Final Abstract

Final Report Approved on February 11, 2026

M.L. 2020 Project Abstract

For the Period Ending June 30, 2025

Project Title: Bobcat And Fisher Habitat Use And Interactions

Project Manager: Michael Joyce

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Funding Source:

Fiscal Year:

Legal Citation: M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 03i and M.L. 2024, Chp. Sec. 2, Subd. 18

Appropriation Amount: $400,000

Amount Spent: $400,000

Amount Remaining: -

Sound bite of Project Outcomes and Results

We found that fishers and bobcats used similar habitats, had similar activity patterns, and ate similar diets. Logging was higher in areas where fisher numbers decreased compared to where numbers were stable or increasing. Our results show that bobcat predation on fishers is due to using similar strategies to survive.

Overall Project Outcome and Results

Fishers and bobcats are native carnivores that live in the forested region of Minnesota. The fisher population in Minnesota has declined by 50% from the late 1990s through the early 2020s, while the bobcat population more than doubled during the same period. A previous Minnesota DNR study showed that one potential cause of the fisher population decline was high rates of predation, especially of bobcats killing female fishers. Understanding why bobcats kill fishers could help identify management solutions to reverse the fisher population decline. Additionally, there has not been a recent telemetry study on bobcats since the population increase, and updated information on bobcat ecology will help manage bobcat populations in Minnesota. Our objectives were to deploy GPS collars on fishers and bobcats to understand fine-scale habitat selection, activity patterns, and diets to better understand the motivation for bobcats killing fishers. Bobcats and fishers had overlapping habitat use, activity patterns, and diets. Specifically, both used

primarily old forests and forest/wetland edges, were primarily active during twilight and the day, and predominantly ate snowshoe hare and squirrels and scavenged deer. We also used harvest and landcover data to evaluate potential causes of the recent changes in bobcat and fisher populations. We found that areas where fisher numbers had decreased tended to have high levels of logging and lower-quality fisher habitat than areas where fisher numbers were stable or increasing. Bobcat population trends were not explained by logging, winter severity, or habitat quality. Taken together, our results suggest that bobcats kill fishers due to competition for space and prey, and that forest management has a strong role on fisher populations in Minnesota. These data can help inform landscape management aimed at maintaining viable populations of both bobcats and fishers.

Project Results Use and Dissemination

We disseminated project results to the public, wildlife managers, and the scientific community through many presentations, informal updates, and print media throughout the project. We will continue to disseminate project results as opportunities arise. Results are also summarized in one PhD dissertation (in progress). We are finalizing a technical report and have 4 manuscripts in progress from this project that will be submitted to scientific journals and shared with wildlife managers.

Environment and Natural Resources Trust Fund

M.L. 2020 Approved Final Report

General Information

Date: March 5, 2026

ID Number: 2020-005

Staff Lead: Mike Campana

Project Title: Bobcat And Fisher Habitat Use And Interactions

Project Budget: $400,000

Project Manager Information

Name: Michael Joyce

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Project Reporting

Final Report Approved: February 11, 2026

Reporting Status: Project Completed

Date of Last Action: February 11, 2026

Project Completion: June 30, 2025

Legal Information

Legal Citation: M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 03i and M.L. 2024, Chp. Sec. 2, Subd. 18

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.and (a) The availability of the appropriations for the following projects is extended to June 30, 2025: (3) Laws 2021, First Special Session chapter 6, article 5, section 2, subdivision 3, paragraph (i), Bobcat and Fisher Habitat Use and Interactions;

Appropriation End Date: June 30, 2025

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? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & 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 14 bobcats and 16 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	Approximate Completion Date
Summarize bobcat and fisher activity, home ranges, and reproduction for first year of study	July 31, 2022
Summarize bobcat and fisher activity, home ranges, and reproduction for second year of study	July 31, 2023
Deploy GPS collars on bobcats and fishers over 3 capture seasons	March 31, 2024
Monitor habitat use to identify areas where bobcats and fishers encounter each other	December 31, 2024
Collect and analyze diet samples from radio-collared bobcats and fishers	December 31, 2024
Finalize analyses of habitat use, diets, and activity patterns and submit final reports	December 31, 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 or 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 work 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
Den Boxes for Fishers and other Nesting Wildlife	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03i	$190,000

