Final Abstract

Final Report Approved on December 12, 2025

M.L. 2023 Project Abstract

For the Period Ending June 30, 2025

Project Title: Changing Distribution of Flying Squirrel Species in Minnesota

Project Manager: Michael Joyce

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Funding Source:

Fiscal Year:

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

Appropriation Amount: $186,000

Amount Spent: $186,000

Amount Remaining: -

Sound bite of Project Outcomes and Results

We developed a filter to identify flying squirrels calls from acoustic data. We identified important differences in nest sites, habitat associations, and distributions for northern and southern flying squirrels. Our results provide valuable baseline data that can be used with our acoustic filter to monitor squirrel populations into the future.

Overall Project Outcome and Results

Minnesota has two native species of flying squirrel: northern flying squirrels and southern flying squirrels. Southern flying squirrels have expanded northward across eastern North America over the last 20-50 years and have pushed northern flying squirrels further northward in the process. Nonetheless, baseline information on the distribution of each species in Minnesota and information on squirrel habitat use where the species overlap was lacking. Flying squirrels are hard to monitor because they are nocturnal and secretive, and it takes a lot of time and money to trap them to determine where each species lives. Our objectives were to develop acoustic monitoring methods, learn more about where each species currently lives, and evaluate habitat use overlap. Like bats, flying squirrel vocalizations can be recorded and identified to species. We developed a filter to identify flying squirrel calls to species. This tool provides an accurate and efficient tool to aid future monitoring of flying squirrel distributions in Minnesota, providing valuable data

for wildlife managers. We set out acoustic recording devices at 105 sites and radio-collared 21 northern and 20 southern flying squirrels to better understand habitat use and overlap. We southern flying squirrels were more likely to occupy northern hardwoods stands, while northern flying squirrels were better able to occupy lowland conifer forests. Both species primarily used nests in cavities, but northern flying squirrels were also able to nest in burrows and in branches. Full results are described in our technical report. Taken together, our results provide valuable baseline information on where each species currently lives and what habitat each prefers. Despite recent shifts in where they live, we appear to currently have enough habitat to support northern flying squirrels for the next several decades. It will be important to continue to monitor parasites, distribution, and interbreeding between species in the future.

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 two completed Master's Thesis, with a third Master's Thesis in progress. We wrote a technical report and have 5 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. 2023 Approved Final Report

General Information

Date: December 15, 2025

ID Number: 2023-090

Staff Lead: Lisa Bigaouette

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

Final Report Approved: December 12, 2025

Reporting Status: Project Completed

Date of Last Action: December 12, 2025

Project Completion: June 30, 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	$ Amount Spent	$ Amount Remaining
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%	0.9		$30,505	-	-
Undergraduate research assistant		Conducts field and office work			0%	0.7		$17,472	-	-
							Sub Total	**$135,033**	**$135,033**	**-**
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					$22,954	$22,954	-
	Tools and Supplies	Supplies for acoustic surveys (batteries, bait, locks/straps, etc.)	To conduct acoustic surveys for flying squirrels					$1,481	$1,481	-
	Equipment	Radiocollars for flying squirrels (14 collars x 2 species = 28 collars @ ~$150 ea; plus an additional 14 collars @ ~$150 to replace collars that stopped working too soon)	For tracking habitat use of flying squirrels					$6,354	$6,354	-

	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					$4,000	$4,000	-
							Sub Total	**$34,789**	**$34,789**	**-**
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					$16,178	$16,178	-
							Sub Total	**$16,178**	**$16,178**	**-**
Travel Outside Minnesota										
							Sub Total	**-**	**-**	**-**
Printing and Publication										
							Sub Total	**-**	**-**	**-**
Other Expenses										
							Sub Total	**-**	**-**	**-**
							Grand Total	**$186,000**	**$186,000**	**-**

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	$102,300	$102,300	-
			Non State Sub Total	**$102,300**	**$102,300**	**-**
			Funds Total	**$102,300**	**$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....

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, 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
Minnesota's flying squirrel populations collide	87db263d-c2e.pdf
Presentation List	b934c9c0-1e5.pdf
Where Squirrels Collide	8f713bb8-d1b.pdf
Minnesota's southern flying squirrels glide north	d9e346e0-f19.pdf
Wild World of Urban Squirrels	65ec1ec3-76f.pdf
Zone of Sympatry	63504c39-91a.pdf
Flying squirrel distribution and habitat associations technical report	2bae5e74-68b.pdf

