Environment and Natural Resources Trust Fund

2025 Request for Proposal

General Information

Proposal ID: 2025-053

Proposal Title: Deer Survival Within Minnesota's Densest Wolf Population

Project Manager Information

Name: Joseph Bump

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Office Telephone: (612) 624-2255

Email: bump@umn.edu

Project Basic Information

Project Summary: Deer are highly valued by Minnesotans, especially in the Northwoods. We'll assess causes of deer survival and habitat needs amidst high wolf density to inform the deer/wolf management debate.

ENRTF Funds Requested: $809,000

Proposed Project Completion: June 30, 2028

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

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

Region(s): NE, NW, Central,

When will the work impact occur?

During the Project and In the Future

Narrative

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

White-tailed deer abundance in northern Minnesota has declined recently, leading to considerable public interest and debate regarding the influence that wolves, winter, and habitat have on deer populations.

Preliminary research by the Minnesota Department of Natural Resources documented higher deer mortality from wolf predation than prior studies, indicating wolves may be a greater source of mortality than previously thought (Smith and DelGuidice 2017).

Added to predation is the role that habitat plays in deer survival (Anderson, Star Tribune 2024). Coniferous forests are critical habitat for deer during winter, but conifer abundance is declining throughout Minnesota—in part due to practices like forest harvesting. On one hand, younger forests created by forest harvest provide abundant food for deer, but on the other hand these forests generally lack the dense conifer cover deer need in snowy winters.

Winters in northern Minnesota are snowier, with the past decade being the snowiest decade on record in much of Minnesota (MPR News 2022). Deep and prolonged snow are difficult conditions for deer survival.

Given the intense public interest and debate surrounding these deeply valued wildlife, there is a pressing need to better understand how deer populations are impacted by wolves, winter, and habitat.

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'll study deer survival and habitat use in the Greater Voyageurs Ecosystem (GVE) in northern Minnesota. The GVE is an ideal place to understand the role of wolves, winter, and habitat on deer because:

1) The GVE has supported the densest wolf population in Minnesota for many years (Gable et al. 2022)
2) The GVE is a multiple-use landscape with substantial habitat variability —ranging from old, mature coniferous forests to forest lands that are intensively logged—that results from the patchwork of county, state, federal, and timber company lands, which all have different forest management regimes.
3) The GVE has long, cold, and snowy winters.

Thus, there is not a better place in Minnesota to try and disentangle "how wolves, habitat, and winters affect deer?" To answer this question, we will capture adult female deer—the most important to a healthy population—and fit them with GPS-collars that will allow us to estimate deer mortality/survival and what habitats deer prefer and depend upon across the landscape.

Further, we will leverage long-term datasets on wolves, wolf predation, and deer populations collected by the ENRTF-supported Voyageurs Wolf Project to understand and interpret patterns in deer survival documented in this study.

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?

Our specific project outcomes are:
1) Quantify causes of deer mortality and survival rates, and the proportion of the deer population killed by wolves annually.
2) Determine what habitats deer prefer and avoid during winter, summer, and fall in relation to forest regimes and landscape availability.
3) Evaluate how deer survival and habitat use changes throughout the annual cycle, which will provide an assessment on

how wolves, winter severity, and habitat cumulatively affect deer mortality and survival across space and time.
4) Use outreach tools to share and inform the public on deer ecology and factors that influence deer populations.

Activities and Milestones

Activity 1: Quantify annual deer mortality and survival in a multiple-use northern Minnesota landscape

Activity Budget: $202,250

Activity Description:

We will quantify deer mortality and survival in a multiple-use landscape, with the primary objectives of identifying survival rates and causes of mortality (predation, starvation, disease). A helicopter crew will capture 75 adult female white-tailed deer and fit them with GPS-tracking collars across two years. Adult females are most important to population growth. We will monitor deer survival and mortality throughout the study's duration using the GPS-collars (the collars send a mortality signal when the animal has died). Upon detection of a mortality signal, we will assess the cause of death with field-based investigations. If the mortality cause cannot be determined in the field, we will collect the carcass and collaborate with a veterinary diagnostic lab to assess the possible cause of death. Biological samples from the deer during captures will be used to assess health (blood parasite load, body condition) to inform survival and mortality patterns. Hunting of females is currently prohibited in the study area, so harvest by humans should not impact this study. This activity will produce annual rates of survival and mortality, causes of mortality, and data regarding how wolves and winter severity relatively influence deer survival and mortality.