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount	$ Amount Spent	$ Amount Remaining
Personnel										
Michael Joyce		Project Manager/Principal Investigator			26.7%	1.32		$116,891	-	-
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%	1.23		$68,021	-	-
Seasonal technician		Assist with data collection and sample processing			7.4%	0.93		$26,014	-	-
							Sub Total	**$270,777**	**$270,777**	**-**
Contracts and Services										
UC-Davis Stable Isotope Facility	Professional or Technical Service Contract	Analysis of diet composition at stable isotope laboratory (172 samples @ ~$15.50 per sample).				0.12		$2,016	$2,016	-
Lotek Wireless, Inc.	Professional or Technical Service Contract	GPS data downloads for fisher GPS collars.				0.09		$3,209	$3,209	-
							Sub Total	**$5,225**	**$5,225**	**-**
Equipment, Tools, and Supplies										
	Equipment	GPS collars (14 bobcat collars @ $1,750 each + 21 fisher collars @ $1,500 each plus accessories)	To collect movement and habitat selection data for bobcats and fishers					$60,375	$60,375	-
	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. Adjusting budget: Because of the timing of the ENRTF appropriation last					$6,315	$6,315	-

			summer, we could not trap bobcats and fishers in fall and instead had to purchase cage traps for winter trapping. The amount here is the cost difference between the foothold traps we originally budgeted for and the cage traps we purchased. We did not need to purchase as many trail cameras as we anticipated, so this money is available to move.							
	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. Reducing budget by $4,080 ($2,860 to Live capture supplies and $1,200 to prepaid debit cards/Other category.)					$4,550	$4,550	-
							Sub Total	**$71,240**	**$71,240**	**-**
Capital Equipment										
							Sub Total	**-**	**-**	**-**
Acquisitions and Stewardship										
							Sub Total	**-**	**-**	**-**
Travel In Minnesota										
	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	Capture and collar bobcats and fishers, monitor study animals, and collect other field data.					$52,758	$52,758	-

		student. Mileage will be reimbursed at $0.575/mile (MN state rate).								
							Sub Total	**$52,758**	**$52,758**	**-**
Travel Outside Minnesota										
							Sub Total	**-**	**-**	**-**
Printing and Publication										
							Sub Total	**-**	**-**	**-**
Other Expenses										
							Sub Total	**-**	**-**	**-**
							Grand Total	**$400,000**	**$400,000**	**-**

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	$ Amount Spent	$ Amount Remaining
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	$220,000	-	$220,000
			Non State Sub Total	**$220,000**	**-**	**$220,000**
			Funds Total	**$220,000**	**-**	**$220,000**

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....

Supplemental Attachments

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

Title	File
Letter of Support from Dr. Roger Powell	a32cb09c-d09.pdf
Background Check Form	1a171239-1a4.pdf
Project Presentation List	29d0ef8d-f82.pdf

Media Links

Title	Link
Link to a presentation recording (MN DNR MOSS seminar)	https://www.youtube.com/watch?v=8xZySsZLJOM

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 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?

