



Environment and Natural Resources Trust Fund

M.L. 2023 Approved Work Plan

General Information

ID Number: 2023-090

Staff Lead: Mike Campana

Date this document submitted to LCCMR: May 23, 2023

Project Title: Changing Distribution of Flying Squirrel Species in Minnesota

Project Budget: \$186,000

Project Manager Information

Name: Michael Joyce

Organization: U of MN - Duluth - NRRI

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Project Reporting

Date Work Plan Approved by LCCMR: June 22, 2023

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

Project Completion: June 30, 2025

Final Report Due Date: August 14, 2025

Legal Information

Legal Citation: M.L. 2023, Chp. 60, Art. 2, Sec. 2, Subd. 03e

Appropriation Language: \$186,000 the first 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 determine current distribution and habitat associations of northern and southern flying squirrels to fill key knowledge gaps in flying squirrel status in Minnesota.

Appropriation End Date: June 30, 2026

Narrative

Project Summary: We will determine the current distribution and habitat associations of northern and southern flying squirrels to fill key knowledge gaps in flying squirrel status in Minnesota.

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

There are two species of flying squirrels in Minnesota. Historically, southern flying squirrels lived in hardwood forests of the southern half of Minnesota while northern flying squirrels occupied hardwoods and transitional forests in northern Minnesota (see visual component). With changing climate, southern flying squirrels are rapidly expanding their range north and pushing northern flying squirrels further north in the process.

The rapid changes in flying squirrel distribution have led to northern flying squirrels being listed as a species of concern in Michigan, Wisconsin, and elsewhere in eastern North America. Neither species has conservation status in Minnesota, due in part to lack of adequate data to assess current distribution or interactions between the two species. Given the rapid change in flying squirrel populations in several eastern states, increasing understanding of the current distribution and abundance of flying squirrels in Minnesota is a critical step in evaluating the conservation status of both species.

Many people enjoy watching flying squirrels at bird feeders. They also have expressed strong interest in learning more about flying squirrels in Minnesota, including which flying squirrel species live near them.

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 the current distribution of both flying squirrel species across Minnesota to provide foundational data that will fill key knowledge gaps on flying squirrel distribution and ecology. Thus, project results will have high conservation and management value.

Recent research has shown that acoustic detectors, such as those used to monitor bats, can detect flying squirrel vocalizations and identify calls to species. Acoustic detectors are an efficient, cost-effective method for detecting flying squirrels where they occur.

We will re-analyze existing acoustic data from a previous ENRTF-funded bat project (M.L. 2015, Chp. 76, Sec. 2, Subd. 03i. Endangered bats, white-nose syndrome, and forest habitat), conduct additional acoustic surveys, and live-trap and radiocollar flying squirrels. We will use the data we collect to:

1. Describe the historic and current distribution of both flying squirrel species.
2. Examine habitat use overlap to determine potential for coexistence and evaluate spatial interactions.
3. Summarize fine-scale habitat used for nesting by both species.

We also expect that our results will be of high public interest and value. To inform the public about the project and disseminate project results, we will conduct public outreach as we have successfully done in past ENRTF projects.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

This project will provide foundational data on both flying squirrel species in Minnesota that is of high value to the DNR. Northern flying squirrel populations may be declining as southern flying squirrels move north. The DNR will begin reviewing data on flying squirrels and other species for the next update of the State Wildlife Action plan in 2-3 years. The data we collect would fill important knowledge gaps and help the DNR evaluate the status of both species more effectively. The acoustic monitoring protocol we develop could also be used to monitor changes in population status in the future.

Project Location

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

Region(s): Central, Metro, NE, NW, SE,

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

Region(s): Central, Metro, NE, NW, SE,

When will the work impact occur?

During the Project and In the Future

Activities and Milestones

Activity 1: Determine the current distribution and habitat associations of flying squirrels in Minnesota

Activity Budget: \$186,000

Activity Description:

We will evaluate the distribution of both flying squirrel species using two different sets of acoustic data. First, we will use existing data sampled broadly across the forested portion of Minnesota from 2015-2021. Over 400,000 calls were recorded at about 350 locations from an ENRTF-funded bat project and follow-up monitoring. Second, we will conduct acoustic surveys at sites where both flying squirrel species occur in 2023-2024 to collect detailed information on overlap in habitat use. Evaluating habitat associations of each species where they overlap can help determine how both species can coexist and would be useful to managers. We will analyze acoustic data using established methods developed by others and tested by us during a recent pilot study. We will also compile flying squirrel records from other data sources (Minnesota Biological survey, other projects). Finally, we will live-trap and deploy radiocollars on both species of flying squirrel and monitor collared squirrels to evaluate habitat use, to validate our acoustic survey results, and to examine spatial interactions between the two species. Part of the zone of overlap in species distributions is near Duluth, and UM-Duluth Biology students would gain valuable field experience on the telemetry part of the project.

Activity Milestones:

Description	Approximate Completion Date
Finalize analysis workflow for processing existing acoustic data	February 28, 2024
Summarize preliminary data on flying squirrel telemetry from the first year of radiocollar deployment	March 31, 2024
Disseminate preliminary results to the public via outreach and media	June 30, 2024
Conduct new acoustic surveys to determine habitat associations of both species of flying squirrel	July 31, 2024
Analyze acoustic data to determine current distribution of both species across Minnesota	December 31, 2024
Deploy radiocollars on 28 flying squirrels (14 per species) and monitor habitat use and movements.	June 30, 2025
Complete all analyses and project technical report	June 30, 2025

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. Ron Moen	UMD-NRRI	Co-investigator. Will provide input and support on all aspects of this project and will work with project manager to oversee all aspects of this project.	Yes

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.

