Environment and Natural Resources Trust Fund

M.L. 2023 Approved Work Plan

General Information

ID Number: 2023-217

Staff Lead: Michael Varien

Date this document submitted to LCCMR: June 5, 2023

Project Title: Linking Breeding and Migratory Bird Populations in Minnesota

Project Budget: $199,000

Project Manager Information

Name: Janelle Long

Organization: Hawk Ridge Bird Observatory

Office Telephone: (218) 428-6209

Email: jlong@hawkridge.org

Web Address: https://www.hawkridge.org/

Project Reporting

Date Work Plan Approved by LCCMR: June 22, 2023

Reporting Schedule: April 1 / October 1 of each year.

Project Completion: June 30, 2026

Final Report Due Date: August 14, 2026

Legal Information

Legal Citation: M.L. 2023, Chp. 60, Art. 2, Sec. 2, Subd. 03o

Appropriation Language: $199,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with Hawk Ridge Bird Observatory to map year-round habitat use of understudied bird species of special conservation concern and evaluate areas with the greatest risk of contaminant exposure.

Appropriation End Date: June 30, 2026

Narrative

Project Summary: Identify locations used by Minnesota birds during the full annual cycle and determine the risk of environmental contaminant exposure on raptors to improve conservation and management of Minnesota bird species.

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

Bird populations, including birds that live or move through Minnesota, have experienced drastic declines throughout North America in the last 50 years. Birds have long been used as indicators of how the ecosystem is doing (i.e., the canary in the coal mine). Declines signal that something might be out of balance in the ecosystem; however, the causes of these declines are largely unknown. Potential causes include, but are not limited to, habitat loss and exposure to environmental contaminants.

Researchers have monitored bird population trends at Hawk Ridge in Duluth, MN since 1972. Migratory birds depend on many different geographic locations during their entire year including breeding, stopover, and non-breeding locations. To understand population trends and create conservation plans for birds experiencing declines, we need a better understanding of all locations that Minnesota birds use during the entire calendar year.

Hazards like habitat loss and contaminant exposure can occur at any location or time of year. Even after 50 years of monitoring bird populations, we still know very little about the locations these birds use during their lives and the possible causes of these declines. Conservation and management are needed to address declines.

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.

To create conservation and management plans for Minnesota birds we propose to:

Identify and connect breeding, stopover, and non-breeding locations of Minnesota birds.
Identify locations and habitats important to Minnesota birds.
Assess the risk of environmental contaminant exposure to raptors.

We will use stable isotope analysis and attach high-resolution tracking devices to determine movements, geographic locations, and habitats used by birds in Minnesota.

We will work with bird banding stations across the state to collect feathers from birds during the breeding season. These feathers will be analyzed for stable isotopes and used to create maps showing breeding locations of birds across the state.

We will collect feathers and attach tracking devices to birds caught during migration. We will assign a breeding location to individuals using the isotope map we created and use tracking devices to determine movements and locations throughout an entire year. We will also use tracking data to determine habitats that each species commonly uses.

Lastly, we will analyze feather samples from individual birds that already have associated contaminant exposure data. Using this data, we will quantify the relative importance of breeding habitats for focal species and identify geographical areas with high risk for contaminant exposure.

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?

The outcome of this project will be a series of maps showing locations and habitats throughout Minnesota that are important for the conservation of several understudied species of special conservation concern (e.g., Northern Goshawk, Northern Harrier, and Canada Warbler). The proposed project will help identify breeding, stopover, and non-breeding locations and habitats for Minnesota birds while also evaluating areas of greatest risk of contaminant exposure

for raptors. We will share outcomes in the form of maps and reports with land managers, state and federal government agencies, and non-profit organizations working to conserve these species.

Project Location

What is the best scale for describing where your work will take place?

Statewide

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

Statewide

When will the work impact occur?

In the Future

Activities and Milestones

Activity 1: Collect feather samples and deploy transmitters on birds during breeding.

Activity Budget: $40,221

Activity Description:
Activity 1 will support Objective #1: Determine breeding locations of birds in Minnesota using stable isotope analysis. We will coordinate with MAPS (Monitoring Avian Productivity and Survivorship) stations and breeding bird nest surveys across Minnesota to collect feather samples (n=10 for each species/site) from birds. MAPS stations study birds during the breeding season and target birds directly on their breeding locations. Stable isotope analysis is a non-invasive technique that can be used to estimate geographic location based on naturally occurring isotopic patterns in the environment. Feathers will be analyzed for stable isotopes and used to relate tissue isotope values to geographic locations. From these known isotope values we will create a base map for MN that will allow us to assign a breeding location to birds banded during migration. In addition, transmitters may be opportunistically deployed on adult breeding birds to assess broad-scale movement patterns.

We aim to target our analysis to 2-3 passerine species from MAPS stations and 3 raptor species for a total of 240 individuals analyzed for Activity 1.

