Den boxes for fishers and other cavity-nesting wildlife) and is the project manager on a project that has been tentatively selected for ENRTF funding focused on carnivore ecology (2020 Bobcat and fisher habitat use and interactions). He has worked extensively on wildlife research projects in northern Minnesota over the last 9 years.

**EDUCATION:**

PhD, 2018. University of Minnesota, Integrated Biological Sciences.

MS, 2013. University of Minnesota, Integrated Biological Sciences.

BS, 2008. University of Wisconsin-Madison, Molecular Biology.

**RECENT PUBLICATIONS (Directly related to research on carnivore habitat selection and movement):**

Joyce, M., J. Erb, P. Coy, B. Sampson, R. Moen. (in revision). Age- and sex-specific dispersal in a harvested population of American martens. Submitted to Journal of Mammalogy.

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 (pp. 181-220).

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 (pp. 313-358).

**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 provide research solutions to balance our economy, resources and environment for resilient communities. 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.

The Wildlife Ecology Team at NRRRI is focused on the ecology, conservation, and management of wildlife populations in Minnesota and beyond. Our research focuses on identifying and addressing current and emerging issues for wildlife

populations in Minnesota, with an emphasis on mammals. Our research aims to provide the knowledge needed to develop solutions that balance wildlife needs with societal needs.

## Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
<b>Personnel</b>								
Michael Joyce, Researcher 5		Project Manager			26.7%	0.21		\$17,733
Masters Graduate Student		Complete MS thesis on project			43.6%	1.13		\$101,348
Technician, Researcher 3		Field and lab work			24.1%	1.5		\$108,045
Undergraduate research assistant		Field and lab work			0%	1.32		\$35,627
							<b>Sub Total</b>	<b>\$262,753</b>
<b>Contracts and Services</b>								
TBD	Professional or Technical Service Contract	Genetic identification of samples from the non-invasive genetic survey. Costs include species identification (440 samples @ \$25/sample = \$11,000) and individual identification of all fisher samples (140 samples @ \$50/sample = \$7,000).				0.24		\$18,000
Friends of the Mississippi River	Professional or Technical Service Contract	Professional contract for locating fishers and accessing private properties in the Metro area for the survey and telemetry.				0.09		\$11,562
TBD	Professional or Technical Service Contract	Analysis of diet composition at stable isotope laboratory (300 samples @ \$16 per sample).				0.2		\$4,800
TBD	Professional or Technical Service Contract	GPS data downloads for fisher GPS collars.				0.1		\$3,780
Cedar Creek Ecosystem Science Reserve	Professional or Technical Service Contract	Professional contract to have seasonal technicians conduct surveys and telemetry work for the project at Cedar Creek Ecosystem Science Reserve				0.12		\$4,000



							<b>Sub Total</b>	<b>\$42,142</b>
<b>Equipment, Tools, and Supplies</b>								
	Equipment	36 GPS collars for fishers (~\$1,625 each)	To collect movement and habitat selection data from fishers					\$58,500
	Tools and Supplies	Supplies for live-capture and telemetry, including bait, pharmaceuticals, batteries for GPS, etc.	Essential tools and equipment for safely trapping and radio-collaring fishers					\$2,500
	Tools and Supplies	Supplies for conducting fisher surveys, including supplies to build non-invasive survey cubbies, bait, track plates, and supplies to handle genetic samples.	Supplies are essential to conduct the non-invasive genetic survey to map fisher distribution and estimate fisher population size					\$9,000
	Tools and Supplies	Remote cameras and supplies (48 cameras @ \$175/camera plus AA batteries and SDHC cards)	Essential for non-invasive survey and for documenting reproduction where it occurs.					\$9,955
							<b>Sub Total</b>	<b>\$79,955</b>
<b>Capital Expenditures</b>								
							<b>Sub Total</b>	<b>-</b>
<b>Acquisitions and Stewardship</b>								
							<b>Sub Total</b>	<b>-</b>
<b>Travel In Minnesota</b>								
	Miles/ Meals/ Lodging	Travel for field work on survey, live-capture, and monitoring study animals including mileage (75%) and lodging for technician, PI, and graduate student. Mileage will be reimbursed at \$0.575/mile (MN state rate).	Collect field data					\$30,000
							<b>Sub Total</b>	<b>\$30,000</b>
<b>Travel Outside Minnesota</b>								
							<b>Sub Total</b>	<b>-</b>

<b>Printing and Publication</b>								
							<b>Sub Total</b>	-
<b>Other Expenses</b>								
		Shipping	To ship genetic samples to lab for DNA analysis to confirm species ID and individual fisher ID. Data needed to map fisher distribution and estimate fisher population sizes.					\$150
							<b>Sub Total</b>	\$150
							<b>Grand Total</b>	<b>\$415,000</b>

## 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
<b>State</b>				
			<b>State Sub Total</b>	-
<b>Non-State</b>				
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. ( <a href="https://research.umn.edu/units/oca/fa-costs/direct-indirect-costs">https://research.umn.edu/units/oca/fa-costs/direct-indirect-costs</a> )	Secured	\$210,181
			<b>Non State Sub Total</b>	<b>\$210,181</b>
			<b>Funds Total</b>	<b>\$210,181</b>

## Attachments

### Required Attachments

#### *Visual Component*

File: [321b685e-0ab.pdf](#)

#### *Alternate Text for Visual Component*

Map of the southern half of Minnesota showing locations of verified sightings of fishers documented since 2005 (top); examples of pictures of fishers from 3 of the sightings on the map with text highlighting the over-arching goal of the study (bottom).