Activity Milestones:

Description	Approximate Completion Date
Obtain permits, order and acquire GPS collars, hire helicopter company	November 30, 2025
Capture 75 adult female white-tailed deer (Winters 2026, 2027); collect biological samples	March 31, 2027
Monitor deer survival, including field investigations to determine mortality causes	December 31, 2027
Ship deer carcasses to veterinary diagnostic laboratory for autopsies	December 31, 2027
Analyze data and write manuscripts	June 30, 2028

Activity 2: Assessing patterns in deer habitat use in relation to forest regimes and winter severity

Activity Budget: $202,250

Activity Description:

Using movement data obtained from the GPS-collars, we will assess female white-tailed deer habitat use across the landscape, in both natural and managed areas, during different seasons. We will assess these patterns in deer space use for three separate seasons (summer, fall [rut], and winter) to determine how deer movements change throughout the year and how they are potentially affected by land management practices (e.g. forestry).. Of particular interest is assessing how deer habitat selection varies during late winter when they are typically most vulnerable to starvation and predation, and assessing how deer respond to forest harvest regimes during different times of the year. The main product developed from this activity will be the creation of maps of seasonal deer habitat use, which provide information on specific areas preferred by deer during different seasons. Understanding how deer respond seasonally to forest management regimes will provide key information that can be used to guide management practices of deer populations and identify critical habitats.

Activity Milestones:

Description	Approximate Completion Date
Monitor deer movements using GPS-collars	November 30, 2027
Analyze data, assessing how deer space use relates to human landscape change	December 31, 2027
Create maps of deer habitat use	December 31, 2027
Interpret results and write manuscripts	June 30, 2028

Activity 3: Quantify deer mortality risk in relation to habitat and seasonal conditions

Activity Budget: $202,250

Activity Description:
The goal of this activity is to link the data obtained from Activities 1&2 to determine patterns of deer mortality risk in relation to their habitat use throughout the landscape. Specifically, we will determine spatial patterns of deer mortality risk, evaluate how these spatial patterns of mortality risk vary across seasons, with particular interest on mortality patterns during winter, and finally assess how forest management regimes influence these patterns of risk (or not). For instance, we will determine how deer use of certain habitats during winter influences the probability that they are killed by predators. This activity will provide valuable information on how the cumulative effects of wolves, seasonal conditions (winter severity), and habitat quality influence deer mortality risk across space and time.

Activity Milestones:

Description	Approximate Completion Date
Analyze data, assessing how deer space use patterns relate to mortality risk	December 31, 2027
Create maps of seasonal deer mortality risk	December 31, 2027
Interpret results and write manuscript	June 30, 2028

Activity 4: Create educational material for outreach to the general public regarding deer ecology in northern Minnesota

Activity Budget: $202,250

Activity Description:
On an ongoing basis, we will produce material such as captioned photos, videos, social media content, dynamic graphs, illustrations, presentations, and press releases highlighting the ecology and natural history of white-tailed deer and their predators in northern Minnesota. Deer hunting, and the effects that predators have on deer populations, are major topics of interest to the general public, yet they are also topics rife with misinformation and disinformation. We will collaborate with partners to develop evidence-based educational and outreach materials that will collectively increase public awareness and knowledge of key aspects of white-tailed deer ecology. This includes presenting information and project results in public forums and seminars with residents near our study area and throughout the state of Minnesota.

Activity Milestones:

Description	Approximate Completion Date
Produce outreach and media materials on an ongoing basis throughout the project.	June 30, 2028

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Thomas Gable	University of Minnesota	Co-PI	Yes

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 establishes methods and data to assess key deer vital rates. Success will be leveraged to raise ongoing funding from state resources agencies, federal research grants, the University of Minnesota, NGOs, and donors.

