Environment and Natural Resources Trust Fund
2020 Request for Proposals (RFP)

Project Title: **ENRTF ID: 050-AH**

Developing Innovative Technology to Track Wildlife Movements

Category: H. Proposals seeking $200,000 or less in funding

Sub-Category: A. Foundational Natural Resource Data and Information

Total Project Budget: $ 168,265

Proposed Project Time Period for the Funding Requested: June 30, 2022 (2 yrs)

Summary:

We will build a cost-effective network of automated radio-telemetry stations to assess fine-scale habitat use and track movements of wildlife to inform and improve management decisions for multiple taxa.

Name: Alexis Grinde

Sponsoring Organization: U of MN - Duluth

Job Title: Dr.

Department: Natural Resources Research Institute

Address: 5013 Miller Trunk Highway

Duluth MN 55811

Telephone Number: (218) 788-2747

Email agrinde@d.umn.edu

Web Address:

Location:

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

A diagram of an automated radio telemetry station (antenna attached to a tripod with a small solar panel) along with pictures of three habitats; forest, wetland, and grassland. Diagrams of wood frog, rose-breasted grosbeak, and least weasel are pictured with radio-transmitters attached. Project outcomes are emphasized in text.

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____%

PROJECT TITLE: Developing Innovative Technology to Track Wildlife Movements

I. PROJECT STATEMENT

We will build a **cost-effective** network of **automated radio-telemetry stations** to **assess fine-scale habitat use** and **track movements** of **wildlife**.

Minnesotans value wildlife. However, Minnesota's habitats are undergoing significant changes due to combined effects of climate, invasive species, and land use changes. These changes are negatively impacting many of Minnesota's iconic wildlife species. Detailed knowledge of wildlife habitat needs is vitally important for effective wildlife management, restoration, and conservation planning.

Fine-scale movement data allows land managers to understand microhabitat requirements during different stages of the annual cycle. This vitally important information is typically unknown because approximately 80% of mammal and bird species listed as endangered, threatened, or special concern in Minnesota and many game species are too small to carry GPS transmitters / collars, posing a major barrier to collecting the data needed to conserve and manage these species. Conventional radio-transmitters can be deployed on small wildlife, but collecting data on movements and fine-scale habitat use with radio-transmitters is very labor intensive, expensive, and impractical.

Automated radio-telemetry stations can be used to monitor radio-tagged wildlife continuously without researchers being present, providing a cost-effective, non-invasive method to overcome limitations of the size of GPS collars. Automated telemetry stations can be used to collect accurate data on movements and fine-scale habitat use of small wildlife, but these methods have not been field-tested in habitats Minnesota's wildlife depend on. This project will utilize hardware recently designed and engineered by NRRI researchers to build a cost-effective system of automated radio-telemetry stations to track fine-scale local movements of wildlife tagged with radio-transmitters. We will test the effectiveness of using automated radio-telemetry stations to track wildlife in multiple habitats on a variety of wildlife species including amphibians, birds, and mammals. Specifically, we will:

1. Assess the effectiveness of automated radio-telemetry stations for tracking Minnesota's wildlife in multiple habitats.
2. Develop best management practices for using automated radio-telemetry stations to facilitate collaborative research on fine-scale animal movement throughout the state.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Build automated radio telemetry stations and conduct systematic trials to develop best practices. **Budget: $76,692**

We will build 42 automated radio telemetry stations. We will conduct systematic trials across seasons in three focal habitats (grassland, forests, and wetlands) using a range of sizes of radio-transmitter tags. Tests will focus on moving tags throughout the study areas to known-locations to identify the influence of habitat and tag type on signal strength. This information will allow us to evaluate the influences of ambient and environmental conditions and develop best practices for the technology including identifying placement of the stations and battery considerations throughout the seasons. Additionally, this activity will establish benchmarks necessary for validating results obtained from multiple wildlife species.

Outcome	Completion Date
1. Build 42 (14 in each of the three focal habitats) automated telemetry stations.	September 2020
2. Establish study areas in focal habitats (grassland, forest, and wetlands) and conduct systematic trials using radio-telemetry tags of various sizes across seasons.	August 2021
3. Develop habitat and wildlife-specific best field practices for automated telemetry stations.	June 2022

Activity 2: Evaluate the ability of automated radio telemetry stations to track wildlife in multiple habitats. **Budget: $91,573**

We will identify priority study areas based on results from Activity 1. We will attach radio-transmitters to various wildlife taxa (frogs, mammals, birds) in each focal habitat to study their movements and fine-scale habitat use. Data will be collected using the automated radio telemetry stations and compared to data collected using traditional hand-held telemetry methods to identify trade-offs between the two approaches. We will develop modeling tools to analyze movement data and to evaluate habitat use for wildlife.