Outcome: Create a map of isotope values based on feathers from birds on their breeding locations. This map will be utilized in Activities 2 and 3.

Activity Milestones:

Description	Approximate Completion Date
Develop data collection protocols for breeding bird stations and add selected species to permits.	December 31, 2023
Coordinate with MAPS stations to train staff/volunteers on data collection protocols.	April 30, 2024
Collect feather samples and deploy transmitters in the 2024 and 2025 breeding seasons.	August 31, 2025
Feathers analyzed for stable isotope analysis from both the 2024 and 2025 season.	December 31, 2025
Data analysis: Maps produced from stable isotopes and transmitter data and made available.	April 30, 2026

Activity 2: Collect feather samples and deploy transmitters on birds banded during migration to determine breeding locations and migratory connectivity.

Activity Budget: $135,379

Activity Description:
We will collect feather samples for stable isotope analysis from birds banded during fall migration of 2024 and 2025. Feathers will be analyzed as in Activity 1 and assigned to a probable breeding location based on isotope ratios and the base maps created in Activity 1. Using the geographic assignment based on dual stable isotope analysis we will quantify the proportion of migrants that are MN breeders. We will calculate odds ratios of likely breeding locations between different regions of MN and estimate distances of movement from those breeding locations.

Transmitters will be deployed on adults to confirm isotopic signatures and add resolution to isotope data. In addition to breeding locations, this data will inform us where birds are during the non-breeding season and migration. Transmitter data will be analyzed using ArcGIS to determine migratory connectivity and habitat use. We will use data to determine pathways and variability across and within birds and determine breeding, stopover, and non-breeding locations. This data will be used to identify important habitats and locations used by MN birds to inform conservation and management.

Outcome: Identify breeding, non-breeding, and stopover locations for birds banded during the fall migration season at Hawk Ridge.

Activity Milestones:

Description	Approximate Completion Date
Develop sampling protocols for fall migration data collection.	October 31, 2023
Acquire appropriate transmitters for target species.	March 31, 2024
Collect feather samples and deploy transmitters during 2024 and 2025 fall migration at Hawk Ridge.	November 30, 2025
Send samples for stable isotope analysis in both fall 2024 and 2025.	December 31, 2025
Assign breeding location to migratory birds using the isotope base map (Activity 1).	May 31, 2026
Final report detailing the important habitats and geographic locations for birds of Minnesota.	June 30, 2026

Activity 3: Assess the risk of environmental contaminant exposure to raptors in MN based on breeding origin.

Activity Budget: $23,400

Activity Description:
Birds can bioaccumulate environmental contaminants in their tissues. In addition, these contaminants can bio-magnify across trophic levels meaning that organisms feeding at higher trophic levels may experience the greatest exposure. Environmental contaminants like methylmercury can lead to reproductive and/or behavioral impacts. We will leverage existing feather samples from birds (n = 100) that have been previously analyzed for total mercury and PFAS (per- and poly-fluoroalkyl substances). We will analyze feathers from these birds to estimate their breeding origins using stable isotope analysis. This will allow us to identify geographic areas of most likely exposure in and outside of MN. We will quantify the relative risk of MN birds to contaminant exposure and also assess whether this technique could be useful for continent-scale contaminant monitoring.

This activity will further a past LCCMR proposal which looked at PFAS exposure in raptors. Through this activity we will be able to see if there are geographic locations that make raptors more likely to be exposed to these environmental contaminants.

Outcome: Quantify the relative exposure risk of MN raptors to mercury and PFAS based on breeding location.

Activity Milestones:

Description	Approximate Completion Date
Select samples for analysis based on individuals previously analyzed for contaminants.	September 30, 2023
Feather samples sent to the lab for stable isotope analysis.	October 31, 2023
Begin data analysis: assign geographic locations based on stable isotopes.	March 31, 2024
Comparative analysis of isotope and contaminant data to determine geographical locations of exposure.	August 31, 2024
Make completed maps of exposure available to decision makers and the public.	April 30, 2025

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. Alexis Grinde	Natural Resources Research Institute	Dr. Grinde was a part of the project conception and will be involved in decision-making, project planning, data analysis, and result dissemination.	No
Dr. Matthew Etterson	Hawk Ridge Bird Observatory	Dr. Etterson was a part of the project conception and will be involved in decision-making, project planning, data analysis, and result dissemination.	No

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.
We expect that our results will help identify breeding locations and breeding habitats for Minnesota birds while providing important information related to risk of contaminant exposure. The proposed techniques will prioritize habitat restoration and mitigation efforts across the state and will serve as a model for methodology that can be used for continent-scale contaminants. The findings and products developed from this project will be directly conveyed to project stakeholders through formal and informal meetings. Updates on the project will be posted to the Hawk Ridge Bird Observatory website, newsletter, Facebook, and Instagram accounts. Attribution language will be included in all of these posts which will also mention and/or tag ENRTF so that project updates can be shared with LCCMR followers. We will acknowledge the ENTRF funding in publications, signage, and other public communications and outreach related to work associated with the project using the trust fund logo or inclusion of language attributing support from the trust fund as appropriate.

