



Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-470

Proposal Title: Long-Eared Owl Monitoring in Minnesota to Inform Conservation

Project Manager Information

Name: Emily Pavlovic

Organization: Hawk Ridge Bird Observatory

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Project Basic Information

Project Summary: Long-eared Owl will be tracked using GPS and radio telemetry to determine migratory patterns, habitat use, and survival to create conservation and management action plans for the species in Minnesota.

ENRTF Funds Requested: \$165,000

Proposed Project Completion: June 30, 2030

LCCMR Funding Category: Small Projects (G)

Secondary Category: Fish and Wildlife (D)

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

Narrative

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

The Long-eared Owl (*Asio otus*) is a year-round resident of Minnesota. Although the species is currently listed as Least Concern globally by the International Union for Conservation of Nature, evidence suggests significant population declines across North America. As a result, it is included on the Partners in Flight Yellow Watch List, which identifies species experiencing notable long-term declines and conservation concern. Several factors may contribute to these declines, including habitat loss and degradation driven by urbanization, agricultural change, and climate change. Climate projections from National Audubon Society indicate a loss of up to 73% of the species' current winter range under future climate scenarios. Past research has primarily been conducted in western North America and focuses mostly on breeding ecology. Far less is known about winter habitat use, even though wintering ecology may be equally important for conservation planning. Long-eared Owls are known to form communal winter roosts that can contain dozens of individuals, making these sites potentially critical habitats. Additionally, the species' secretive behavior makes population monitoring difficult. Improving our understanding of both breeding and winter habitat requirements, while developing more effective monitoring approaches, is essential for accurately assessing population status and guiding conservation and management efforts in Minnesota.

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 improve understanding of Long-eared Owl population trends in Minnesota, we propose a multi-method monitoring and tracking effort centered at Hawk Ridge in Duluth. During the peak migration period in October, owls will be monitored nightly using thermal imaging optics from the Hawk Ridge count platform. Thermal technology allows observers to detect nocturnal migrants that are otherwise difficult to see. These migration counts will be compared with the number of owls captured and banded at the Hawk Ridge banding station, located approximately 600 meters from the observation platform. By pairing migration counts with banding data, we will establish a long-term dataset capable of identifying regional population trends. In addition, Long-eared Owls captured at the banding station will be fitted with either GPS transmitters or radio nanotags to track migratory routes, habitat use, and survival throughout the annual cycle. A small genetic sample will also be collected from each individual to determine sex, allowing us to evaluate potential sex-related differences in migration timing, habitat use, and survival. Together, these approaches will provide critical data to inform future monitoring and conservation of this secretive species in Minnesota.

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?

This project will improve our ability to assess the population status of Long-eared Owl in Minnesota by developing more effective monitoring methods. Thermal migration counts, combined with banding data, will provide a stronger long-term dataset for detecting population trends. Tracking data will identify breeding, migration, and winter habitats used by Long-eared Owls, allowing land managers and conservation partners to better protect and manage these areas. Because Long-eared Owls rely on healthy forest ecosystems, conservation actions informed by this research will also benefit a wide range of other forest-dependent wildlife and contribute to the protection and enhancement of Minnesota's natural resources.

Activities and Milestones

Activity 1: Tracking Long-eared Owls to Determine Migratory Patterns, Habitat Use, and Survival

Activity Budget: \$89,334

Activity Description:

The objective of Activity 1 is to track Long-eared Owls banded during fall migration at Hawk Ridge to better understand migratory patterns, habitat use, and survival. Owls will be captured and banded at the Hawk Ridge banding station during fall migration. Adults that meet size and health requirements for transmitter attachment will be fitted with lightweight GPS cellular transmitters prior to release. Juveniles, and adults that do not meet the size threshold for GPS units, will be equipped with radio nanotags. Transmitters will allow researchers to track individual owls throughout the year, documenting migration routes, timing, and stopover locations. These data will also enable survival estimates and allow comparisons of migration behavior by age, sex, and weather conditions. Location data will be combined with landcover datasets and analyzed using R and ArcGIS to identify habitat use during both the breeding season and winter roosting periods. Project outputs will include spatial datasets of migration routes, habitat use analyses, and survival estimates. Outcomes will be evaluated by analyzing tracking success, movement patterns, and habitat associations. Results will be shared with conservation organizations and land managers to inform habitat protection and management strategies for Long-eared Owls in Minnesota and across their migratory range.

