Environment and Natural Resources Trust Fund

M.L. 2024 Approved Work Plan

General Information

ID Number: 2024-044

Staff Lead: Lisa Bigaouette

Date this document submitted to LCCMR: July 24, 2024

Project Title: Characterizing Tree Cavities and Use by Minnesota's Wildlife

Project Budget: $349,000

Project Manager Information

Name: Alexis Grinde

Organization: U of MN - Duluth - NRRI

Office Telephone: (218) 788-2747

Email: agrinde@d.umn.edu

Web Address: https://www.nrri.umn.edu/

Project Reporting

Date Work Plan Approved by LCCMR: July 31, 2024

Reporting Schedule: June 1 / December 1 of each year.

Project Completion: June 30, 2027

Final Report Due Date: August 14, 2027

Legal Information

Legal Citation: M.L. 2024, Chp. 83, Sec. 2, Subd. 03c

Appropriation Language: $349,000 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 assess the effects of forest management on Minnesota's primary cavity engineer, the pileated woodpecker, and on the wildlife that rely on the cavities that pileated woodpeckers create. This appropriation is also to develop management guidelines.

Appropriation End Date: June 30, 2027

Narrative

Project Summary: Pileated Woodpeckers are keystone habitat modifiers that support an array of game, non-game, and conservation concern species. Additional information is needed to understand cavity dynamics for these species.

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

Many vertebrates rely on tree cavities for shelter and nesting, and these cavities are often a limiting resource, especially for species that are unable to construct cavities themselves. The Pileated Woodpecker is a keystone species in Minnesota's forests because it is a primary excavator that provides habitat for many other cavity nesting species. The importance of woodpecker cavities to a broad array of secondary cavity-using species including imperiled bats/insects (bees/wasps), fisher, marten, waterfowl, and raptors have long been recognized by ecologists and forest managers. Many cavity nesting species in Minnesota are also Species of Greatest Conservation Need (SGCN), thus providing quality habitat for these species is a priority.

Despite the importance of cavity creation, Pileated Woodpecker ecology and their impact on ecosystem function has not been studied in Minnesota. Changes in land use, climate, and tree distributions are expected to have cascading effects on bird distribution, including Pileated Woodpeckers, which in turn could alter cavity availability, thus making the issue especially important for the conservation of Minnesota's biodiversity.

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 study will provide critical information needed for assessing the impacts of forest management on Minnesota's primary cavity engineer, the Pileated Woodpeckers and their influence on cavity dependent species of management concern including bats, woodpeckers, fisher, marten, and raptors. First, to understand habitat use and movement ecology of Pileated Woodpeckers we will use multiple strategies including conducting systematic surveys in managed forests, soliciting breeding observations from citizen scientists from across the state, and deploying tracking tags to quantify home ranges and movement patterns throughout the year. Next, we will conduct systematic surveys to determine cavity availability across managed forests and will deploy trail cameras at a subset of cavities to document cavity use by secondary cavity species throughout the year. We will use the results of the study to develop comprehensive management guidelines for cavity-dependent habitat management in Minnesota. These guidelines will identify practical land management strategies for conserving Minnesota's biodiversity and include silviculture approaches and landscape considerations for ensuring long-term availability of cavities across the state.

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?

We will: 1. Document habitat and cavity use of Pileated Woodpeckers in Minnesota, 2. Characterize Pileated Woodpecker breeding cavities, 3. Assess cavity use by primary and secondary cavity dwellers including woodpeckers, bats, owls, martens, and fishers, and 4. Quantify characteristics of cavity trees and model potential cavity distribution across landscape. This project will provide data to assess cavity quantity and quality across Minnesota's forests and results will provide insight into forest management activities that will ensure long-term sustainability of this critical habitat feature that support Minnesota's wildlife.

Project Location

What is the best scale for describing where your work will take place?
          Region(s): NE, Central,

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

When will the work impact occur?