Yes, Sponsored Projects Administration

Work Plan Amendments

Amendment ID	Request Type	Changes made on the following pages	Explanation & justification for Amendment Request (word limit 75)	Date Submitted	Approved	Date of LCCMR Action
1	Amendment Request	• Budget • Budget - Capital, Equipment, Tools, and Supplies • Budget - Travel and Conferences • Budget - Other	Our request is to purchase cage traps instead of foothold traps for bobcats. Due to the timing of ENRTF approprations, we could not order collars in time for fall trapping and cage traps are the best method for winter trapping. We also want to provide financial incentives to trappers who live-trap a bobcat and let us deploy a GPS collar on it. Similar programs have been used elsewhere to efficiently deploy GPS collars on bobcats.	February 28, 2023	Yes	March 6, 2023
2	Amendment Request	• Budget • Other • Budget - Capital, Equipment, Tools, and Supplies • Activities and Milestones • Budget - Personnel • Budget - Professional / Technical Contracts • Budget - Travel and Conferences	We are requesting modifications to the work plan and budget. We need a third capture season to accomplish project objectives due to poor capture success in the first capture year. We have modified collar sample sizes based on capture success and new sample sizes will allow us to meet project objectives and reduced collar and supply budgets accordingly. We need more money for personnel and travel to complete the additional capture season and monitoring.	October 10, 2023	Yes	October 11, 2023
3	Completion Date	Previous Completion Date: 06/30/2024 New Completion Date: 12/31/2024; Governor Approved on 04/15/2024	We need a full third capture season plus associated monitoring of study animals to obtain the sample sizes needed to address our objectives. The extra time will allow us to finish monitoring new study animals through summer and into early fall 2024, and have time to complete data analyses. The need for a third full capture season is due to us having poor capture success during our first year of the study.	October 10, 2023	Yes	May 21, 2024

4	Amendment Request	• Activities and Milestones	I updated the milestone completion dates to correspond to the 6 month extension to the project end date (from 6/30/2024 to 12/31/2024). These revised completion deadlines will allow us to complete the project by the revised end date.	July 17, 2024	Yes	August 6, 2024
5	Amendment Request	• Activities and Milestones • Budget - Personnel • Budget - Professional / Technical Contracts • Budget - Capital, Equipment, Tools, and Supplies • Budget - Travel and Conferences	We are requesting minor adjustments to several budget categories to balance minor over-expenditures. All field work is complete and most of the budget has been spent, but these changes will allow us to complete the remaining work on this project. Additionally, we are requesting to modify our bobcat sample size from 16 to 14, as we were unable to deploy collars on 16 bobcats. The reduced sample will allow us to address our objectives.	November 20, 2024	Yes	November 21, 2024
6	Completion Date	Previous Completion Date: 12/31/2024 New Completion Date: 11/30/2025	Administrative workaround to approve October update and amendment without approving final update.	November 21, 2024	Yes	November 21, 2024
7	Completion Date	Previous Completion Date: 11/30/2025 New Completion Date: 12/31/2024	Administrative workaround to approve October update and amendment without approving final update.	November 21, 2024	Yes	November 21, 2024
8	Completion Date	Previous Completion Date: 12/31/2024 New Completion Date: 06/30/2025	We are waiting to receive data from stable isotope samples we submitted. We cannot finish analysis of fisher and bobcat diets and diet overlap until we receive data back, which could take several months. All other aspects of this project are completed.	December 19, 2024	Yes	December 27, 2024
9	Amendment Request	• Budget • Budget - Personnel • Budget - Professional / Technical Contracts	I am requesting an amendment to balance out the budget with remaining spending through project end date of June 30, 2025. Specifically, I am requesting minor adjustment to categories to balance funds spent that were slightly different from budget amounts. Unspent stable isotope	September 8, 2025	Yes	December 17, 2025

			service lab fees and GPS data service costs balance out overspent personnel costs.			

Status Update Reporting

Final Status Update August 14, 2025

Date Submitted: September 8, 2025

Date Approved: December 17, 2025

Overall Update
We have completed all work on this project, including field work and data analysis. We trapped, collared, and tracked 13 fishers and 14 bobcats, collecting important information on landscape use, habitat selection, and activity patterns. While trapping and tracking study animals, we collected diet samples (hair samples and scats). We found that bobcats and fishers overlap in habitat use and activity patterns, but that while they consume many of the same prey, their diets are somewhat distinct. We also compiled bobcat and fisher harvest data and geospatial data to evaluate large-scale drivers of bobcat and fisher population dynamics over the last ~20 years. We found that declining fisher population trends were associated with areas that had more and increasing forest disturbance (primarily forest harvest) and resulting lower quality habitat. Conversely, bobcat population trends were not strongly correlated with forest disturbance or winter severity. We have been able to share this project through many public and professional events and will continue to disseminate results to stakeholders and the broader scientific community.

