



# Environment and Natural Resources Trust Fund

M.L. 2021 Draft Work Plan

## General Information

**ID Number:** 2021-396

**Staff Lead:** Rory Anderson

**Date this document submitted to LCCMR:** February 9, 2021

**Project Title:** Bioacoustics For Broad-Scale Species Monitoring And Conservation

**Project Budget:** \$305,000

## Project Manager Information

**Name:** Elena West

**Organization:** U of MN - College of Food, Agricultural and Natural Resource Sciences

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## Project Reporting

**Date Work Plan Approved by LCCMR:**

**Reporting Schedule:** December 1 / June 1 of each year.

**Project Completion:** December 31, 2024

**Final Report Due Date:** February 14, 2025

## Legal Information

**Legal Citation:**

**Appropriation Language:**

**Appropriation End Date:** June 30, 2025

## Narrative

**Project Summary:** This study will use autonomous recording devices to determine the statewide distribution and reproduction of red-headed woodpeckers and develop a protocol to monitor population trends and responses to habitat management.

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

Severe declines in red-headed woodpecker numbers over the last 50 years have resulted in a cumulative loss of nearly 95% of the population in Minnesota. Although there are a number of known breeding locations in the state, there is a lack of information on the species' statewide distribution, reproduction, and the habitat characteristics associated with breeding success. The coarseness of the Breeding Bird Survey and the incomplete nature of more intensive surveys (e.g., the County Biological Survey) do not provide the necessary information about the species' distribution and reproduction that are critical components of habitat management and restoration efforts. To address these information gaps we will focus on the following objectives:

1. Identify the current breeding distribution of red-headed woodpeckers in Minnesota and collect information on occupancy, reproduction, and breeding habitats.
2. Develop a monitoring protocol to estimate red-headed woodpecker population trends and responses to habitat management.

We propose a broad-scale, fine-resolution survey for red-headed woodpeckers across their potential breeding distribution in Minnesota using cutting-edge technology (autonomous recording units [ARUs]) and an evaluation of how ARUs can best be used to establish a monitoring program for this species, and possibly other species of management concern.

**What is your proposed solution to the problem or opportunity discussed above? i.e. What are you seeking funding to do? You will be asked to expand on this in Activities and Milestones.**

We propose to make use of technological advances by utilizing ARUs, which passively record sound for long periods. ARUs may reduce the need for trained observers and per-survey costs, allowing for more frequent, widespread surveys than traditional observer-based approaches. This study is a logical extension of our study of a single population of red-headed woodpeckers at Cedar Creek Ecosystem Science Reserve (supported by the ENTRF). We will work with existing partners from Cedar Creek and the Audubon Chapter of Minneapolis, in addition to the U.S. Geological Survey and state agencies to determine red-headed woodpecker presence and behavior at the landscape scale.

As this is a new technology, a key consideration is determining the level of sampling effort needed to detect changes in site occupancy. ARU placement periods will vary from 3-14 days to evaluate the effect of visit frequency on occupancy and breeding activity. ARUs will be moved among potential breeding habitats throughout the species' potential range in Minnesota to increase sample size, allowing us to assess the factors that influence statistical power to detect trends (e.g., sample size, number of visits, and magnitude of change) and develop a rigorous monitoring protocol that can detect responses to management.

**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?**

It is critically important in efforts to restore red-headed woodpecker populations to not only identify presence but also breeding locations. Habitat restoration initiatives are successful only when wildlife both use and reproduce at rates that sustain populations. A standardized protocol for monitoring these parameters for red-headed woodpeckers across their Minnesota distribution is needed to determine their responses to habitat restoration and improve conservation efforts more broadly. ARU versatility is continually improving and device costs have fallen dramatically. Therefore, we will also test the capabilities of both a low- and higher-cost ARU to determine an approach that is cost-effective and scalable.

## 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?**

During the Project and In the Future

## Activities and Milestones

### Activity 1: Conduct passive acoustic monitoring of red-headed woodpecker occupancy and reproduction

**Activity Budget:** \$228,750

**Activity Description:**

We will compile red-headed woodpecker vocalization libraries, determine the effective range of ARUs, and test a subsample of units to validate field methods in summer 2021. Pilot work will be conducted at Cedar Creek, where red-headed woodpeckers occur in relatively stable numbers (>100 breeding adults annually) and the location of our current study. We will then identify potential study locations by processing land cover maps to identify potentially suitable sites and deploy 2 ARUs at each site (low and higher cost). Within each site, we will space plots  $\geq 250$  m apart to avoid overlap in the sampled acoustic environment. We will evaluate auditory data to identify potential target vocalizations (i.e., vocalizations indicative of presence and breeding), and also record the presence of other forest bird species' vocalizations in the audio data for potential future evaluation. Based on results from 2021, we will deploy ARUs more broadly beginning in March 2022 to assess red-headed woodpecker occupancy and reproduction at sites throughout their potential breeding distribution in Minnesota. To assess breeding habitat selection at confirmed nesting locations we will measure nest tree (species, height, cavity size and direction), forest stand (vegetation structure, and age or size class), and landscape characteristics.

