



## Environment and Natural Resources Trust Fund

M.L. 2020 Approved Work Plan

### General Information

**ID Number:** 2020-005

**Staff Lead:** Corrie Layfield

**Date this document submitted to LCCMR:** August 13, 2021

**Project Title:** Bobcat And Fisher Habitat Use And Interactions

**Project Budget:** \$400,000

### Project Manager Information

**Name:** Michael Joyce

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

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

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

**Web Address:** <https://www.nrri.umn.edu/>

### Project Reporting

**Date Work Plan Approved by LCCMR:** August 13, 2021

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

**Project Completion:** June 30, 2024

**Final Report Due Date:** August 14, 2024

### Legal Information

**Legal Citation:** M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 03i

**Appropriation Language:** \$400,000 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 identify potential solutions to reverse the fisher population decline through better understanding of habitat, diet, and activity patterns of bobcats and fishers.

**Appropriation End Date:** June 30, 2024

## Narrative

**Project Summary:** We will describe habitat use, diet, and activity patterns of bobcats and fishers to understand why bobcats kill female fishers and identify potential solutions to reverse the fisher population decline.

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

Fishers and bobcats are native carnivores that live in the forested region of Minnesota. The fisher population in Minnesota has declined by 50% over the past 20 years.

A Minnesota DNR fisher study identified two potential causes of the fisher population decline: 1) Limited availability of large-diameter cavity trees to support reproduction, and 2) High rates of predation on fishers, mainly by bobcats. With respect to predation, the relevant results of the DNR study include:

- 21 of 26 fishers killed by predators in Minnesota were females, including 20 adult females
- 15 adult female fishers were killed while caring for dependent kits, resulting in loss of all 15 litters
- Bobcats are the primary predator of female fishers in Minnesota

One potential reason bobcats are killing female fishers is that the bobcat population has more than doubled in the past 20 years. The high rates of predation on female fishers documented by the DNR project are not sustainable. Understanding why bobcats kill fishers will help to identify management solutions to reverse the fisher population decline.

There has not been an in-depth study on bobcats in Minnesota since the early 1980's, and data on bobcat ecology would enhance bobcat management in Minnesota.

**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.**

This proposal is part of a larger effort to improve fisher management in Minnesota. The ENRTF-funded fisher den box project is currently addressing cavity availability. The main objective of this project is to use data on fisher and bobcat habitat use, activity patterns, and diets to learn why female fishers are being killed by bobcats. Understanding why female fishers are vulnerable to being killed by bobcats will allow us to identify potential solutions that would help reverse the fisher population decline.

We will deploy GPS collars on bobcats and fishers in Minnesota to:

- Determine habitat use and activity patterns of bobcats and fishers
- Identify habitats where bobcats and fishers are likely to come into contact
- Collect prey and diet data to measure diet overlap and competition for prey
- Evaluate factors contributing to the bobcat population increase over the last 20 years

In addition to identifying potential solutions to reverse the fisher population decline, this project will also update our knowledge of bobcat ecology in Minnesota. We will collect data on bobcat diets, activity patterns, habitat selection, home range sizes, and survival, which will enhance bobcat management in Minnesota.

**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 generate foundational data that the DNR can use to manage fisher and bobcat populations in Minnesota. GPS data on fine-scale habitat use by fishers and bobcats has never been collected in Minnesota. Data on habitat use, activity patterns, and diets of bobcats and fishers in the same area are important for understanding why bobcats are killing fishers and for developing management strategies to maintain healthy populations of both species.

The last bobcat study in Minnesota was conducted almost 40 years ago, long before the bobcat population increased. This project will update knowledge of bobcat ecology in Minnesota.

## Project Location

**What is the best scale for describing where your work will take place?**

Region(s): Central, NE, NW,

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

Region(s): Central, NE, NW,

**When will the work impact occur?**

During the Project and In the Future

## Activities and Milestones

### Activity 1: Determine habitat use, diets, and activity patterns of bobcats and fishers to inform management options

**Activity Budget:** \$400,000

#### Activity Description:

We will capture and deploy GPS collars on 24 bobcats and 28 female fishers in two study areas where previous fisher research has taken place. We will use GPS location data from study animals to describe fine-scale habitat use and identify areas where fishers are vulnerable to predation by bobcats. Locations will also be used to identify and to monitor reproductive dens used by fishers and bobcats, and to determine why bobcats kill fishers during the breeding season. We will collect data on bobcat and fisher diets and prey availability to measure prey competition between bobcats and fishers. We will summarize home range sizes and overlap, survival and causes of mortality, and activity patterns of bobcats and fishers we radiocollar. Lastly, we will use existing data on bobcat and fisher harvests from the DNR and historical forest change data to identify changes in bobcat and fisher distribution over time and determine the role of forest change in recent population trends.