Activity 1
We trapped for and caught 18 bobcats and 21 fishers and we GPS-collared 14 bobcats and 13 fishers. Collar data revealed that fishers and bobcats both used a lot of mature forest and forest-shrub edges, while bobcats also used young forest, shrubland, and wetlands. Bobcats and fishers had very similar activity patterns (87% overlap), with both species being most active during the day and during twilight, with relatively less activity during the night.

We collected stable isotope samples from 30 bobcats and 27 fishers along with 97 bobcat scats and 122 fisher scats to estimate diet composition and diet overlap. While both species ate many of the same species (snowshoe hare, grouse, squirrels, other small mammals), stable isotope results revealed that bobcats specialize on hare and grouse, while fishers utilized a much broader diet. Scat results largely supported stable isotope values.

Across northern Minnesota, fisher population declines were associated with more and increasing forest disturbance and decreasing habitat quality. Bobcat population trends were not associated with disturbance, habitat suitability, or winter severity. Together, these results help demonstrate potential for competition as a likely mechanism explaining bobcat predation on fishers and provide valuable data for wildlife managers. All milestones are complete.
(This activity marked as complete as of this status update)

Dissemination
We have given 6 technical presentations, 4 presentations to partners and stakeholders, and 11 presentations to non-technical, public audiences. We currently have 1 additional technical presentation scheduled for Fall 2025.

We are nearly finished writing a technical report describing project results in detail. We are also working on preparing 3 manuscripts that will be submitted to scientific journals for peer review and publication. Lastly, 1 graduate student is in the process of completing his thesis projects on several components of this project. Together, these products will allow us to disseminate project results to the broader scientific community, and we will share it directly with stakeholders across the state as well.

We have developed a website describing project objectives, methods, and results. It is in the final stages of web hosting. We will share the link with LCCMR staff lead when it is available.

We have provided the proper acknowledgements of ENRTF funding in all presentations and have asked for media contacts to do the same.

Status Update Reporting

Status Update April 1, 2025

Date Submitted: April 30, 2025

Date Approved: August 1, 2025

Overall Update

We have continued to make progress towards our project goals. Since the last update, we completed analysis of home ranges for all GPS-collared study animals, received stable isotope data back from the service lab, finalized all scat analyses, and have made progress on all statistical analyses to address our project objectives. We are on track to complete the project by the current deadline.

Activity 1

We continue to make progress on Milestone 1 through analysis of habitat use data collected from GPS collars. We have completed Milestone 2 and are working on statistical analysis of diet samples (Milestone 3). Animal spatial and activity data are currently being analyzed to evaluate fine-scale habitat use and activity patterns for both species to understand factors promoting interactions between bobcats and fishers. Finally, we are working on finalizing geospatial analysis of population trends and correlation to winter severity and forest change (e.g., forest harvest and wind disturbance) to understand factors influencing bobcat and fisher population dynamics over the last 20 years. We are in the process of finalizing preliminary analyses to address our questions and beginning to draft text for use in final reports and peer-reviewed publications.

Dissemination

Since the last update, we have given 2 technical presentation (The Wildlife Society Annual Conference October 2024, Minnesota Chapter of The Wildlife Society February 2025) and 3 informal meetings with project partners (MN DNR, December 2024; Chippewa and Superior National Forest Biologists, December 2024 and March 2025). Our project website is still waiting to go live, though the content is completed. We are working on a dissemination strategy to inform the public of the website once it becomes live. We expect additional presentations to technical and lay audiences over the next 3 months.

