



# Environment and Natural Resources Trust Fund (ENRTF)

## M.L. 2018 ENRTF Work Plan (Main Document)

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**Today's Date:** February 22, 2018

**Date of Next Status Update Report:** January 1, 2019

**Date of Work Plan Approval:** 06/05/2018

**Project Completion Date:** June 30, 2021

**Does this submission include an amendment request?** No

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**PROJECT TITLE:** Mapping Avian Movement in Minnesota

**Project Manager:** Gerald Niemi

**Organization:** Natural Resources Research Institute, University of Minnesota Duluth

**College/Department/Division:** Forest and Land Initiative

**Mailing Address:** 5013 Miller Trunk Highway

**City/State/Zip Code:** Duluth, MN 55811

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**Location:** Northeast Minnesota

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**Total Project Budget:** \$200,000

**Amount Spent:** \$0

**Balance:** \$200,000

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**Legal Citation:** M.L. 2018, Chp. 214, Art. 4, Sec. 02, Subd. 03h

**Appropriation Language:** \$200,000 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 pilot the establishment of a network of automated radio-telemetry stations to monitor bird migration and local movements and to develop strategic plans for using the infrastructure long term to monitor animal movement for conservation. This appropriation is available until June 30, 2021, by which time the project must be completed and final products delivered.

## **I. PROJECT STATEMENT:**

Our project will establish a network of automated radiotelemetry stations, which we will use to monitor bird migration along the north shore of Lake Superior and document local movements of Common Terns, a state threatened species, also designated a “Species of Greatest Conservation Need” (SGCN) by the Minnesota Department of Natural Resources (MNDNR). The results of this project will help to develop strategic plans to monitor animal movement within the state. With birds as the focal taxa, we will demonstrate the utility of automated tracking stations and highlight the ways in which this network can be used to track animals at multiple spatial scales throughout Minnesota.

Avian flight has long fascinated scientists and bird-lovers; however techniques for studying movement have been limited. For example, satellite transmitters are expensive and limited to use on large birds. Traditional radio-telemetry is also expensive and labor intensive because birds must be followed on the ground. Geolocators require that birds be recaptured post-migration to recover their movement data. Similarly, traditional banding is inefficient; less than 1% of songbirds banded are ever relocated. Recently a consortium of researchers developed a system of automated radiotelemetry stations that collect locations of migratory and resident birds carrying relatively inexpensive transmitters. This growing system, referred to as the Motus network, currently has its greatest density in the Eastern Great Lakes region of the United States and Canada. This technology provides an efficient and cost-effective method to gather data on bird movements over large areas.

We will join the Motus network and deploy automated radiotelemetry stations in Minnesota. The Motus towers will be set up in strategic locations in northeastern Minnesota, such as along the shores of Lake Superior and along the St. Louis River Estuary. We will focus on these areas to study migratory and local movements of birds in the region. Our project consists of two applications of Motus technology: **1)** to identify timing and migratory movements of birds in northeastern Minnesota, and **2)** to identify local movements and dispersal behavior of adult and juvenile Common Terns.

For the first application we will focus on the North Shore of Lake Superior. This area is known to be a migratory route for many species, however timing of migration and specific pathways are unknown. The Motus network will allow us to assess the duration of migration and characterize species specific migratory movements. These data will help us identify stopover areas that are used by birds during migration and increase our understanding of the effects of weather on migratory behavior. We will concentrate on common songbird and raptor species that constitute the bulk of migrating individuals, to maximize our potential to detect migratory patterns. We will partner with bird banding stations in the region, such as Hawk Ridge Bird Observatory in Duluth, to capture birds and attach transmitters.

In the second application we will focus on Common Terns, they are identified as one of the most vulnerable species at both a federal and state level and as a high priority species for conservation in the state. Interstate Island, in the St. Louis River Estuary, is one of only two breeding colonies for Common Terns in Lake Superior and one of four consistently active colonies in the state. Determining local movement, habitat use, and dispersal of adult and juvenile terns will help identify important areas in the St. Louis River Estuary. This information will greatly aid in the development of local and regional Common Tern management plans. In particular, identifying movement patterns of juvenile birds is crucial because it has not previously been feasible to monitor this age-class using traditional tracking methodologies.

The specific goals of this project are to:

- 1) Develop a network of Motus stations along the St. Louis River Estuary and the shores of Lake Superior,
- 2) Identify migratory movements, timing, and pathways of migration along Lake Superior for songbird and raptor species, and

- 3) Deploy Motus towers along the St. Louis River Estuary to track local movements, foraging locations, and dispersal of Common Terns, to inform management strategies.