#### Activity Milestones:

Description	Completion Date
Summarize bobcat and fisher activity, home ranges, and reproduction for first year of study	July 31, 2022
Deploy GPS collars on bobcats and fishers over 2 capture seasons	March 31, 2023
Collect and analyze diet samples from radio-collared bobcats and fishers	July 31, 2023
Summarize bobcat and fisher activity, home ranges, and reproduction for second year of study	July 31, 2023
Monitor habitat use to identify areas where bobcats and fishers encounter each other	October 31, 2023
Finalize analyses of habitat use, diets, and activity patterns and submit final reports	June 30, 2024

## Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. Michael Joyce	UMD-NRRI	Project manager who will design, implement, and oversee all aspects of this project including live-capture of study animals, field monitoring, and data management and analysis.	Yes
Dr. Ron Moen	UMD-NRRI	Co-investigator who will provide input and assistant to Dr. Joyce on all aspects of this project.	Yes
Dr. Roger Powell	North Carolina State University (retired; lives in Ely, MN)	Will provide input and in-kind support on the project, including field work, data-analysis, and writing.	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.**

We will create a website to distribute information to the public, but this will be done after the project starts. The website will be modelled after other websites we maintain (e.g., [www.nrri.umn.edu/moose](http://www.nrri.umn.edu/moose) or [www.nrri.umn.edu/bats](http://www.nrri.umn.edu/bats)).

In addition, we will present project results at local, regional, and international scientific meetings and prepare and submit papers for publication in peer-reviewed journals. Travel to scientific meetings outside of Minnesota will not be paid for by project funding. We will also organize webinars and communicate with wildlife and land managers with the MN DNR and federal, state, and county forests throughout the project to share project results and solicit feedback.

We will likely have periodic contact with print and broadcast media. These contacts will be documented as they occur.

The Minnesota Environment and Natural Resources Trust Fund (ENRTF) will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the ENRTF 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 be funded?**

This proposal is part of a larger effort to understand fisher ecology in Minnesota. This project will build off the results of the DNR fisher project and complement our ongoing fisher den box project that was funded by the ENRTF last year. Radio-collaring female fishers near den boxes will provide additional data to understand factors influencing whether fishers use den boxes, while information on where fishers are vulnerable to predation by bobcats will help guide future fisher den box deployments. Data on bobcat ecology will be used to inform bobcat management and future bobcat research in Minnesota.

## Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
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Den Boxes for Fishers and other Nesting Wildlife	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03i	\$190,000
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## Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
<b>Personnel</b>								
Michael Joyce		Project Manager/Principal Investigator			26.7%	1.32		\$113,708
Ron Moen		Co-investigator			26.7%	0.12		\$20,407
TBD, Graduate Student		Complete graduate thesis working on project			16.6%	0.75		\$9,492
Undergraduate research assistant		Help conduct field, lab, and office work to support project			0%	1.2		\$29,952
Technician		Help collect and analyze data			24.1%	1.2		\$65,835
Seasonal technician		Assist with data collection and sample processing			7.4%	0.27		\$7,488
							<b>Sub Total</b>	<b>\$246,882</b>
<b>Contracts and Services</b>								
TBD	Professional or Technical Service Contract	Analysis of diet composition at stable isotope laboratory (172 samples @ \$16 per sample).				0.12		\$2,752
TBD	Professional or Technical Service Contract	GPS data downloads for fisher GPS collars.				0.09		\$8,640
							<b>Sub Total</b>	<b>\$11,392</b>
<b>Equipment, Tools, and Supplies</b>								
	Equipment	GPS collars (24 bobcat collars @ \$1,750 each + 28 fisher collars @ \$1,500 each)	To collect movement and habitat selection data for bobcats and fishers					\$84,000
	Equipment	GPS antenna for fisher collars	Allows us to download fisher locations remotely from the field					\$175
	Tools and Supplies	Live capture supplies (bobcat traps: 36 @ \$27 each; ear tags, syringes, drugs, sample bags, lure, bait, batteries, etc.)	For live-trapping bobcats and fishers to deploy GPS collars; costs also cover prey surveys					\$1,976

	Tools and Supplies	Equipment and supplies to monitor study animals (Remote cameras: 88 @ \$175 each; Temperature data loggers: 48 @ \$59/logger; SD cards and lithium batteries for trail cameras)	For monitoring GPS-collared bobcats and fishers at reproductive dens and for monitoring weather conditions across both study areas					\$21,575
							<b>Sub Total</b>	<b>\$107,726</b>
<b>Capital Expenditures</b>								
							<b>Sub Total</b>	-
<b>Acquisitions and Stewardship</b>								
							<b>Sub Total</b>	-
<b>Travel In Minnesota</b>								
	Miles/ Meals/ Lodging	Travel for field work on prey surveys, 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).	Capture and collar bobcats and fishers, monitor study animals, and collect other field data.					\$34,000
							<b>Sub Total</b>	<b>\$34,000</b>
<b>Travel Outside Minnesota</b>								
							<b>Sub Total</b>	-
<b>Printing and Publication</b>								
							<b>Sub Total</b>	-
<b>Other Expenses</b>								
							<b>Sub Total</b>	-
							<b>Grand Total</b>	<b>\$400,000</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	\$220,000
			<b>Non State Sub Total</b>	<b>\$220,000</b>
			<b>Funds Total</b>	<b>\$220,000</b>

## Attachments

### Required Attachments

#### *Visual Component*

File: [7316f3f8-41b.pdf](#)

#### *Alternate Text for Visual Component*

Maps showing distribution of harvest for bobcats and fishers, graphs of population trends for bobcats and fishers from 1977 through 2017, and pictures of each species....