Additional Status Update Reporting

Additional Status Update February 14, 2025

Date Submitted: December 19, 2024

Date Approved: December 27, 2024

Overall Update

We have continued to make progress towards our project goals. All data collection is complete and most of the data analyses have also been completed. Since the last update, we have finished processing all scat and stable isotope samples, and have conducted preliminary analyses of scat samples. Stable isotope samples were submitted to the lab, but it will take several months for the lab to process the samples, and we will need time after we receive data form the lab to analyze the isotope data to evaluate diet composition and overlap between fishers and bobcats. We have nearly finalized analyses of home range size and activity of bobcats and fishers, as well as analyses of harvest and landscape data to understand the role of forest harvest in bobcat and fisher population dynamics. We need extra time to allow our samples to be analyzed and finalize all analyses, but we are close to finishing this project.

Activity 1

Field work for milestone 1 is also complete, but we are still analyzing data, while we are also working to finalize analyses described in milestones 2 and 3. Animal spatial and activity data are close to having analyses completed to evaluate fine-scale habitat use and activity patterns for both species to understand factors promoting interactions between bobcats and fishers. Scat samples are done being processed and preliminary analyses have been conducted, while stable isotope samples are awaiting lab analysis and then need to be analyzed to finalize diet composition and diet overlap comparisons between bobcats and fishers. We are in the process of finalizing preliminary analyses to address our questions and beginning to draft text for use in final reports and peer-reviewed publications. Activity 1 is close to being completed, but will require the stable isotope data form the lab in order to finish all analyses.

Dissemination

Since the last update, we have given 1 technical presentation at the international annual meeting of The Wildlife Society in mid October (note: the conference was in Maryland and ENRTF funds were not used for travel). 2 informal meetings with project partners (MN DNR, December 2024; Chippewa National Forest, December 2024). We expect additional presentations to technical and lay audiences over the next 6 months. Our website has experienced unexpected delays, but should finally be launched by early January. We have drafted text and selected images and are working with our web development staff to get the site live. The site will be used to promote the project and disseminate project results to the public well after the project completion date.

Additional Status Update Reporting

Additional Status Update February 14, 2025

Date Submitted: November 20, 2024

Date Approved: November 21, 2024

Overall Update
Per LCCMR staff guidance and due to system logic, this is place holder text for the final update to be submitted in February 2025.

Activity 1
Per LCCMR staff guidance and due to system logic, this is place holder text for the final update to be submitted in February 2025.

Dissemination
Per LCCMR staff guidance and due to system logic, this is place holder text for the final update to be submitted in February 2025.

Status Update Reporting

Status Update October 1, 2024

Date Submitted: November 20, 2024

Date Approved: November 21, 2024

Overall Update

We have continued to make progress towards our project goals. Since the last update, we completed all live-capture and tracking of GPS-collared study animals. In total, we have captured 24 fishers and 19 bobcats, and have collared 16 fishers (14 females; 2 male) and 14 bobcats (8 female; 6 male) across all trapping sessions. We worked with wildlife managers to identify trappers to participate in our incentive program, but were not able to locate any interested trappers so did not use any of the money set aside for trapper incentives. Instead, all trapping was conducted by project staff. We have completed collection of scat samples and are finishing analysis of them currently. We are working to prepare and send off stable isotope samples and are working on finalizing analyses of home range size and activity of bobcats and fishers, as well as analyses of harvest and landscape data to understand the role of forest harvest in bobcat and fisher population dynamics. We are on track to complete the project by the current deadline.

