**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**

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| **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.

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| **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 |

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|  **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.

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| **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”.