Activity Milestones:

Description	Approximate Completion Date
Federal and State Permitting Acquired for Deploying Transmitters	July 31, 2027
Transmitters Ordered	July 31, 2027
Transmitters Deployed on Long-eared Owls During Fall Migration	November 30, 2027
Deployment of Remaining Transmitters (if needed)	November 30, 2028
Data Analysis of Migration Patterns, Habitat Use, and Survival	July 31, 2029
Presentation of Results	December 31, 2029
Publication of Results	June 30, 2030

Activity 2: Visual Monitoring of Long-eared Owl to Determine Population Trends

Activity Budget: \$40,333

Activity Description:

The objective of Activity 2 is to determine whether the number of Long-eared Owls banded at Hawk Ridge each fall accurately reflects the total number migrating through the region. Currently, approximately 60 Long-eared Owls are captured and banded annually at the Hawk Ridge banding station, but many additional individuals likely pass through undetected. To address this gap, we will conduct systematic nocturnal migration monitoring using thermal imaging optics from the Hawk Ridge count platform. Observers will record the number of owls detected during nightly surveys throughout the peak migration period in October. These data will then be compared with banding totals collected at the nearby banding station, located approximately 600 meters away. The primary output of this activity will be a dataset comparing thermal-detected migration counts with banding records. This information will help evaluate whether banding data alone can serve as a reliable index of population size and migration trends. The results will contribute to the development of a more comprehensive monitoring protocol for Long-eared Owls and provide a foundation for detecting long-term changes in this secretive species.

Activity Milestones:

Description	Approximate Completion Date
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Pilot season of monitoring Long-eared Owl migration using thermal imaging	November 30, 2027
Data analysis of pilot season comparing thermal imaging to banding data	May 31, 2028
Data analysis of first season of monitoring	May 31, 2028
Create protocol for systematic visual monitoring of Long-eared Owls	August 31, 2028
First full season of visual monitoring of Long-eared Owls using thermal imaging	November 30, 2028
Second full season of visual monitoring of Long-eared Owls using thermal imaging	November 30, 2029
Final data analysis of visual monitoring versus banding data	May 31, 2030

Activity 3: Genetic Sexing of Long-Eared Owls to Determine Sex Ratios for Migration Pattern & Habitat Use Differences

Activity Budget: \$35,333

Activity Description:

The objective of Activity 3 is to genetically determine the sex of all Long-eared Owls captured and banded at Hawk Ridge during fall migration, enabling analysis of sex-specific migratory patterns and habitat use. Because visual sexing based on size and plumage is often unreliable due to overlapping traits, we will collect genetic samples (feathers or blood) from each owl during banding. These samples will be processed using Polymerase Chain Reaction (PCR) tests and visualization to accurately identify sex. In parallel, we will record detailed morphometric measurements and plumage characteristics to assess whether these traits can improve visual sexing reliability. Tasks will be accomplished by integrating sample collection into standard banding procedures, followed by laboratory PCR analysis. The primary outputs will include a dataset linking genetic sex with morphometric and plumage data for each owl. This information will support analyses of sex-specific migration and habitat use and may improve field-based sexing methods for future banding efforts. Activity outcomes will be evaluated by comparing visual sexing predictions with genetic results, assessing accuracy improvements from additional morphological measurements, and determining the potential for applying these methods in ongoing monitoring and conservation efforts.

Activity Milestones:

Description	Approximate Completion Date
Federal and state permits acquired for genetic sampling	July 31, 2027
Genetic sample collection during Fall 2027	November 30, 2027
Genetic testing of Long-eared Owl genetic samples from Fall 2027	December 31, 2027
Genetic sample collection during Fall 2028	November 30, 2028
Genetic testing of Long-eared Owl genetic samples from Fall 2028	December 31, 2028
Analysis of genetic and morphometric data	May 31, 2029

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Janelle Long	Hawk Ridge Bird Observatory	Financial Administrator	Yes

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.

Findings will be disseminated through peer-reviewed publication in scientific journals as well as to relevant agencies through oral presentations at scientific meetings. We will provide oral presentations at regional (and national) scientific meetings which we have put into the budget. We will also schedule individual meetings with staff from Minnesota Department of Natural Resources and other conservation organizations to directly convey our findings. Results will also be shared through Hawk Ridge Bird Observatory's website, social, media, and public outreach which reaches tens of thousands of participants each fall. Transmitter data will be added to MoveBank, an online animal-tracking data repository on completion of the project. We will acknowledge the Minnesota Environment and Natural Resources Trust Fund through use of the trust fund logo or attribution language on all project print and electronic media, publications, signage, and other communications in accordance with the ENRTF Acknowledgment Guidelines.

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?

Results will be shared with land managers and conservation partners within Minnesota as well as shared through presentations at both local and national conferences and in at least one publication in a scientific journal. If findings suggest that visual monitoring will allow us to better determine population trends, then we will add this effort into our long-term monitoring program at Hawk Ridge and provide resources and information to others who might also benefit from this form of monitoring. If further questions are raised about habitat use and patterns, we will seek additional funding to continue research on this topic.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Linking Breeding and Migratory Bird Populations in Minnesota	M.L. 2023, , Chp. 60, Art. 2, Sec. 2, Subd. 03o	\$199,000

Project Manager and Organization Qualifications

Project Manager Name: Emily Pavlovic

Job Title: Research Director

Provide description of the project manager's qualifications to manage the proposed project.