Media Links

Title	Link
Minnesota Outdoor News Radio	https://goodpods.com/podcasts/minnesota-outdoor-news-radio-33437/episode-515-grand-duck-finale-late-fall-river-fishing-bhas-patrick-ber-78670938
The Wandering Naturalist Podcast: What was that? Rocky Lied to Me	https://thewanderingnaturalist.libsyn.com/episode-182-what-was-that-rocky-lied-to-me
MN DNR Outdoor Skills and Stewardship Seminar: Flying squirrels in a changing world	https://www.youtube.com/watch?v=4IWhmhn9GdU
Studying Flying Squirrels on the UMD Campus	https://www.youtube.com/watch?v=e8_vd_-YKL8

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 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 (UMD)

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

N/A

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 - Capital, Equipment, Tools, and Supplies • Budget - Travel and Conferences	I am requesting moving $2,200 to radiocollar budget line to purchase 14 more collars than expected. This change is needed because collars have not been lasting as long as expected, so we need more collars to get data on the sample of animals we proposed. We used less money on acoustic detectors and supplies for acoustic surveys and trapping, so moved money from those categories to cover additional radiocollar expenses.	October 30, 2024	Yes	November 21, 2024
2	Amendment Request	• Budget • Budget - Personnel • Budget - Capital, Equipment, Tools, and Supplies • Budget - Travel and Conferences • Budget - Non-ENRTF Funds Contributed • Attachments	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 travel costs balance out overspent supply and personnel lines.	October 20, 2025	Yes	October 21, 2025

Status Update Reporting

Final Status Update August 14, 2025

Date Submitted: October 20, 2025

Date Approved: October 21, 2025

Overall Update

We have completed all work on this project, including field work and data analysis. We conducted acoustic surveys in several parts of northern Minnesota to clarify distribution of both flying squirrel species and identify species-habitat relationships. We also compiled occurrence records and used all occurrence data to describe historic and current distributions of both species. We found evidence for broad-scale, northward range contraction of northern flying squirrels over the last 100-150 years, with relatively modest northward expansion of southern flying squirrels occurring over a more recent time period of ~50 years. We trapped and radio-collared 41 flying squirrels (21 northern flying squirrels, 20 southern flying squirrels) and located 192 unique nest sites. We found differences in nest site use that indicate resource partitioning in areas of overlap, while home range analysis showed extensive overlap of individuals of the same and differing species. We have been able to share this project through many public and professional events and have had collaborators and students assist us in monitoring flying squirrels in the field.

Activity 1

We conducted an acoustic survey that resulted in over 280 GB of data and developed a filter to identify flying squirrels from acoustic data. We also identified flying squirrel calls in acoustic data collected for bats, although we did not identify as many flying squirrel calls as we had anticipated. We summarized all available records of both species of flying squirrel to determine historic and current distributions. Our summary of occurrences suggested that: 1) northern flying squirrels used to exist much farther south and have contracted northward over the last 100-150 years, and 2) southern flying squirrels expanded northward over the last ~50 years, but northward expansion appears relatively modest across the entire landscape.

We trapped flying squirrels in 7 locations in and around Duluth, including 2 sites with both species, 3 sites with only northern species, and 2 sites with only southern species. We deployed radio-collars on 21 northern flying squirrels and 20 southern flying squirrels. We successfully tracked collared flying squirrels to nest sites on 1,174 occasions and recorded 192 unique nest sites. Radiotelemetry results indicate substantial overlap at the home range scale and resource partitioning at the nest site scale. All milestones are complete.
(This activity marked as complete as of this status update)

Dissemination

We have given 17 technical presentations, 5 presentations to partners and stakeholders, and 9 presentations to non-technical, public audiences. We currently have 5 additional technical presentations scheduled for Fall 2025. See attached presentation list. We were interviewed for 5 media stories and 2 podcasts that highlighted the project.

We wrote a technical report describing project results in detail. We are also working on preparing 5 manuscripts that will be submitted to scientific journals for peer review and publication. Lastly, 1 graduate student completed their thesis project on flying squirrel parasites and 2 graduate students are in the process of completing their thesis projects on different components of this project (thesis defenses expected by December 2025). 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 9, 2025

Date Approved: July 2, 2025

Overall Update

We completed flying squirrel trapping for this project and have a single collared squirrel remaining that we continue to monitor using radiotelemetry. Tracking squirrels once a week has provided data on habitat use, range, and interactions for both species. We deployed 103 acoustic detectors near Remer, Minnesota from May 2024 to July 2024 to collect data about species range and interactions in a suspected zone of overlap between species. We are currently analyzing this data, which will result in the identification of flying squirrel species. We have been able to share this project through many public and professional events and have had collaborators and students assist us in monitoring flying squirrels in the field.

Activity 1

We conducted an acoustic survey that resulted in over 280 GB of data, completing Milestone 3. A preliminary filter has been developed that can differentiate between northern and southern flying squirrels, and we have nearly completed Milestone 7. We are currently working to finish compiling historical occurrence records of both species and are about to start analyzing acoustic data collected prior to the start of this project (Milestone 1).