**II. OVERALL PROJECT STATUS UPDATES:**

**First Update January 1, 2019**  
**Second Update July 1, 2019**  
**Third Update January 1, 2020**  
**Final Update June 30, 2021**

**III. PROJECT ACTIVITIES AND OUTCOMES:**

**ACTIVITY 1: Assess migratory timing for Minnesota’s migrating birds along Lake Superior**

**Description:**

We will establish a network of 8 Motus towers along the shore of Lake Superior to identify migration pathways and timing of migration for songbird and raptor species. We will identify priority locations for these stations based on proximity to Lake Superior and accessibility. We will identify and contact partners in these locations that can help maintain the towers. Potential partners include local schools, environmental research centers, tribal and state agencies, and private land owners.

We will contact established bird banding stations in the area to coordinate their on-going banding efforts with our transmitter deployment; potential partners include Hawk Ridge Bird Observatory, Sugarloaf Cove, and Wolf Ridge Environmental Learning Center. The locations of these banding stations will allow us to track tagged individuals along Lake Superior using the Motus towers.

An emphasis will be placed on attaching transmitter tags on several common species such as Blue Jay and Sharp-shinned Hawk. These species migrate in high density along Lake Superior and will provide sufficient sample sizes to assess migratory patterns. Use of these transmitters has been shown to not negatively affect survival rates of birds. All necessary approvals from the Bird Banding Laboratory and University of Minnesota (IACUC) will be obtained to capture, handle, and attach transmitters.

**ENRTF BUDGET: \$ 99,675**

<b>Outcome</b>	<b>Completion Date</b>
1. Identify government, academic, NGO, and private partners to host Motus stations along the shore of Lake Superior.	December 2018
2. Partner with banding stations to place a minimum of 80 transmitters (40 per year) on songbirds and raptors.	October 2020
3. Document timing of migration along Lake Superior for songbirds and raptors and assess ability of Motus towers to track migratory movements.	June 2021

**First Update January 1, 2019**  
**Second Update July 1, 2019**  
**Third Update January 1, 2020**  
**Final Update June 30, 2021**

**ACTIVITY 2: Assess local movements and dispersal behavior of Common Terns in the St. Louis River Estuary.**

**Description:**

We will establish a minimum of six Motus towers along the St. Louis River Estuary and south shore of Lake

Superior. These Motus towers will allow us to identify local movement of Common Terns nesting on Interstate Island, located in the Duluth-Superior harbor. We will identify priority locations for these stations which maximize coverage of potential tern foraging habitat. We will identify and contact partners in these locations that can help maintain the towers; potential partners include National Estuarine Research Reserve, Minnesota Pollution Control Agency, MN DNR, and private land owners.

In collaboration with MN DNR, we will place transmitters on adult and juvenile Common Terns from the Interstate Island breeding colony. We will coordinate our transmitter deployment with their on-going monitoring and banding efforts. We will summarize movement data for adult Common Terns during the breeding and post-breeding seasons. These data will help us to identify foraging locations and quantify site level information associated with food sources which terns depend on during the breeding season.

Juvenile Common Terns fledge in late July; Motus towers will allow us to determine habitat use and post-fledgling movement patterns. Mortality is greatest for juvenile birds; the information obtained from the Motus network will allow us to determine important habitats used by juveniles. Additionally, these data can provide insight into the timing of migration and increase accuracy of survival estimates for this age class. Overall, this project will provide critical information to prioritize conservation and restoration efforts and target management strategies for this species.

**ENRTF BUDGET: \$ 100,325**

<b>Outcome</b>	<b>Completion Date</b>
1. Establish a network of Motus receivers along the St. Louis River Estuary and south shore of Lake Superior to determine local movements and dispersal of adult and juvenile Common Terns.	October 2020
2. Band and tag a minimum of 50 (25 each year) Common Terns for two breeding seasons. Note 20 tags will be purchased with LCCMR funds and 30 additional tags from a previous study will be used for this outcome.	October 2020
3. Incorporate movement and habitat use information into Common Tern recovery plans.	June 2021
4. Assess usefulness of Motus network and develop strategic plan for long-term network in Minnesota.	June 2021

**First Update January 1, 2019**

**Second Update July 1, 2019**

**Third Update January 1, 2020**

**Final Update June 30, 2021**

**IV. DISSEMINATION:**

Scientific publications: We expect that this project will produce at least 1 peer reviewed journal article focusing on avian movement.

Presentations: Results will be disseminated through local, regional, and national conferences.

Publicly available data will be hosted through the Natural Resources Research Institute website.