Emily Pavlovic is the Research Director for Hawk Ridge Bird Observatory and oversees all long-term monitoring activities for Hawk Ridge as well as managing short-term focused research projects. She has contributed to past LCCMR proposals

through Hawk Ridge in addition to collaborating with other organizations. She has a master's degree in Integrated Biosciences from the University of Minnesota Duluth and conducted her thesis research on migrating raptors in Duluth.

Organization: Hawk Ridge Bird Observatory

Organization Description:

Hawk Ridge Bird Observatory (HRBO) is a 501(c)(3) nonprofit organization in Duluth, MN whose mission is to promote the conservation of raptors and other birds in the Western Great Lakes Region through research, education, and stewardship. HRBO manages the 365-acre Hawk Ridge Nature Reserve. Research including monitoring and banding of raptors has occurred at Hawk Ridge since 1972 and contributes to the long-term knowledge of raptor populations in North America.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Project Coordinator		Coordinate research activities and dissemination			0%	0.15		\$9,000
2 Avian Research Technicians		Collect, analyze, and publish data			0%	1.5		\$80,000
Project Administrator		Oversees project financials			0%	0.03		\$5,000
							Sub Total	\$94,000
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
	Equipment	Genetic sexing equipment	Lab equipment (benchtop thermocycler) to genetically sex long-eared owls					\$2,500
	Equipment	Thermal imaging equipment	Purchase of two thermal imaging scopes to count migrating owls					\$9,000
	Equipment	Transmitters	Purchase of 15 GPS and 45 radio transmitters to track Long-eared Owl migration					\$45,000
	Tools and Supplies	Field supplies	Field supplies including transmitter deployment and trapping/banding supplies					\$3,000
	Tools and Supplies	Lab supplies	Laboratory supplies for genetic sexing (reagents, PPE, consumables)					\$1,500
							Sub Total	\$61,000
Capital Equipment								
							Sub Total	-

Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Conference Registration Miles/ Meals/ Lodging	Registration, travel, and meals to local MN conference for 2 people to present project findings, ~300 miles (federal mileage reimbursement rate)	Project results will be presented at a local avian conference in Minnesota to disseminate results that can be used by others to inform management decisions and species conservation efforts.	X				\$1,000
	Miles/ Meals/ Lodging	Travel in personal vehicle to field sites at the federal mileage reimbursement rate. A total of 4 trips per year at maximum of 300 miles each.	Travel to field sites in MN to deploy transmitters (if needed) or assess habitat					\$2,000
							Sub Total	\$3,000
Travel Outside Minnesota								
	Conference Registration Miles/ Meals/ Lodging	Attendance of 2 people to a conference to present project results (conference registration, airfare, lodging, and meals)	Travel outside of MN will be to an internationally attended conference (e.g., Raptor Research Foundation, American Ornithological Society, etc.)	X				\$4,000
							Sub Total	\$4,000
Printing and Publication								
	Publication	Publication in peer-reviewed journal	Project findings will result in the publication of at least one peer-reviewed paper					\$3,000
							Sub Total	\$3,000
Other Expenses								
							Sub Total	-
							Grand Total	\$165,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Travel In Minnesota	Conference Registration Miles/Meals/Lodging	Registration, travel, and meals to local MN conference for 2 people to present project findings, ~300 miles (federal mileage reimbursement rate)	Presentation of project results
Travel Outside Minnesota	Conference Registration Miles/Meals/Lodging	Attendance of 2 people to a conference to present project results (conference registration, airfare, lodging, and meals)	Findings from the project will be insightful for not only Minnesota, so presentation to a wider audience will increase the impact of the project.

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

Total Project Cost: \$165,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [9cf83d55-cd1.pdf](#)

Alternate Text for Visual Component

Pictures of Long-eared Owl with North American range map showing breeding distribution of owls in Northern Minnesota and wintering range in Southern Minnesota. The problem the proposal addressed is listed with a brief sentence about the proposed solution....

Financial Capacity

Title	File
Hawk Ridge Bird Observatory 990	8bee8dfd-67a.pdf

Board Resolution or Letter

Title	File
HRBO Authorization Letter	e6825cc1-0fd.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Do you understand that travel expenses are only approved if they 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 understand the Commissioner's Plan applies.

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?

No

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:

Janelle Long, HRBO; Frank Nicoletti, HRBO; Sean McLaughlin, HRBO

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

N/A