We trapped both species of flying squirrels in 7 different locations in and around Duluth. We identified two sites containing both flying squirrel species in Cloquet and Duluth. There were two sites that only contained southern flying squirrels and three with only northern flying squirrels. We live-trapped squirrels in three seasons and captured 74 unique northern flying squirrels and 47 unique southern flying squirrels. We deployed radio-collars on 21 northern flying squirrels and 20 southern flying squirrels. We successfully tracked collared flying squirrels to nest sites on 1,174 occasions and recorded 191 unique nest sites (Milestone 4 is complete). We are currently finishing data analysis on nest site use by sex, species, and zone. We are on track to complete all remaining milestones by the end of the project.

Dissemination

We have given two technical presentations about the flying squirrel project at The Minnesota Chapter of The Wildlife Society annual meeting (Feb 2025); five public presentations (MN DNR MOSS Seminar, two presentations to McGregor High School classes, Lake Superior Community College wildlife class, and lightning talks given at the University of MN Duluth biology department seminar). There have been several interviews about the project (NRRI online “News” outlet, University of MN’s “MN Weekly,” an interview for “Outdoor News,” and an article in the Star Tribune of MN, all taking place October 2024). The University of MN Duluth also featured the flying squirrel project in a short video (https://news.d.umn.edu/articles/zone-sympatry). In addition to these public presentations, undergraduate students from the UMD campus, a Lake Superior Community College wildlife ecology class, and many dedicated students from the Fond Du Lac Tribal Community College have learned how to use telemetry to track squirrels and assisted us with field work. Lastly, tracking and trapping squirrels leads to lots of public engagement about the research we are doing, and allows for “trailside” education about the project. We have disseminated results with MN DNR and other stakeholders.

Status Update Reporting

Status Update October 1, 2024

Date Submitted: September 2, 2024

Date Approved: September 3, 2024

Overall Update
This status update is waived per guidance from LCCMR staff provided on August 13, 2024

Activity 1
This status update is waived per guidance from LCCMR staff provided on August 13, 2024

Dissemination
This status update is waived per guidance from LCCMR staff provided on August 13, 2024

Status Update Reporting

Status Update April 1, 2024

Date Submitted: March 29, 2024

Date Approved: May 23, 2024

Overall Update

We have completed several rounds of flying squirrel trapping and continue to monitor collared squirrels. We have access to four different locations for trapping and anticipate access to several new locations in the city of Duluth that will expand our sample size. We have live-trapped squirrels in three seasons and captured 57 unique individuals. We have identified at least one zone of sympatry in Cloquet, Minnesota and will continue trapping efforts there. Using telemetry to track collared flying squirrels, we have identified 85 different rest sites of Northern and Southern flying squirrels. Additionally, tracking squirrels once a week has provided data on habitat use and range for both species and individual levels. We have deployed several acoustic monitors at test sites and are finalizing site selection for our acoustic survey that will begin in April. Winter trapping for flying squirrels has just been completed and will resume in May and continue through the Fall and summer months of 2024. Tracking of collared flying squirrels continues at all four areas each week. We have been able to share this project through many public and professional events and have had collaborators and students assist us in monitoring flying squirrels in the field.

Activity 1

We have completed three seasons of trapping for flying squirrels, capturing 43 individual northern flying squirrels, and 14 southern flying squirrels, with 25 radio collars deployed at four different locations. With these capture results and subsequent tracking with telemetry, we are well on our way to completing Milestone 4. We are just completing Milestone 6 of Activity 1, as we begin summarizing data from squirrel telemetry collected once a week. Many of these collars were deployed on individuals in September 2023, which has resulted in many data points for each individual. While Milestone 7 is not complete, we do have a preliminary workflow for the acoustic data and will be testing it with new and old data in April and May 2024.

Dissemination

We have given two technical presentations since we started the project, one at The Minnesota Chapter of The Wildlife Society annual meeting (Feb 2024), and the other at the Cloquet Forestry Center Forestry and Wildlife Research and Practice Review (Feb 2024). Four public presentations about the project have occurred across a variety of groups: one presentation at the Natural Resources Research Institute open house (July 2023), an interview conducted by the Three Rivers Park District for their Wandering Naturalist Podcast (Oct 2023), a presentation to the Environmental Institute at the Fond Du Lac Tribal Community College (Nov 2023), and a University for Seniors presentation on the UMD campus (Dec 2023). In addition to these public presentations, undergraduate students from the UMD campus, staff from the Boulder Lake Environmental Learning Center, and many dedicated students from the Fond Du Lac Tribal Community College have learned how to use telemetry to track squirrels and assisted us with field work. Lastly, tracking and trapping squirrels leads to lots of public engagement about the research we are doing, and allows for “trailside” education about the project.