



Environment and Natural Resources Trust Fund

2024 Request for Proposal

General Information

Proposal ID: 2024-044

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

Project Manager Information

Name: Alexis Grinde

Organization: U of MN - Duluth - NRRRI

Office Telephone: (218) 788-2747

Email: agrinde@d.umn.edu

Project Basic Information

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.

Funds Requested: \$349,000

Proposed Project Completion: June 30, 2027

LCCMR Funding Category: Foundational Natural Resource Data and Information (A)

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

Narrative

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, we will deploy tracking tags on Pileated Woodpeckers to understand the habitat use and movement ecology, including quantifying home range size and cavity excavation rates and use across managed forest landscapes. 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. describe the habitat use and excavation rates of Pileated Woodpeckers in Minnesota, 2. document the cavity, tree, and landscape characteristics of cavities made by Pileated Woodpeckers, 3. document cavity use and characteristics of secondary cavity users including woodpeckers, bats, owls, martens, and fishers, 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 species.

Activities and Milestones

Activity 1: Document Pileated Woodpecker habitat use and characterize cavities and excavation rates

Activity Budget: \$166,097

Activity Description:

To better understand the home range, excavation rates, and cavity use of Pileated Woodpeckers, we will 1.) Establish study areas (n= 8) that represent a gradient of forest management intensities (intensive management to extended rotation), 2.) Conduct systematic surveys to document occupancy and abundance of Pileated Woodpeckers across forest conditions, 3.) Deploy tracking tags (e.g., radio transmitters, GPS tags) on Pileated Woodpeckers (n= 32) in 2024 and 2025 to track individuals throughout the breeding and non-breeding season to document home-range size and cavity excavation rates, and 4.) Assess cavity use and document cavity characteristics of Pileated Woodpeckers including nesting and roosting cavities. These data will provide critical information that will be used to understand ecology of Pileated Woodpeckers and will determine current and potential cavity densities across managed forest landscapes.

Outcome: Understand Pileated Woodpecker ecology and cavity excavation and use across managed forest landscapes.

Activity Milestones:

Description	Approximate Completion Date
Establish study areas across forest management intensities	April 30, 2025
Conduct surveys to document Pileated Woodpecker density across study areas	August 31, 2026
Deploy tracking tags on Pileated Woodpeckers and assess habitat use	August 31, 2026
Quantify habitat and cavity characteristics of Pileated Woodpeckers	December 31, 2026

Activity 2: Quantify cavity availability and document use by secondary cavity dwellers

Activity Budget: \$130,903

Activity Description:

To assess the importance of Pileated Woodpecker cavities on secondary cavity dwellers we will use a dual approach. First, we will set up and conduct systematic surveys in each of the study plots established in Activity 1 to quantify cavity abundance and use by secondary cavity dwellers (including bats, fur-bearers, waterfowl, other woodpeckers, and raptors). We will establish 20 m radius vegetation plots at each survey station. Trees larger than 22 cm dbh will be identified to species, dbh measured, decay stage, the number and type of cavities present, and any signs of disease will be recorded. We will use a telescoping pole with a camera attached to assess internal cavity size, internal characteristics, and other dimensions. Trail cameras will be deployed at a subset of cavities throughout the year, when feasible, to document cavity use by secondary cavity dwellers over time. We will conduct comprehensive surveys to document differences in distributions of cavity dwelling species across study areas. Second, we design a citizen science component to gather locations of active cavities and document their characteristics throughout the state.

Outcome: Document cavity availability and diversity of secondary cavity nesting wildlife across the state.

Activity Milestones:

Description	Approximate Completion Date
Establish survey locations and protocol for assessing cavity availability	April 30, 2025
Establish methods of surveying secondary cavity dwellers (ARUs, point counts, trail cameras)	April 30, 2025
Create a citizen science outreach tool to obtain active cavity locations throughout the state	December 31, 2025
Characterize and monitor cavities in study areas	September 30, 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.

Outcome: Identify and communicate conservation priorities.

Activity Milestones:

Description	Approximate Completion Date
Quantify tree, stand, and landscape level metrics for habitat models	September 30, 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

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

Project Manager and Organization Qualifications

Project Manager Name: Alexis Grinde

Job Title: Wildlife Ecologist

Provide description of the project manager’s qualifications to manage the proposed project.

Dr. Grinde is a Wildlife Ecologist and Research Lab Manager of the Avian Ecology Lab at the Natural Resources Research Institute, University of Minnesota Duluth. She has over 15 years of research experience focusing on conservation ecology. Dr. Grinde manages seven full-time research scientists and multiple research projects and contracts focusing on the development of management strategies for habitats and wildlife. Her research focuses on conservation ecology including studying the large-scale impacts of environmental change on wildlife, biodiversity, and ecosystem functions. Applications of her research include informing land management decisions in relation to changing land use patterns and providing recommendations for conservation plans for species of conservation concern.

Organization: U of MN - Duluth - NRRRI

Organization Description:

The Natural Resources Research Institute (NRRRI) is an applied research and economic development engine for the University of Minnesota research enterprise. NRRRI employs over 130 scientists, engineers and technicians to deliver on its mission to deliver research solutions to balance our economy, resources and environment for resilient communities. NRRRI collaborates broadly across the University system, the state and the region to address the challenges of a natural resource based economy. NRRRI scientists have extensive experience in managing large, interdisciplinary projects. Major objectives include the development of tools for environmental assessment and resource management. NRRRI’s role is as an impartial, science-based resource that develops and translates knowledge by characterizing and defining value-resource opportunities, minimizing waste and environmental impact, maximizing value from natural resource utilization

and maintaining/restoring ecosystem function. The Avian Ecology Lab conducts research that contributes to knowledge of avian conservation and ecology through a combination of original research, long-term and ecological effects monitoring, education, and stakeholder engagement to develop conservation strategies to preserve and enhance species diversity.

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	Cameras	Multiple cameras will be purchased to document wildlife and assess cavity characteristics.					\$5,000
	Equipment	Autonomous Recording Units (ARUs)	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	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
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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](#)

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....

Optional Attachments

Support Letter, Photos, Media, Other

Title	File
UMD SPA Transmittal Letter	4f8f38a2-b9f.pdf
MN DNR In-Kind Letter	952999c5-720.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

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?

No

Does your project include the design, construction, or renovation of a building, trail, campground, or other capital asset costing \$10,000 or more?

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?

No