In the Future

Activities and Milestones

Activity 1: Document Pileated Woodpecker habitat and cavity use

Activity Budget: $166,097

Activity Description:

To better understand the habitat-use, home range and characteristics of breeding cavities used by Pileated Woodpeckers, we will 1.) Establish study areas (n= 8) that represent a gradient of forest management intensities (intensive management (i.e. young forest landscapes) to extended rotation (i.e. mature forest landscapes)), 2.) Conduct systematic transect-surveys in these study areas to document presence and abundance of Pileated Woodpeckers across forest conditions, 3.) We will solicit citizen scientist observations of active breeding Pileated Woodpecker cavities to increase the spatial extent of documented breeding locations, 4.) Deploy a total of 32 tracking tags (e.g., radio transmitters, GPS tags) on Pileated Woodpeckers. We plan to deploy test tags in 2024/ early 2025 (n=2) to determine optimal tag configuration,16 tags in the 2025 breeding season, and 14 in 2026 breeding season. Tags will allow us to track individuals throughout the breeding and non-breeding season to document home-range size. These data will provide critical information that will be used to understand habitat-use and ecology of Pileated Woodpeckers across the state. Together, these data will help us understand Pileated Woodpecker ecology and cavity use across the state, with a focus on managed forests.

Activity Milestones:

Description	Approximate Completion Date
Establish study areas across forest management intensities	April 30, 2025
Determine optimal tag model and configuration	April 30, 2025
Deploy tracking tags on Pileated Woodpeckers during the 2025 breeding season and assess habitat use	August 31, 2025
Conduct surveys to document Pileated Woodpecker density across study areas	August 31, 2026
Deploy tracking tags on Pileated Woodpeckers during the 2026 breeding season and assess habitat use	August 31, 2026
Develop citizen scientist interface and conduct outreach activities to engage volunteer Pileated Woodpecker cavity observations.	August 31, 2026

Activity 2: Document use by secondary cavity dwellers and quantify cavity characteristics

Activity Budget: $130,903

Activity Description:

To assess the importance of Pileated Woodpecker cavities on secondary cavity-dwellers we will use multiple survey techniques. We will 1.) Set up and conduct systematic surveys in each of the study plots established in Activity 1 to quantify abundance of primary excavators and secondary cavity-dwellers (including bats, fur-bearers, waterfowl, other woodpeckers, and raptors). Transect-line surveys will be used to document differences in distributions of cavity-dwelling species across study areas. The surveys will take place in late April - June when birds and mammals (chipmunks and squirrels), are breeding and defending territories, 2.) Deploy autonomous recording units (ARUs) in the study areas to detect the presence of secondary cavity dwellers, and 3.) Trail cameras will be deployed at a subset of cavities identified at the study sites and via citizen science observations to document cavity use by secondary cavity dwellers over time. We will characterize used-cavities by identifying the tree species, measuring dbh, decay stage, the number and type of cavities present, and any signs of disease. We will systematically document cavity availability across the management gradient by establishing vegetation plots at the eight study areas. Together, these data will relate cavity availability to abundance of cavity-dependent wildlife.

Activity Milestones:

Description	Approximate Completion Date
Establish survey locations and protocol for assessing cavity availability at study areas	April 30, 2025
Establish methods of surveying secondary cavity dwellers (ARUs, point counts, trail cameras)	April 30, 2025
Develop habitat and cavity assessment methodology.	May 31, 2025
Conduct surveys for primary and secondary cavity dwellers in the 2025 breeding	September 30, 2025
Deploy trail cameras to document secondary cavity users during the 2025 season	December 31, 2025
Conduct surveys for primary and secondary cavity dwellers in the 2026 breeding season	September 30, 2026
Conduct cavity and habitat assessment surveys	November 30, 2026
Deploy trail cameras to document secondary cavity users during the 2026 season	December 31, 2026

Activity 3: Identify management strategies to promote quality habitat and long-term cavity availability

Activity Budget: $52,000

Activity Description:

Findings from Activities 1 and 2 will be integrated to determine if there are differences in habitat quality and landscape context for cavity dependent wildlife. We will use this information along with existing information from a variety of sources such as Minnesota Breeding Bird Atlas and eBird to assess the distribution and abundance of Pileated Woodpeckers across the state. These models will incorporate landscape factors, forest composition and structure, and tree size requirements for cavities and secondary cavity nesters. Together these data will allow us to document wildlife use of cavities, cavity "hotspots", and cavity resource use in relation to availability. We will analyze the data and incorporate the results to develop comprehensive management guidelines for cavity-dependent habitat management in Minnesota. These guidelines will include silviculture approaches and landscape considerations for ensuring long-term availability of cavities across the state. We will work with our project partners including MN DNR and USFS to incorporate our findings into the conservation plans for species of management or conservation concern.