Activity 1

We have concluded all live-trapping and monitoring, so milestones 4-6 are complete. Field work for milestone 1 is also complete, but we are still analyzing data, while we are also working to finalize analyses described in milestones 2 and 3. Animal spatial and activity data are currently being analyzed to evaluate fine-scale habitat use and activity patterns for both species to understand factors promoting interactions between bobcats and fishers. Scat data are nearly done being analyzed (i.e., are in the final quality control/quality assurance steps), and stable isotope samples are being finalized so that our analysis of diet composition and diet overlap between bobcats and fishers can be finalized. Finally, we are working on finalizing geospatial analysis of population trends and correlation to winter severity and forest change (e.g., forest harvest and wind disturbance) to understand factors influencing bobcat and fisher population dynamics over the last 20 years. We are in the process of finalizing preliminary analyses to address our questions and beginning to draft text for use in final reports and peer-reviewed publications.

Dissemination

Since the last update, we have given 1 technical presentation to Fond Du Lac Tribal and Community College (April 2024), 2 informal meetings with project partners (MN DNR, May 2024 and September 2024) and 3 additional public presentations to Friends of North Pikes Creek (Bayfield, WI; July 2024), Wright County 4H members (August 2024), and DNR's Minnesota Outdoor Skills and Stewardship Seminar (October 2024). There were over 500 people that signed up for the DNR MOSS Seminar and 180 people who joined the event live. We expect additional presentations to technical and lay audiences over the next 6-12 months. Our website has experienced unexpected delays, but should finally be launched by the end of the project and will be used to help disseminate project results to the public.

Status Update Reporting

Status Update April 1, 2024

Date Submitted: March 29, 2024

Date Approved: July 17, 2024

Overall Update

We have continued to make progress towards our project goals. Since the last update, we have conducted our third and final trapping season and have deployed additional GPS collars on fishers and bobcats. In total, we have captured 24 fishers and 18 bobcats, and have collared 16 fishers (14 females; 2 male) and 14 bobcats (8 female; 6 male) across all trapping seasons. We have also collected and analyzed additional scat samples for diet composition; conducted preliminary analyses of home range size and activity of bobcats and fishers; and conducted analyses of harvest and landscape data to understand the role of forest harvest in bobcat and fisher population dynamics. We have also collected additional samples for stable isotope analysis and are preparing those for shipment to be analyzed.

Activity 1

We have concluded our third capture season, effectively completing milestone 6 (milestones 4 and 5 have previously been completed). We trapped bobcats and fishers from November through February (fishers) and March (bobcats) 2024 and have fit six more fishers (5 female; 1 male) and six more bobcats (2 female; 4 male) with GPS collars. Sample size for bobcats was higher than last winter's trapping season due to changes we made in our trapping procedures. We are continuing to work toward completing the remaining milestones (1-3). Animal spatial and activity data are still being gathered by GPS collars. We are currently investigating GPS locations of collared animals and documenting activity and behavior. We are also collecting scat samples for diet analysis and have completed analysis on most of the scats we have collected so far. Stable isotope samples will be sent for analysis by the end of this spring and preliminary examination of the results will occur this summer. We are in the process of updating preliminary analyses to finish data analysis that will be used in final reports.

Dissemination

Since the last status update, we have given two additional presentations to public groups (St. Paul Audubon Society, October 2023; Sax Zim Bog, January 2024) and one presentation to a technical audience (Minnesota Chapter of The Wildlife Society, February 2024) on fisher ecology in Minnesota, including preliminary results of this project. We have more public presentations scheduled over the next six months, and will be sharing information with project partners and stakeholders in June 2024.

Status Update Reporting

Status Update October 1, 2023

Date Submitted: October 10, 2023

Date Approved: October 11, 2023

Overall Update

We have continued to make progress towards our project goals. Since the last update, we have deployed additional GPS collars on fishers and bobcats; collected and analyzed additional scat samples for diet composition; conducted preliminary analyses of home range size and activity of bobcats and fishers; and conducted analyses of harvest and landscape data to understand the role of forest harvest in bobcat and fisher population dynamics. We have continued to improve our trapping success and have identified additional areas to focus our trapping efforts for fishers and bobcats through this fall and winter. We have also collected additional samples for stable isotope analysis and are preparing those for shipment to be analyzed. Due to low capture success in the first year, we are requesting an amendment to allow us to conduct a third capture season and deploy remaining GPS collars. Our requested modifications to the budget and work plan will still allow us to meet project objectives. We are currently preparing for the third and final capture season.

