



# Environment and Natural Resources Trust Fund

M.L. 2026 Final Work Plan

## General Information

**ID Number:** 2026-506

**Staff Lead:** Noah Fribley

**Date this document submitted to LCCMR:** May 27, 2026

**Project Title:** Incidence of Avian Influenza in Minnesota Forest Birds

**Project Budget:** \$234,000

## Project Manager Information

**Name:** Mark Clark

**Organization:** U of MN - Duluth

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## Project Reporting

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

**Project Completion:** June 30, 2029

**Final Report Due Date:** August 14, 2029

## Legal Information

**Legal Citation:** M.L. 2026, Chp. 104, Sec. 2, Subd. 06q

**Appropriation Language:** \$234,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota, Duluth, to augment wild bird surveys in northern Minnesota with sampling for present and past infections with avian influenza and coinfection with Haemosporidian parasites to identify at-risk bird species and quantify trends in avian influenza prevalence over time.

**Appropriation End Date:** June 30, 2029

## Narrative

**Project Summary:** Avian influenza is a virus threatening poultry, livestock, wildlife, and humans. Prevalence in wild birds is unknown. Information on present and past infections or coinfections in wild birds is needed.

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

**Problem:** Avian influenza has recently emerged as a viral disease infecting wildlife, livestock, and humans. In 2024, outbreaks of highly pathogenic avian influenza (HPAI) occurred in poultry, dairy cattle, and wild birds in Minnesota, and infection in humans occurred within the United States. However, prevalence in free-living bird populations is poorly understood. Current surveillance targets poultry, captive wild birds, suspect wild birds (e.g., visibly debilitated individuals) or their carcasses, or comes through opportunistic sampling from select groups (e.g., waterfowl) (Figure 1). Does individual condition or infection from other pathogens affect susceptibility of wild bird hosts to avian influenza? Broader surveillance for past exposure, trends in infection, and coincidence with other pathogens in wild birds is necessary to understand avian influenza dynamics.

**Opportunity:** Currently established programs monitoring other aspects (e.g., population trends) of wild bird populations in Minnesota provide a unique opportunity to survey a diverse number of species for evidence of influenza, past exposure to influenza, and infection with other pathogens. This information would provide unique information on past and current incidence, trends in influenza infection in free-living birds, identification of potential co-factors affecting infection, identification of at-risk species, and reference information for comparison during future outbreaks.

**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.**

We will survey prevalence of avian influenza, influenza antibodies, and blood-borne Haemosporidian parasites (the most common blood parasites in birds, and vectors for avian malaria) in a large and species-diverse number of birds from northern Minnesota from 2026-2028. We will partner with existing monitoring programs (e.g., Hawk Ridge Bird Observatory MAPS) capturing free-living forest birds in northern Minnesota to obtain body measurements, blood samples, and buccal swabs from individual birds to analyze overall condition and test for active influenza infection, evidence of past influenza infection, and evidence of Haemosporidian parasite infection.

By analyzing these disease patterns across multiple species and habitats, we aim to establish baseline infection rates and identify potential geographic or seasonal trends in disease prevalence. Further, these data will allow us to identify species that are at higher risk of infection, providing critical insights for conservation and disease management efforts in Minnesota's avian populations.

**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?**

**Outcome 1:** We will quantify prevalence of active avian influenza infection, past avian influenza infection, and Haemosporidian parasite infection in birds from northern Minnesota.

**Outcome 2:** We will determine if body condition or infection with Haemosporidian parasites increases the likelihood of infection with avian influenza, quantify trends in prevalence over time, and identify at risk species in Minnesota.

**Outcome 3:** We will disseminate our findings 1) to relevant agencies, 2) the Minnesota public through outreach activities, and 3) to the scientific community through peer-reviewed publication and presentations.

## Project Location

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

Region(s): NE

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

Statewide

**When will the work impact occur?**

During the Project

## Activities and Milestones

### Activity 1: Sample collection in northern Minnesota and preliminary lab analyses

**Activity Budget:** \$74,435

**Activity Description:**

We will obtain body measurements, blood samples, and mucous samples in conjunction with summer monitoring of bird populations during 2026-2028. Birds will be captured in mist nets, key morphological traits including mass, wing length, and skeletal length will be collected to assess body condition. A 10 ul blood sample and a buccal swab will be collected from each individual. Samples will be returned to the lab within 8 hours of collection for preliminary processing and storage. For at least two summers during the project, we aim to collect samples from at least 450 individuals totaling 900 over the course of the study. To maximize species diversity surveyed, once we have obtained 10 samples from a given species in a year, we will prioritize sampling from species with fewer than 10 samples. While we aim to maximize species diversity surveyed, we will prioritize sampling from two species (American robin *Turdus migratorius*, Black-capped chickadee *Parus atricapillus*) that are abundant in northeastern Minnesota forests but also commensal with humans and two species (Veery *Catharus fuscescens*, White-throated sparrow *Zonotrichia albicollis*) that are also abundant in northeastern Minnesota forests but associate less with human habitats.