Activity Milestones:

Description	Approximate Completion Date
Identify remote sensing data product(s) to use for state-wide habitat suitability modeling	September 30, 2025
Quantify tree, stand, and landscape level metrics for habitat models	September 30, 2026
Process and summarize remote sensing data for incorporation to habitat models.	December 31, 2026
Analyze data to create habitat and cavity availability models	February 28, 2027
Work with partners to integrate findings into forest management plans	June 30, 2027

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Ed Zlonis	Minnesota Department of Natural Resources	Assist with study design, cavity assessment methods, and provide guidance on modeling approach to align with on-going studies on wood duck.	No
Jim Berdeen	Minnesota DNR	Assist with study design, cavity assessment methods, and provide guidance on modeling approach to align with on-going studies on wood duck.	No
Mike North	MN DNR	Assist with study design, cavity assessment methods, and provide guidance on modeling approach to align with on-going studies on woodpecker studies in Red Lake peatlands.	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.
Our results will be disseminated to public land managers through annual updates and professional presentations at state and local meeting. Additionally, we will present project results at local (e.g., MN Chapter of The Wildlife Society, Forestry and Wildlife Research Review) and international (e.g., American Society of Ornithologists) scientific conferences. We will acknowledge the ENTRF funding in publications, signage, and other public communications and outreach related to work associated with the project using the trust fund logo or inclusion of language attributing support from the trust fund as appropriate.

Scientific publications: We expect that this project will produce at least 2 peer reviewed journal articles.
Presentations: Results will be disseminated through local, regional, and national conferences.
Data: Publicly available data will be hosted through the Natural Resources Research Institute website.

Project partners will use the results of this study to identify and improve practices to benefit Minnesota's forest resources.

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?
There is growing concern among ecologists that cavity availability is a limiting factor for cavity-dependent species in some forested landscapes. This study will provide critical information needed for assessing the impacts of forest management on Minnesota's primary cavity engineer, the Pileated Woodpeckers and their influence on cavity dependent species of management concern including northern long-eared bat, American marten, and Boreal Owl. This study will identify practical land management strategies for conserving Minnesota's biodiversity. Our results will provide information that land managers can use to promote land management that conserves Minnesota's wildlife.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Conserving Minnesota's Forest Birds of Management Concern	M.L. 2018, Chp. 214, Art. 4, Sec. 2, Subd. 03g	$500,000

What's "Bugging" Minnesota's Insect-Eating Birds?	M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 03a	$199,000
EAB And Black Ash: Maintaining Forests And Benefits	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 06e	$700,000
Improving Golden-Winged Warbler Conservation and Habitat Restoration	M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 03a	$197,000

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Alexis Grinde, Wildlife Ecologist		Principal Investigator; Project management and coordination			26.9%	0.24		$33,198
Research Associate (P&A)		Project management and data acquisition of woodpecker ecology, habitat use, and develop management recommendations.			26.9%	0.24		$27,168
Research Scientists (Civil Service)		Project management, data acquisition and analysis for woodpecker ecology and habitat use.			24.24%	1.95		$143,551
Undergraduate Students - field technicians		Assist with data collection			0%	0.09		$3,042
Field Technicians (Temp/Casuals)		Assist with data collection			7.64%	0.3		$13,515
Graduate Student		Graduate research associate position for woodpecker ecology and secondary cavity use.			19.42%	0.75		$41,409
							Sub Total	**$261,883**
Contracts and Services								
-							**Sub Total**	-
Equipment, Tools, and Supplies								
	Equipment	Trail cameras. (n= 20 cameras @ $250 ea.)	Multiple trail cameras will be purchased to document wildlife and assess cavity characteristics.	X				$5,000
	Equipment	Autonomous Recording Units (ARUs; n= 23 @ $349 ea.)	NRRI will contribute most of the ARU equipment; these funds will go towards the supplies needed for retrofitting of the ARUs to detect bats as well as birds and squirrels					$8,000

	Equipment	GPS / telemetry tags: 32 tags (GPS + radio tag combination @ $1,500 each) = $48,000 / GPS download device = $1,200 ea. *2 = $2,400	GPS tags will be deployed to track target species					$51,156
	Tools and Supplies	Batteries and SD cards (SD cards n=40 @ $50 ea.; rechargeable battery packs n=22 @ $30 ea.)	Batteries and SD cards are needed for the ARUs to function and record while in the field					$2,661
							Sub Total	**$66,817**
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Mileage (75%) and lodging (25%) for frequent travel to experimental sites. Costs will follow the UMN travel policy rates (3% inflation rate).	Travel costs associated with field work					$20,300
							Sub Total	**$20,300**
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
-							**Sub Total**	-
Other Expenses								
-							**Sub Total**	-
							Grand Total	**$349,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Equipment, Tools, and Supplies		Trail cameras. (n= 20 cameras @ $250 ea.)	Trail cameras will be used for wildlife monitoring and will be deployed at cavities to document the use of cavities by primary and secondary cavity dwellers over time.