**Activity Milestones:**

Description	Completion Date
Acquire equipment, develop ARU deployment methods at Cedar Creek and identify deployment locations	December 31, 2021
ARU deployment and field work (year 1)	August 31, 2022
Processing and analysis of data collected during Activity 1 (year 1)	February 28, 2023
ARU deployment and field work (year 2)	August 31, 2023
Processing and analysis of data collected during Activity 1 (year 2)	June 30, 2024

### Activity 2: Evaluate ARU effectiveness and develop a monitoring protocol to detect red-headed woodpecker population trends and responses to habitat management

**Activity Budget:** \$76,250

**Activity Description:**

We will use findings from activity 1 to evaluate ARU effectiveness and develop a broad-scale, fine-resolution monitoring protocol for red-headed woodpeckers. We will work with local, state, and federal partners to develop best practices and tools for land managers working on habitat restoration efforts to benefit red-headed woodpeckers and other species of high conservation concern that are targets of management. We will disseminate our best practices and recommendations for long-term monitoring of red-headed woodpeckers through our partner, the Audubon Chapter of Minneapolis, which has established working relationships with Audubon chapters and private landowners throughout the state and region.

**Activity Milestones:**

Description	Completion Date
Evaluate ARU effectiveness based on findings from Activity 1 and make recommendations for long-term monitoring of red-headed woodpeckers	June 30, 2024
Submit final report and activity summary	December 31, 2024



2. Develop a monitoring protocol to rigorously detect red-headed woodpecker population trends and responses to habitat management

December 31, 2024

## Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. Mike Wells	The Bell Museum	Dr. Wells will help coordinate field logistics and development of project protocols, and will assist with the writing and dissemination of the monitoring protocol. Dr. Wells will also assist with acoustic library development and analyses of audio data.	No
Dr. Caitlin Barale Potter	Cedar Creek Ecosystem Science Reserve	Dr. Potter will help coordinate field logistics and development of project protocols, and will assist with the writing and dissemination of the monitoring protocol.	No
Keith Olstad	Audubon Chapter of Minneapolis	Mr. Olstad will help coordinate field logistics and development of project protocols, and will assist with the writing and dissemination of the monitoring protocol. Audubon will provide \$7,500 per year of financial support to this initiative, in addition to in-kind volunteer engagement throughout the state.	No
Dr. David Andersen	U.S. Geological Survey, Minnesota Cooperative Fish and Wildlife Research Unit	Dr. Andersen will serve as postdoctoral advisor for Dr. West (Project Manager) and provide in-kind and other support, including purchase and loan of supplies (audio recorders, vehicles, SD cards for recorders, batteries, etc.).	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.**

This study will help us determine the statewide distribution and reproduction of red-headed woodpeckers and develop a protocol to monitor population trends and responses to habitat management. We will disseminate study results to state and federal land managers and organizations working on habitat restoration and conservation of red-headed woodpeckers and their habitats. A number of these organizations are currently part of the Audubon Chapter of Minneapolis Red-headed Woodpecker Recovery Project Habitat Partners group and are actively involved in restoration and conservation efforts and these groups will be a key part of our outreach and dissemination efforts. We will also present our findings at state, regional, and national meetings and will publish study results in the peer-reviewed literature. We will also share study results with the public via a project website and popular press articles. We will acknowledge the 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 per 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 be funded?**

There is currently a lack information necessary to restore red-headed woodpecker populations in Minnesota. Results from this study will reduce that information gap, and we will disseminate findings to state and federal land managers and to organizations working on habitat restoration and conservation of red-headed woodpeckers. We will present our findings at state, regional, and national meetings and will publish study results in the peer-reviewed

literature, and disseminate study results to the public via a project website and popular press articles. Funding to support a long-term monitoring program will be raised through outside grants and state Audubon chapters.

### Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Red-headed Woodpeckers as Indicators of Oak Savanna Health	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03j	\$171,000

## Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
<b>Personnel</b>								
Field Technicians		Field technicians will carry out ARU deployments across the state.			8%	1.52		\$32,000
University of Minnesota Postdoctoral Research Assistant		The postdoctoral researcher will co-lead data collection, analysis, writing and dissemination of management plan to local, state, and federal management agencies and the public.			25.4%	3.5		\$242,000
							<b>Sub Total</b>	<b>\$274,000</b>
<b>Contracts and Services</b>								
							<b>Sub Total</b>	-
<b>Equipment, Tools, and Supplies</b>								
	Equipment	Equipment for fieldwork including batteries, SD cards, protective cases for acoustic devices, and data management tools	ARUs each require an SD or micro SD card and batteries.					\$5,750
	Equipment	Autonomous Recording Units (higher-cost category): 15 units	Needed for recording woodpecker vocalizations and assessment of different ARU models					\$3,750
							<b>Sub Total</b>	<b>\$9,500</b>
<b>Capital Expenditures</b>								
							<b>Sub Total</b>	-
<b>Acquisitions and Stewardship</b>								
							<b>Sub Total</b>	-
<b>Travel In Minnesota</b>								