Activity 1

Sample sizes from last fall and winter's trapping season were higher than our previous season due to change we made in our trapping procedures. Since our last update, we deployed five additional GPS collars on fishers and six GPS collars on bobcats. We have continued to collect scat samples for diet analysis and have completed analysis on ~75% of the scats we collected. Although there is extensive diet overlap, bobcats tend to eat more hares and squirrels while fishers eat more smaller mammals. Stable isotope samples will be sent for analysis by the end of this fall and preliminary examination of the results will occur this winter. Scat and isotope samples will continue to be collected and analyzed for the completion of milestone 2. We have conducted preliminary analyses on bobcat and fisher activity and home range size for the first two years of the study to complete milestone 4. Finally, we have made progress on our evaluation of how historical forest change has affected bobcat and fisher populations as inferred from harvest data. We anticipate these analyses will be complete by late fall and efforts to share results will begin this winter.

Dissemination

Work on our project website has been delayed as we have focused on other scientific objectives, but a draft website should be finalized and go live during Fall 2023.

Since the last status update, we have given two additional presentations to public groups on fisher ecology in Minnesota, including preliminary results of several ongoing fisher projects (Isanti Environmental Coalition, February 2023; Whitewater State Park HOP program, May 2023). We expect additional presentations to technical audiences over the next 6-12 months of the project.

Status Update Reporting

Status Update April 1, 2023

Date Submitted: February 27, 2023

Date Approved: March 6, 2023

Overall Update

We have continued to make progress towards our project goals. Since the last update, we have deployed several additional GPS collars on bobcats (3 new collars) and fishers (6 new collars) and identified areas to focus fisher and bobcat trapping efforts throughout the remainder of this winter's trapping season. We have made preliminary analyses of activity and location data and collected numerous scats for our diet analyses. We have begun assembling harvest and geospatial data and finalized a research plan to evaluate the impact of landscape change on bobcat and fisher populations over the last several decades. At the time of this update, we have completed 2022 fall prey surveys, conducted several bobcat and fisher trapping sessions, and are preparing samples for laboratory analysis of scat and stable isotope samples to better understand bobcat and fisher diets. We are currently focusing efforts on data collection and management but look forward to future efforts to disseminate preliminary project results to the public and natural resource professionals.

Activity 1

Sample sizes from last winter's trapping season were lower than anticipated, so we have spent considerable effort this summer exploring ways to improve capture success. We have identified better areas to target and will work with trappers to help deploy GPS collars. In late summer and early Fall, we have deployed several additional GPS collars on female fishers and have continued to collect scat samples for diet analysis. In late fall through January, we have collared additional fishers and bobcats. We have been investigating GPS clusters to identify scats and rest sites used by study animals. We have conducted preliminary analyses on bobcat and fisher activity and home range size for the first year of the study to complete Milestone 4. We defer reporting of results until sample sizes improve over the fall and winter. Finally, we have finalized a research plan for our evaluation of how historical forest change has affected bobcat and fisher populations as inferred from harvest data. Preliminary analyses have begun, and we anticipate final analyses being completed this spring and summer.

Dissemination

We have started drafting the website and will try to launch the website late winter 2022-2023 after trapping concludes.

Since the last status update, we have given one additional presentation to a public group (Minnesota River Valley Audubon Chapter, June 2022). We expect additional presentations to technical audiences over the next 6-12 months of the project.