Non ENRTF Funds

Category	Specific Source	Use	Status	$ Amount
State				
In-Kind	MNDNR In-kind	In-kind for DNR wildlife staff; Jim Berdeen 0.05 FTE each year, 3 years, total = $20,000; Mike North 0.05 FTE each year, 3 years, total = $17,500; Ed Zlonis 0.05 FTE each year, 3 years, total = $16,000. DNR Fish and Wildlife in-kind travel total 3 years = $8,000.	Pending	$61,500
			State Sub Total	**$61,500**
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	$191,951
			Non State Sub Total	**$191,951**
			Funds Total	**$253,451**

Attachments

Required Attachments
Visual Component
File: [885f2abb-6ed.pdf](885f2abb-6ed.pdf)

Alternate Text for Visual Component
Pictured Pileated Woodpeckers surrounded by multiple cavity dependent wildlife including fisher, Northern Saw-whet Owl, fisher, American marten, Wood Duck, and flying squirrel, and Northern long-eared bat. Pileated Woodpeckers as keystone habitat modifiers that create breeding and roosting sites for many species of management concern and need to understand cavity availability....

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

Title	File
MN DNR In-Kind Letter	[952999c5-720.pdf](952999c5-720.pdf)
UMD SPA Transmittal Letter	[4f8f38a2-b9f.pdf](4f8f38a2-b9f.pdf)
Accepted Research Addendum	[9a5525fb-4d5.pdf](9a5525fb-4d5.pdf)

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage
3. I added MN DNR partners to the partners page

15. Is this comment referring to the "cameras" line? I added the word trail camera to clarify, because of the common use of trail cameras to study wildlife, I was thinking that trail cameras fall under the realm of wildlife monitoring equipment, as opposed to a "camera" (how I had it entered) which is AV equipment. With that change do you still view it as "ineligible"? I did mark it as ineligible and put in justification for the purchase.

17. I added text to clarify our tag deployment targets.

18. I edited the text in each section for clarity.

19. I added the details in the budget.

20. Great, I will definitely reach out to her, thank you!

21. I expect there will likely be 2 to 3 publications that will result from this study, however because of the focus on field work, having an accepted publication by the end of the study is unlikely. I generally use internal funds or obtain publishing grants to cover publication costs.

22. I edited the activity and milestones to reflect better alignment and better address peer review comments.

23. I edited Activity 1 and 2 and associated milestones to better align with peer review comments and increase clarity. I also added milestones to Activity 3 related to identifying and processing remotely sensed data products (i.e. lidar) for habitat modeling. I also reworded the project outcomes under the narrative page to align terminology with the edits I made to Activities 1 and 2.

#

24. Done, thanks for pointing that out.

25. We are not training citizen scientists, I didn't mean to imply that was our intent. Instead, we are planning on reaching out to the large and very engaged birding / natural resources community to obtain breeding observations. We will do this via outreach activities / communications via social media and list serves (e.g. MOU, Audubon groups, nature centers, etc.). Talks and communication will focus on the importance of cavities and educating them about our project, and asking them to report known locations of breeding Pileated Woodpeckers along with any cavity tree information

they have. Pileated Woodpeckers are easy to identify so we don't feel that any sort of training is needed. As I mentioned and added to the milestones, we will develop a web-based data entry system for folks to enter their observations; we have used google forms in the past but are hoping to work with our collaborators at ebird to add an entry form via their app, however I am not sure if this is possible at this point so I don't want to over promise. The phrasing I used in Activity 1 accurately reflects what we have planned, I hope that helps clarify.

26. Done- thanks!

27. Thank you!

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?
  N/A

Do you agree travel expenses must follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?
  Yes, I agree to the UMN Policy.

Does your project have potential for royalties, copyrights, patents, 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?
  No

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing $10,000 or more or large-scale stream or wetland restoration?
  No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?
  No