Our results will be of high public interest and value. We will conduct public outreach to inform the public about the project, to solicit flying squirrel sightings, and to disseminate project results. 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. We will also disseminate results to the public via webinars and other outreach events.

We will disseminate results to land managers through annual updates and professional presentations at state and local meetings. In particular, we will disseminate results to the Minnesota DNR non-game biologists throughout the project. Additionally, we will present project results to the larger scientific community at local (e.g., Minnesota Chapter of The Wildlife Society's annual state meeting, Cloquet Forestry Center's annual Forestry and Wildlife Research Review), regional (e.g., Midwest Furbearer Workshop, Midwest Fish and Wildlife Conference), and international (e.g., annual meetings of The Wildlife Society and the American Society of Mammalogists) scientific meetings. Travel to scientific meetings held outside of Minnesota will not be paid for by project funding. We will also prepare and submit papers for publication in peer-reviewed journals (e.g., the Journal of Wildlife Management, Journal of Mammalogy, etc.).

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 project will leverage existing acoustic data collected by a previous ENRTF-funded project (2015. Endangered bats, white-nose syndrome, and forest habitat) to generate foundational data on flying squirrel distribution. We have discussed this project with MN DNR non-game mammologist Gerda Nordquist to ensure that the data we collect are of high value to the MN DNR. Specifically, we have designed this project to address key knowledge gaps and provide information that will help inform the status of both species when the DNR begins reviewing species statuses as part of the next Wildlife Action Plan update.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Endangered Bats, White-Nose Syndrome, and Forest Habitat	M.L. 2015, Chp. 76, Sec. 2, Subd. 03i	\$1,250,000

Den Boxes for Fishers and other Nesting Wildlife	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03i	\$190,000
Bobcat And Fisher Habitat Use And Interactions	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 03i	\$400,000

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Michael Joyce, Research Scientist		Project Manager			25.1%	0.2		\$17,216
Ron Moen, Research Scientist/Professor		co-Investigator			25.1%	0.16		\$27,568
Wildlife Technician		Field and office work			22.3%	0.6		\$28,017
M.S. Graduate Student		Conducting field work, data management, data analysis, and writing. The student will contribute to all aspects of this project.			19.1%	0.26		\$14,255
Seasonal Wildlife Technician		Conducts field and office work			7%	0.8		\$26,965
Undergraduate research assistant		Conducts field and office work			0%	0.7		\$17,472
							Sub Total	\$131,493
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
	Equipment	New acoustic detectors with microphones (15 @ \$1,400 ea) and 10 replacement microphones for existing acoustic detectors (@ \$200 ea).	To conduct acoustic surveys for flying squirrels					\$23,000
	Tools and Supplies	Supplies for acoustic surveys (batteries, bait, locks/straps, etc.)	To conduct acoustic surveys for flying squirrels					\$3,000
	Equipment	Radiocollars for flying squirrels (14 collars x 2 species = 28 collars @ \$150 ea)	For tracking habitat use of flying squirrels					\$4,200
	Tools and Supplies	Flying squirrel live trapping supplies (cage traps, wood for trapping platforms, bait, pharmaceuticals, etc.)	For live-trapping flying squirrels to fit radiocollars					\$4,307
							Sub Total	\$34,507
Capital Expenditures								

							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Travel for field work on acoustic surveys, trapping and collaring flying squirrels, and tracking radio-collared study animals. Includes mileage (75%) and lodging for entire research team. Mileage will be reimbursed at \$0.585/mile (MN state rate)	Collect field data for project					\$20,000
							Sub Total	\$20,000
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								
							Sub Total	-
							Grand Total	\$186,000

Classified Staff or Generally Ineligible Expenses

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

Category	Specific Source	Use	Status	\$ Amount
State				
			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	\$102,300
			Non State Sub Total	\$102,300
			Funds Total	\$102,300

Attachments

Required Attachments

Visual Component

File: [48083d0e-82f.pdf](#)

Alternate Text for Visual Component

The visual component shows a map of historic distribution of northern and southern flying squirrels, a picture of a flying squirrel from Itasca State Park, a map of >350 sites where >400,000 acoustic files have been collected that we would analyze, and example sonograms of flying squirrel calls....

Optional Attachments

Support Letter, Photos, Media, Other

Title	File
UMD Sponsored Projects Transmittal Letter	a595dd03-c65.pdf
Background Check Form	c73ce9d1-d19.pdf
Research Addendum	45a46a71-510.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

I made the following changes to the work plan, listed by Comment ID from the Comments and Revisions page:

1. I removed myself from the Project Partner list.
2. A quick clarification, the second milestone as originally listed is to be completed after the first year of the project, so we did have a milestone before the first year and a half of the project is complete. Regardless, we have added two additional milestones within the first year of the project and adjusted the date of completion for an existing milestone since it will be completed earlier than we had originally listed. The milestones are not automatically being ordered by date of completion. If needed, I can remove and re-enter them in the order of completion. Please just let me know (email is best) if you would prefer I re-enter them.
3. I added a milestone that all analyses and technical report should be complete at the end of the project. We typically don't put in peer-reviewed publications or theses as deliverables because these very often are not completed until after the project end date.
4. I added more details of what the graduate student will be working on in the Personnel section of the Budget so it is clear.

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 Commissioner's Plan.

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 (UMD)