Results will be implemented in multiple ways:
1) Publication of peer reviewed articles.
2) Development of annual reports to share with state and tribal resource agencies, and communities.
3) Creation of educational materials (social media, webinars) for outreach to the general public regarding deer ecology in northern Minnesota.
4) Presentation at professional conferences and association meetings.
5) Creation of university course content that incorporates project results.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Mapping Aquatic Habitats for Moose	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03l	$199,000
Voyageurs Wolf Project – Phase II	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 03e	$575,000
Offal Wildlife Watching: How Do Hunters Provision Scavengers?	M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 03g	$473,000

Project Manager and Organization Qualifications

Project Manager Name: Joseph Bump

Job Title: Professor

Provide description of the project manager's qualifications to manage the proposed project.
Professor in the Department of Fisheries, Wildlife, and Conservation Biology

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Organization Description:
The Department of Fisheries, Wildlife, and Conservation Biology (FWCB) comprises a multidisciplinary group of scholars working on applied and fundamental problems related to the ecology of free-ranging wild animals, management of harvested and invasive species, and documentation and conservation of biodiversity. Our mission is to inspire and create solutions for biological conservation and management in a diverse and changing world.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Principle Investigator		1 faculty research to supervise, manage, and be responsible for all project aspects			37.1%	0.24		$53,568
Researcher 5 - Field lead		1 PhD Researcher to lead all field and publication efforts			37.1%	3		$225,536
Researcher 1 - Field technician		1 full-time, year round field technician to assist with all project efforts			33.5%	3		$160,200
							Sub Total	**$439,304**
Contracts and Services								
Vectronic-Aerospace	Professional or Technical Service Contract	Satellite service to receive and send data from GPS collars; $225/collar/year.				-		$50,625
TBD	Professional or Technical Service Contract	A helicopter capture company will be contracted to help capture and collar deer (75 deer at $1250 per capture).				-		$93,750
							Sub Total	**$144,375**
Equipment, Tools, and Supplies								
	Equipment	GPS-collars	GPS collars to track deer survival and movement (75 collars at $2,150 per collar)					$161,250
	Tools and Supplies	Capture supplies, drugs, and equipment	Items to safely and successfully aid capture and collar of deer (e.g. immobilization drugs, gloves, eye-shields, hobbles, ground matts, scale, sling)					$10,000
							Sub Total	**$171,250**
Capital Expenditures								

							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	10,000 miles/year for 3 years @ $0.67/mile	Travel to field sites and field work track deer movements, understand habitat use, recover deer that have died, investigations of cause of death for collared deer.					$20,100
							Sub Total	**$20,100**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
	Publication	1 peer-reviewed article per year at ~$2,324/article	Page charges for scientific publications to help disseminate results.					$6,971
							Sub Total	**$6,971**
Other Expenses								
		Short term lease to house field technicians: $9,000/year for housing field crew for 3 years	Housing for field work at project site is critical and very limited.					$27,000
							Sub Total	**$27,000**
							Grand Total	**$809,000**

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
State				
In-Kind	University of Minnesota	Unrecovered indirect costs to the University of Minnesota	Secured	$430,100
			State Sub Total	**$430,100**
Non-State				
			Non State Sub Total	**-**
			Funds Total	**$430,100**

Total Project Cost: $1,239,100

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: 9401f5a0-752.pdf

Alternate Text for Visual Component

A Venn diagram with images of a deer, a wolf, a forest in summer, and winter forest scene are pictured. The words wolf, habitat, and winter are written with a question mark over the deer and the question below reads, "What drives deer survival within Minnesota's densest wolf population?...

Supplemental Attachments

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

Title	File
Support Letter from: Iron Range Partnership for Sustainability	5fe7a0b4-146.pdf
Support Letter from: International Wolf Center	d9196b4a-38f.pdf
Support Letter from: Izaak Walton League of America (Duluth)	58941dff-f00.pdf
Support Letter from: Minnesota Deer Hunters Association	bcb37ed0-3d2.pdf
Support Letter from: Voyageurs Conservancy	9877e11f-ce7.pdf
Support Letter from: Wildlife Science Center	5ba1a028-03e.pdf
UMN - LCCMR proposal approved for submission / PRF 1129202	41e40aaf-e9a.pdf
Support letter from: Minnesota Department of Natural Resources	9404f0e0-4d7.pdf
Support Letter from: Back Country Hunters and Angerls	6e0cba17-39b.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

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

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

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Dr. Thomas Gable (Researcher) Patrick McDonald (Financial Specialist); both employed by the University of Minnesota.