### Optional Attachments

#### *Support Letter or Other*

Title	File
Letter of Support from Friends of the Mississippi River	<a href="#">a7ba2773-a45.pdf</a>
Letter of Support from the National Park Service/Mississippi River National River Recreation Area	<a href="#">5e4cf434-09c.pdf</a>
Sponsored Projects Authorization Letter	<a href="#">b1edc961-871.pdf</a>

## Administrative Use

**Does your project include restoration or acquisition of land rights?**

No

**Does your project have patent, royalties, or revenue potential?**

No

**Does your project include research?**

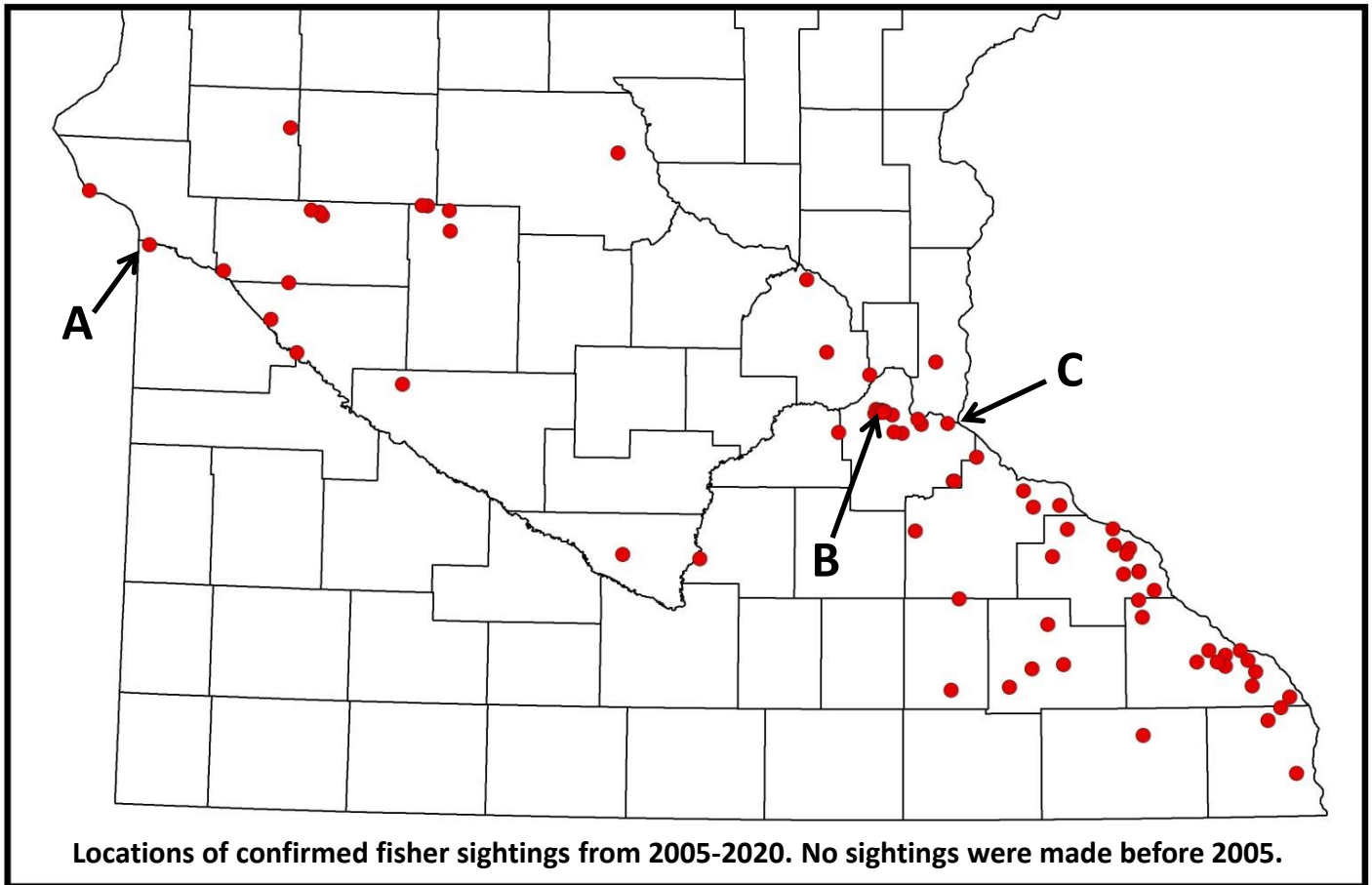
Yes

**Does the organization have a fiscal agent for this project?**

Yes, Sponsored Projects Administration

# Distribution and movements of fishers in southern Minnesota

Verified sightings of fishers have increased in southern Minnesota over the last 6 years



We will determine the distribution, status, and habitat use of fishers in the southern half of Minnesota to provide the information needed to manage fishers in this region