Outcome	Completion Date
1. Identify 3 study sites for automated telemetry stations and conduct wildlife surveys to determine focal taxa for study areas.	August 2021
2. Deploy radio-transmitters on wildlife (25 transmitters in each study area, focal species will be specific to each study area) and track movements and fine-scale habitat use using automated telemetry stations and hand held telemetry methods.	December 2022
3. Evaluate wildlife movement data and develop tools to assess habitat use.	June 2022

III. PROJECT PARTNERS AND COLLABORATORS:

The project team includes Dr. Alexis Grinde and Dr. Michael Joyce from the Natural Resources Research Institute. We will work with MNDNR departments of wildlife and non-game to identify study areas and for input on focal wildlife species.

IV. LONG-TERM IMPLEMENTATION AND FUNDING:

This proposal is part of a larger effort to understand wildlife movement and habitat use to inform management and conservation plans in Minnesota. The major advantage of the automated radio-telemetry stations is that they are small, portable, and can be easily moved and redeployed in target study areas across the state. This project will provide the basic data and foundational information needed to develop methods that can be used by researchers and managers to improve our understanding of habitat use and inform management decisions for multiple taxa. This project will build on the knowledge gained from several current and previous projects funded by LCCMR including "Managing Forest Birds of Conservation Concern", "Mapping Avian Movements in Minnesota", and "Den Boxes for Fishers and Other Nesting Wildlife".

Attachment A: Project Budget Spreadsheet
Environment and Natural Resources Trust Fund
M.L. 2020 Budget Spreadsheet
Legal Citation:
Project Manager: Dr. Alexis Grinde
Project Title: Developing Innovative Technology to Track Wildlife Movements
Organization: Natural Resources Research Institute, University of Minnesota Duluth
Project Budget: $ 168,265
Project Length and Completion Date: 2 years; June 30, 2022
Today's Date: April 6, 2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
BUDGET ITEM			
Personnel (Wages and Benefits)	$ 101,285	$ -	$ 101,285
A. Grinde, Research Program Manager at Natural Resources Research Institute; PI: $14,366 (74% salary, 26% fringe), 6% FTE.			
M. Joyce, Wildlife Ecologist at Natural Resources Research Institute: $16,983 (74% salary, 26% fringe), 10% FTE. *Note that NRRI research staff salaries are largely sponsored by external funds.			
Research scientists: $16,398 (77% salary, 23% fringe), 12% FTE for 2 years.			
Graduate Research Assistant: $39,969 (86% salary, 14% fringe) and tuition reimbursement in AY; 50% FTE AY and 50% FTE SUM for 1 year.			
Research assistant: $13,569 (92% salary, 8% fringe), 20% FTE for 2 years.			
Equipment/Tools/Supplies			
Radio transmitters to attach to wildlife ($220.00 each), we will deploy 25 tags in each of the three study areas ($16,500).	$ 16,500	$ -	$ 16,500
Supplies need to build automated telemetry units, components include computer hardware, batteries as a power supply, and antennae. $1050 / unit * 42 units (14 at each study area; $44,100)	$ 44,100		$ 44,100
Travel expenses in Minnesota			$ -
Travel to the research sites multiple times each season to collect data related for Activities 1 and 2. We estimate over 3000 miles, travel expenses also include lodging and meal allowance for graduate students, research associates, and field technicians.	$ 6,380	$ -	$ 6,380
Other			$ -
	$ -	$ -	$ -
COLUMN TOTAL	$ 168,265	$ -	$ 168,265

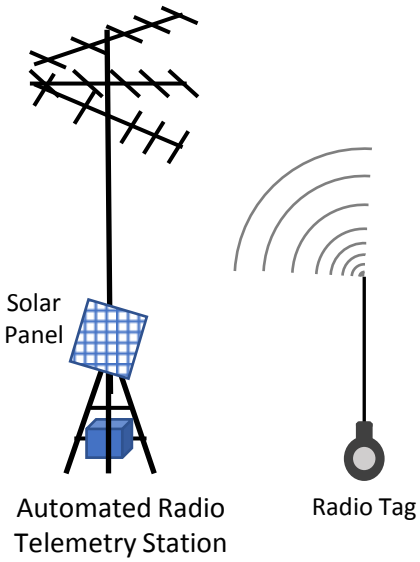
SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT	Status (secured or pending)	Budget	Spent	Balance
Non-State:		$ -	$ -	$ -
State:		$ -	$ -	$ -
In kind: Indirect costs (54% of Total Direct Costs)		$ 82,229	$ -	$ 82,229

Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS	Amount legally obligated but not yet spent	Budget	Spent	Balance
Conserving Minnesota's Forest Birds of Management Concern (2019-2022)	**466,136**	**500,000**	**33,864**	**466,136**