	Miles/ Meals/ Lodging	4-wheel drive vehicle mileage (100 miles/day x 40 days) x 2 vehicles = 8,000 miles @0.575 = \$4,600 per year x 2 years = \$9,200 plus mileage first year (50 miles/day x 40 days x 1 vehicle = 2,000 miles @0.575 = \$1,150) plus mileage for pilot work, attending meetings, etc. (2,000 miles @0.575 = \$1,150) = \$11,500	For ARU deployment and maintenance, delivering presentations, and meeting with collaborators in Minnesota					\$11,500
	Miles/ Meals/ Lodging	Lodging for field crews (4 people @ \$50/night/person x 25 nights x 2 field seasons) = \$10,000	Housing for field crews while deploying and maintaining ARUs					\$10,000
							<b>Sub Total</b>	<b>\$21,500</b>
<b>Travel Outside Minnesota</b>								
							<b>Sub Total</b>	-
<b>Printing and Publication</b>								
							<b>Sub Total</b>	-
<b>Other Expenses</b>								
							<b>Sub Total</b>	-
							<b>Grand Total</b>	<b>\$305,000</b>

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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## Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
<b>State</b>				
			<b>State Sub Total</b>	-
<b>Non-State</b>				
Cash	Audubon Chapter of Minneapolis	Funds provided by the Audubon Chapter of Minneapolis RHWO Recovery Project for field technician salaries (\$8,000/technician x 2 technicians x 2 field seasons = \$32,000) and costs associated with dissemination of project results and the monitoring protocol to local Audubon chapters, members of the public, land managers, and state and federal agencies working on red-headed woodpecker habitat restoration and conservation (\$1000/year for 2 years)	Potential	\$34,000
In-Kind	U.S. Geological Survey	David E. Andersen salary and benefits (1 month/year x 3.5 years)	Secured	\$59,290
Cash	U.S. Geological Survey, Biological Resources Division, Minnesota Cooperative Fish and Wildlife Research Unit	Autonomous Recording Units (ARUs) needed for recording woodpecker vocalizations: Swift Recorders (15 ARUs @ \$250 per ARU = \$3,750); AudioMoth Recorders (30 ARUs @ \$70 per ARU = \$2,100)	Secured	\$5,850
Cash	U.S. Geological Survey, Biological Resources Division, Minnesota Cooperative Fish and Wildlife Research Unit	Equipment for fieldwork including batteries, SD cards, and GPS units	Secured	\$2,500
			<b>Non State Sub Total</b>	<b>\$101,640</b>
			<b>Funds Total</b>	<b>\$101,640</b>

## Attachments

### Required Attachments

#### *Visual Component*

File: [fdfa7f41-aa9.pdf](#)

#### *Alternate Text for Visual Component*

The visual component of our proposal states the problem we are seeking to address, which is: (1) Loss of nearly 95% of Minnesota's red-headed woodpecker population, and 2) Lack of information on the species' statewide distribution and reproduction needed for habitat management and restoration efforts), along with a photo of a red-headed woodpecker. We include our proposed approach in a box to the right of that, which is: 1) a broad-scale, fine-resolution survey for red-headed woodpeckers acro...

### Optional Attachments

#### *Support Letter or Other*

Title	File
Audubon Chapter of Minneapolis Letter of Support	<a href="#">30d7a9a2-388.pdf</a>
Research Addendum	<a href="#">e79dc597-20e.docx</a>

## Difference between Proposal and Work Plan

#### *Describe changes from Proposal to Work Plan Stage*

We have made no substantive changes to the scope and objectives of our work plan other than adjust our project budget to reflect the recommended amount. To reduce our budget we eliminated some personnel (a University of Minnesota undergraduate intern position and 2 field technician positions for each of 2 years). We also eliminated a portion of our equipment costs and a portion of our budget for field technician lodging. We have been able to secure funds for some of the equipment needed for this project through project collaborator Dr. David Andersen via the U.S. Geological Survey, Minnesota Cooperative Fish and Wildlife Research Unit. We are working with another project collaborator, the Audubon Chapter of Minneapolis Red-headed Woodpecker Recovery Project to secure additional funds for 2 field technician positions for each of 2 years (replacing the positions we eliminated due to the reduction in our budget).



## 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 UMN Policy.

**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?**

Yes, Sponsored Projects Administration