**Description:**

**First Update January 1, 2019**

**Second Update July 1, 2019**

Third Update January 1, 2020

Final Update June 30, 2021

**V. PROJECT BUDGET SUMMARY:**

**A. Preliminary ENRTF Budget Overview:** See attached budget spreadsheet

**Explanation of Capital Expenditures Greater Than \$5,000:** n/a

**Explanation of Use of Classified Staff:** n/a

**Total Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation:**

Enter Total Estimated Personnel Hours: 2,028	Divide by 2,080 = TOTAL FTE: 0.975
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**Total Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation:**

Enter Total Estimated Personnel Hours: 0	Divide by 2,080 = TOTAL FTE: 0
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**B. Other Funds:**

SOURCE OF AND USE OF OTHER FUNDS	Amount Proposed	Amount Spent	Status and Timeframe
<b>Other Non-State \$ To Be Applied To Project During Project Period:</b>			
	\$ n/a	\$ n/a	
<b>Other State \$ To Be Applied To Project During Project Period:</b>			
	\$ n/a	\$ n/a	
<b>Past and Current ENRTF Appropriation:</b>			
	\$ n/a	\$ n/a	
<b>Other Funding History:</b>			
	\$ n/a	\$ n/a	

**VI. PROJECT PARTNERS:**

**A. Partners receiving ENRTF funding**

Name	Title	Affiliation	Role
n/a			

**B. Partners NOT receiving ENRTF funding**

Name	Title	Affiliation	Role
Matthew Etterson, PhD	Board of Directors	Hawk Ridge Bird Observatory	Coordination of banding efforts

**VII. LONG-TERM- IMPLEMENTATION AND FUNDING:** This proposal is a part of a larger effort to understand avian migration in Minnesota. The major advantage of the Motus system is that the receivers are small, portable, and can be easily redeployed. This will allow us the flexibility to monitor local and migratory movements at various locations throughout the state and to move receivers based on the research question being posed. This project will create the infrastructure and provide foundational information that can be used by researchers throughout the state and will greatly improve our understanding of migration for multiple taxa including bats, dragonfly, and butterfly movements in MN. Additionally, the equipment used in this study will be built and maintained by NRRI and can be utilized for future research projects.

**VIII. REPORTING REQUIREMENTS:**

- **The project is for 3 years, will begin on July 1, 2018 and end on June 30, 2021.**
- **Periodic project status update reports will be submitted January 1 and June 1 of each year.**
- **A final report and associated products will be submitted between June 30 and August 15, 2021.**

**IX. SEE ADDITIONAL WORK PLAN COMPONENTS:**

- A. Budget Spreadsheet**
- B. Visual Component or Map**
- C. Parcel List Spreadsheet**
- D. Acquisition, Easements, and Restoration Requirements**
- E. Research Addendum**

**Attachment A:**  
**Environment and Natural Resources Trust Fund**  
**M.L. 2018 Budget Spreadsheet**



**Project Title:** Mapping Avian Movement in Minnesota  
**Legal Citation:** M.L. 2018, Chp. 214, Art. 4, Sec. 02, Subd. 03h  
**Project Manager:** Gerald Niemi  
**Organization:** Natural Resources Research Institute, University of Minnesota Duluth  
**College/Department/Division:** Forest and Land Initiative  
**M.L. 2018 ENRTF Appropriation:** \$200,000  
**Project Length and Completion Date:** 3 years, June 30, 2021  
**Date of Report:** 2-22-2017

<b>ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET</b>	<b>TOTAL BUDGET</b>	<b>TOTAL SPENT</b>	<b>TOTAL BALANCE</b>
<b>BUDGET ITEM</b>			
<b>Personnel (Wages and Benefits)</b>	\$141,000		\$141,000
Gerald Niemi, Principal Investigator (66.5% salary, 33.5% benefits); 1% effort each year for 3 years. \$5,985			
Alexis Grinde, Co-Investigator (66.5% salary, 33.5% benefits); 5% effort each year for 3 years. \$19,100			
Annie Bracey, Co-Investigator (66.5% salary, 33.5% benefits); 8% effort each year for 3 years. \$24,718			
Research Scientist, Fieldwork, Data Collection and Analysis (66.5% salary, 33.5% benefits); 19% cumulative effort each year for 3 years. \$91,197			
<b>Equipment/Tools/Supplies: \$56,000</b>			
14 sensor gnome telemetry receivers @ \$1500 ea. These receivers will be deployed by project partners and will be used on buildings that have access to power supply. Additional \$4,000 added for antennae and receiver repair. \$32,000	\$32,000		\$32,000
100 transmitters (\$200 ea.) to attach to birds to track movements. \$20,000	\$20,000		\$20,000
Motus registration fees. \$1500 / year to register Motus stations on Motus network + \$25 for each transmitter deployed to track birds on Motus receivers outside of Minnesota. \$4,000	\$4,000		\$4,000
<b>Travel expenses in Minnesota</b>	\$3,000		\$3,000
Travel for fieldwork, including mileage (75%) and lodging (25%) for researchers and banders. Mileage will be reimbursed at \$0.535/mile (University of MN rate). Travel is largely associated with large-scale (state-wide) deployment and maintenance of the Motus receivers during the spring and fall migration. Lodging is estimated between (\$90-\$130 per night. \$3,000			
<b>COLUMN TOTAL</b>	<b>\$200,000</b>		<b>\$200,000</b>