Scientific publications: We anticipate that this project will produce at least two peer reviewed journal articles focusing on migratory connectivity and habitat use.

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

Data: Publicly available data will be hosted through the Hawk Ridge Bird Observatory website. After the publication of the results, all isotope data will be added to IsoBank, a collaborative isotope data repository and all transmitter data will be added to MoveBank, an online animal-tracking data repository.

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?
Hawk Ridge Bird Observatory researchers and project manager will analyze project data and publish results both locally and at a national scale. Results and findings will be shared with land managers, state and federal government agencies, and non-profit organizations working to conserve these species. Additional funding sources will be acquired if needed for continuing work. These funding sources may include local grants and donor solicitation.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded

Quantifying Exposure of Minnesota's Raptors to Mercury and PFAS	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03c	$250,000

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Passerine Bander		Operate passerine banding during summer and fall season			0%	2		$11,670
Raptor Bander		Operate raptor banding during the fall season			0%	0.5		$6,668
Project Coordinator		Manage project and finances			0%	0.1		$3,569
Primary Researcher		Coordinate data collection, analysis, and final reports			0%	0.5		$21,093
							Sub Total	**$43,000**
Contracts and Services								
Stable Isotope Analysis	Professional or Technical Service Contract	Feathers from ~1000 individuals will be analyzed for stable isotope analysis. The cost of the analysis will be $25 for hydrogen stable isotope analysis and $200 for strontium isotope analysis.				0.2		$92,300
							Sub Total	**$92,300**
Equipment, Tools, and Supplies								
	Tools and Supplies	Transmitters	Transmitters will be deployed on MN birds to learn about movements and create connectivity between breeding and migration. Cost of transmitters ranges from $250-1500. We plan to attach about 45 transmitters to species of interest over the course of two years. These numbers may change due to the general yearly fluctuations in birds banded.					$62,000
	Tools and Supplies	Field Supplies	Purchase of tools and supplies needed for collecting samples including envelopes for feathers and tools needed for transmitter deployment.					$400

	Tools and Supplies	ArcGIS	Subscription to ArcGIS for 3 years for data analysis					$300
							Sub Total	**$62,700**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	Estimate ~5 trips per year to breeding bird stations and other habitats. Trips will range in distance from 30-200 miles. Estimated based on government rate of 58.5 cents/mile.	A few trips will be made each year to train personnel and collect samples from birds on their breeding grounds. Additional trips may be taken to deploy transmitters if samples size is low during migration at Hawk Ridge. This involves driving to suitable habitats where birds are likely to be present.					$1,000
							Sub Total	**$1,000**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
							Sub Total	**-**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$199,000**

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				
			State Sub Total	**-**
Non-State				
			Non State Sub Total	**-**
			Funds Total	**-**

Attachments

Required Attachments

Visual Component

File: 65685ad1-bdf.pdf

Alternate Text for Visual Component

A map showing the most probable breeding location for a sample of Sharp-shinned Hawks banded at Hawk Ridge in 2020 based on stable isotope analysis. An example of feathers that will be collected and a red-tailed hawk with a transmitter attached. Text describing the objectives of the project....

Financial Capacity

File: e885ff7b-794.pdf

Board Resolution or Letter

Title	File
HRBO Board Resolution	227b942e-3a5.pdf

Optional Attachments

Support Letter, Photos, Media, Other

Title	File
Background Check Certification Check	20992118-dd9.pdf
Pavlovic 2023-217 Research Addendum	a33d634d-5a6.pdf

Media Links

Title	Link
Hawk Ridge Bird Observatory	https://www.hawkridge.org/

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

Added additional milestones to the activities to describe that early project planning stages as well as the final report generating stages.

I'm confirming that none of the personnel will be paid benefits.

Stable isotope analysis funding was moved to Professional, Technical, Services Contracts. Estimated number of samples was included.

Added estimated number of transmitters and approximate cost per unit.

Revised budget to include funds for travel within Minnesota to collect samples and deploy transmitters if necessary. We cannot predict how many individuals will be caught and banded so this is a backup in case sample sizes are low.

A comment had been made about the Administrative personnel costs. Clarified the text to make it more clear that this is for project coordination, not administrative costs.

Rewrote the narrative section to hopefully make it more clear what the problem and solution is that we are trying to

address with this project.

Added two collaborators who have been instrumental in the project conception and will be integral for decision making and data analysis.

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

N/A

Do you agree travel expenses must follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I agree to the Commissioner's Plan.

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