Status Update Reporting

Status Update October 1, 2022

Date Submitted: February 14, 2023

Date Approved: March 6, 2023

Overall Update

We have continued to make progress towards our project goals. Since the last update, we have deployed several additional GPS collars on bobcats (3 new collars) and fishers (6 new collars) and identified areas to focus fisher and bobcat trapping efforts throughout the remainder of this winter's trapping season. We have made preliminary analyses of activity and location data and collected numerous scats for our diet analyses. We have begun assembling harvest and geospatial data and finalized a research plan to evaluate the impact of landscape change on bobcat and fisher populations over the last several decades. At the time of this update, we have completed 2022 fall prey surveys, conducted several bobcat and fisher trapping sessions, and are preparing samples for laboratory analysis of scat and stable isotope samples to better understand bobcat and fisher diets. We are currently focusing efforts on data collection and management but look forward to future efforts to disseminate preliminary project results to the public and natural resource professionals.

Activity 1

Sample sizes from last winter's trapping season were lower than anticipated, so we have spent considerable effort this summer exploring ways to improve capture success. We have identified better areas to target and will work with trappers to help deploy GPS collars. In late summer and early Fall, we have deployed several additional GPS collars on female fishers and have continued to collect scat samples for diet analysis. In late fall through January, we have collared additional fishers and bobcats. We have been investigating GPS clusters to identify scats and rest sites used by study animals. We have conducted preliminary analyses on bobcat and fisher activity and home range size for the first year of the study to complete Milestone 4. We defer reporting of results until sample sizes improve over the fall and winter. Finally, we have finalized a research plan for our evaluation of how historical forest change has affected bobcat and fisher populations as inferred from harvest data. Preliminary analyses have begun, and we anticipate final analyses being completed this spring and summer.

Dissemination

We have started drafting the website and will try to launch the website late winter 2022-2023 after trapping concludes.

Since the last status update, we have given one additional presentation to a public group (Minnesota River Valley Audubon Chapter, June 2022). We expect additional presentations to technical audiences over the next 6-12 months of the project.

Status Update Reporting

Status Update April 1, 2022

Date Submitted: April 29, 2022

Date Approved: May 6, 2022

Overall Update

We have made good progress towards our goal of understanding bobcat and fisher habitat use, diet, and activity patterns to provide foundational data for bobcat and fisher management in Minnesota. We captured and deployed GPS collars on fishers and bobcats and have begun collecting spatial and activity data. We investigated GPS locations of collared animals to document activity and behavior and to collect scat for diet analysis. We have also collected hair samples from captured fishers and bobcats to use for diet analysis and completed our first prey surveys in fall 2021. Additionally, we have begun preliminary analyses of the data we have collected. We will continue capturing fishers and bobcats to deploy additional GPS collars and will conduct another season of small mammal surveys to meet our milestones and project objectives. We have also begun disseminating information about the project to members of the public and natural resource professionals. The data we continue to collect and our subsequent analyses will allow us to summarize foundational data on these species and better understand their interactions to inform management actions for addressing the declining fisher population in Minnesota.

Activity 1

We collected prey availability data during October 2021 and have entered and summarized those data. We are gearing up to conduct spring prey surveys in late May 2022. We trapped bobcats and fishers from January through February (fishers) or March (bobcats) 2022 and fit individuals with GPS collars. We also collected hair samples and scats during capture that will be used for diet analysis. We will begin processing diet samples during summer 2022. Animal activity data are being gathered by GPS collars, but we have not started to analyze those data yet. We investigated GPS locations of collared individuals to document habitat characteristics and collect available data on behavior during periods of rest and hunting. During these searches we collected scats for diet analysis and photographed sites for documentation. We have begun to analyze data to meet our milestone of summarizing data from the first year of the project by July 2022. Additionally, we have begun compiling bobcat and fisher harvest data and historical forest change data to assess impacts of forest change over time on both species.

Dissemination

We have begun planning for the project website and will start developing the website during summer 2022, with a preliminary goal of launching the website in early fall 2022.

To date, we have given one presentation about the project to a public group (West Metro Chapter of the Minnesota Master Naturalists in February 2022) and one presentation to a technical audience (Biologists from the Chippewa and Superior National Forest, March 2022). We have one presentation to a public group scheduled for this summer. As we continue to collect data, we will schedule additional presentations.