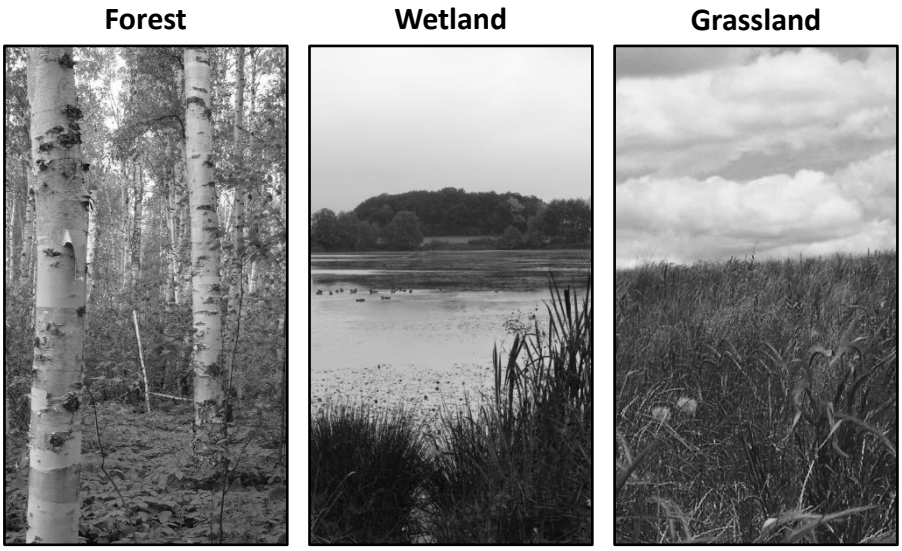
Developing Innovative Technology to Track Wildlife Movements

Activity 1: Develop, build, and test automated radio telemetry stations

1A. Build 42 Automated Radio Telemetry Stations



1B. Deploy and test stations in 3 focal habitats

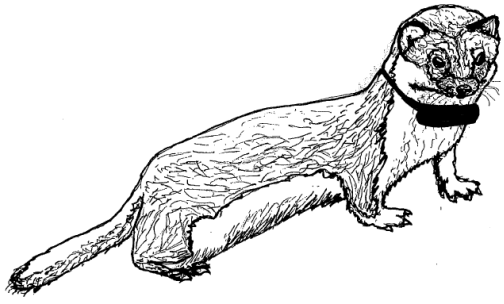


Activity 2: Evaluate the ability of automated radio telemetry stations to track wildlife

2A. Deploy radio transmitters on wildlife and track movements of tagged wildlife

Wood Frog

Rose-breasted Grosbeak



Least Weasel

**We will consult with DNR Wildlife and Non-game to identify study areas and focal taxa for Activity 2*

Project Outcomes:

- Develop a cost-effective, automated system to track movements and habitat use of small wildlife
- Benchmark testing of how well the automated radio telemetry system tracks wildlife
- Guidelines for use of automated radio telemetry stations to track wildlife in Minnesota
- Foundational data on movements and fine-scale habitat use by amphibians, birds, and mammals
- Tools to use fine-scale movement data to assess habitat use

2020 LCCMR Project Manager Qualifications and Organization Description

Dr. Alexis Grinde, Natural Resources Research Institute, University of Minnesota Duluth

Key Qualifications

Dr. Grinde is a Wildlife Ecologist and Research Lab Manager at the Natural Resources Research Institute, University of Minnesota Duluth. She has over 15 years of research experience focusing on conservation ecology.

EDUCATION
Ph.D. Integrated Biological Sciences. University of Minnesota, Duluth. **Thesis:** Spatio-temporal Ecology of Forest Birds. **Adviser:** Dr. Gerald Niemi.
M.S. Biology. University of North Dakota. **Thesis:** Ecological effects of wild pigs in California's oak woodlands. **Adviser:** Dr. Rick Swietzer.
B.S. Biology. Bemidji State University. **Thesis:** The Effects of Rainfall on Number of Nest Initiation Attempts by Nene in Hawaii Volcanoes National Park. **Adviser:** Dr. Elizabeth Rave.

RELEVANT RESEARCH EXPERIENCE
Research Program Manager and Wildlife Ecologist. Natural Resources Research Institute, University of Minnesota Duluth. Manages 5 full-time research scientists and multiple research projects and contracts focusing on developing 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 forest management decisions in relation to changing land use patterns and providing recommendations for conservation plans for species of conservation concern.

The Natural Resources Research Institute is a part of the University of Minnesota Duluth. NRRI's mission is to promote private sector employment based on natural resources in an environmentally sensitive manner.