### Optional Attachments

#### *Support Letter or Other*

Title	File
Letter of Support from Dr. Roger Powell	<a href="#">a32cb09c-d09.pdf</a>
Background Check Form	<a href="#">1a171239-1a4.pdf</a>

## Difference between Proposal and Work Plan

### *Describe changes from Proposal to Work Plan Stage*

First draft of work plan

We reduced the budget from the proposed level (\$440,719) to the recommended level (\$400,000) by reducing personnel and travel budgets. Despite the decreased funding, we are confident we can address our objectives and complete the proposed activity and milestones. We also updated the project completion date and milestone completion dates.

Final draft of work plan (added 7/21/2021)

LCCMR requested earlier milestones to better track progress towards the activity objectives. I have added two additional milestones, both of which involve providing preliminary summaries of field data before field data collection is complete. I have also adjusted the dates of 3 of the original objectives so that they come earlier in the project than they originally did.

## 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 UMN Policy.

**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

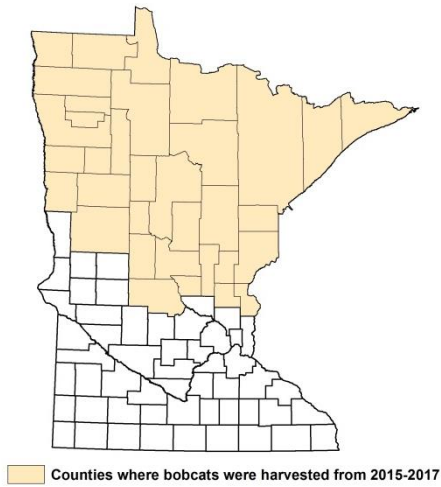
**Does the organization have a fiscal agent for this project?**

Yes, Sponsored Projects Administration

# Bobcat and fisher habitat use and interactions: Why do Bobcats Kill Fishers?

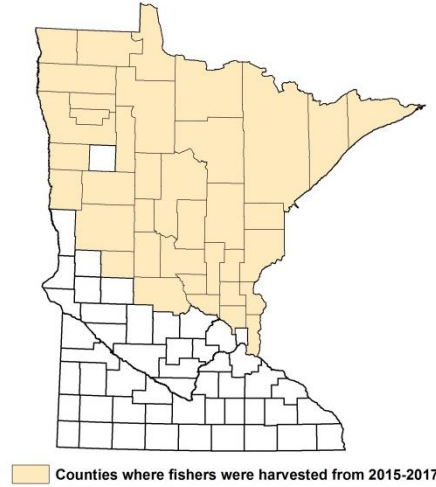
## Bobcats in Minnesota

Distribution of Bobcat Harvest

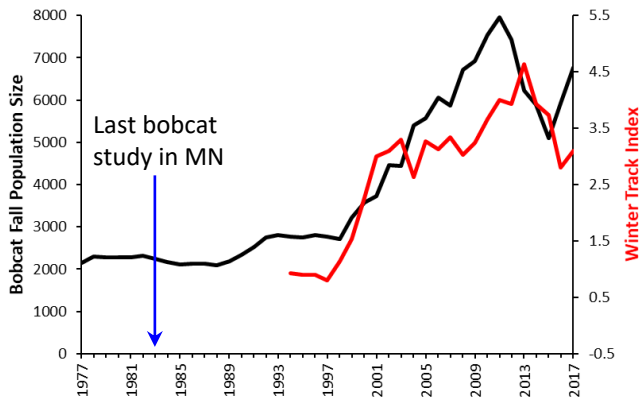


## Fishers in Minnesota

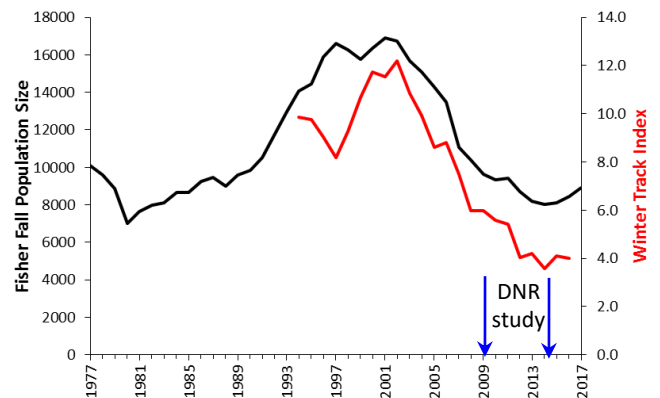
Distribution of Fisher Harvest



The bobcat population increased over 20 years



The fisher population declined 50% over 20 years



Bobcat at a fisher reproductive den in Minnesota



Fisher in Minnesota



**Project Outcome:** Foundational data on bobcat and fisher habitat use, diets, and activity patterns that will be used to develop management plans to reverse the fisher population decline and promote healthy populations of both species