**Activity Milestones:**

Description	Approximate Completion Date
Identify and coordinate with project partners throughout the state	August 31, 2026
Develop and train common methodology for measurements and sample collection	September 30, 2026
Collection of blood samples and buccal swabs from n = 900 birds	May 31, 2028
Quantify condition of individual birds sampled	June 30, 2029

### Activity 2: Laboratory analysis of blood & tissue samples at University of Minnesota Duluth

**Activity Budget:** \$108,392

**Activity Description:**

During Fall 2027 (immediately after the summer 2027 field season), we will use a small number of previously collected avian blood samples (collected prior to summer 2026) to fine tune the assays we will use to detect infections of influenza or Haemosporidians. After analyzing the preliminary samples, we will proceed with analysis of samples collected during Summer 2027. We will use a commercially available ELISA for general influenza A antibodies to screen for influenza A. For samples with detectable influenza A antibodies present, a subsequent ELISA for H5N1 will be conducted, and we will submit pharyngeal swab samples (from those birds) to the University of Minnesota Veterinary Diagnostic Laboratory for PCR based sequencing of viral string. We will use real time PCR to analyze samples for DNA from Haemosporidian parasites, which indicates presence of the parasites in the blood. Finally, we will use Enzyme-linked immunosorbent assay (ELISA) to determine if avian influenza antibodies are present, which can indicate prior infection with avian influenza.

**Activity Milestones:**

Description	Approximate Completion Date
Obtain -80 freezer to hold samples at UMD	December 31, 2026
Complete lab work for samples collected from 1st Summer field season	May 31, 2027
Complete preliminary lab work for influenza and Haemosporidian parasites	December 31, 2027
Complete lab work for samples collected from 2nd Summer field season	May 31, 2028

### Activity 3: Analyze data, write & publish results in scientific journals; disseminate results to the public

**Activity Budget:** \$51,173

#### **Activity Description:**

We will analyze the data to identify species at higher risk of infection, offering valuable insights for conservation and disease management in Minnesota’s avian populations. Understanding infection patterns and susceptibility will help inform broader conservation efforts to protect the state's bird diversity. Our findings will be disseminated through scientific manuscripts submitted to peer-reviewed journals, presentations at scientific meetings, and outreach efforts to engage both the scientific community and the public. Through these efforts, we aim to advance knowledge on avian disease ecology and inform strategies for protecting bird populations in the region.

#### **Activity Milestones:**

Description	Approximate Completion Date
Analyze data, write manuscripts, submit findings to scientific journals	December 31, 2028
Conduct outreach activities to present findings to public	June 30, 2029
Attend scientific meetings to present findings	June 30, 2029

## Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Alexis Grinde, PhD	Natural Resources Research Institute	Co-PI: Dr. Grinde leads the Avian Ecology Lab at NRRI and is a graduate faculty member at UMD and UMN. Specializing in avian ecology, she develops conservation strategies for Minnesota bird species. She will contribute to data collection, analysis, and student mentorship for this project.	No
Emily Pavlovic, MS	Hawk Ridge Bird Observatory	Co-PI. Emily Pavlovic is the Research Director for Hawk Ridge Bird Observatory in Duluth, MN. She conducted her thesis research at Hawk Ridge on determining natal origins and migratory patterns of raptors using stable isotope analysis. She will assist in data collection, analysis, and mentoring of students.	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.**

Beyond dissemination of our findings through peer-reviewed publication in scientific journals, we will also disseminate our findings to relevant agencies through oral presentations at scientific meetings and to the Minnesota public through outreach activities. We will provide oral presentations at regional (and national) scientific meetings. Members of the Minnesota Department of Natural Resources, the Minnesota Ornithologists Union, the Minnesota office of the United States Department of Agriculture Animal and Plant Health Inspection Service, and the United States Fish & Wildlife Service regularly attend annual meetings of the Minnesota Chapter of the Wildlife Society, and we have budgeted funds to present at those meetings. However we will also schedule individual meetings with staff from Minnesota Department of Natural Resources and the Minnesota office of the United States Department of Agriculture Animal and Plant Health Inspection Service to directly convey our findings. We also plan dissemination of our findings to the public through several outreach activities. For instance, we will provide a poster highlighting our findings to HRBO to showcase at a variety of outreach activities coordinated by HRBO (through Co-PI Emily Pavlovic, a HRBO staff member) as well as through the HRBO website. We will also propose a public workshop for the University of Minnesota Duluth Twin Ports Teen Science Cafe to share our findings with high school teachers and students from Minnesota. 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?**

Our findings will be disseminated to managers and the scientific community through peer-reviewed publications, and to the public via outreach to local stakeholders (Activity 3). We have budgeted for these activities, and do not anticipate additional work will be needed. Our results will be archived through publications, linked to web pages maintained at UMD and HRBO, to establish a reference of influenza incidence in Minnesota forest birds for comparison should outbreaks occur in the future.

## Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Understanding Native Fishes in the Bowfishing Era	M.L. 2024, , Chp. 83, Art. , Sec. 2, Subd. 03s	\$588,000



## Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
<b>Personnel</b>								
PI, Mark Clark		Supervise graduate student, assist with sample collection, supervise lab analysis, conduct data analysis and contribute to manuscript writing, presentations and outreach.			27%	0.04		\$5,997
Annie Bracey, NRRRI		NRRRI team member, assist in logistics of sample collection			27%	0.06		\$8,319
Stephen Nelson		Technical staff at NRRRI who will coordinate field crews working at NRRRI in conjunction with project.			24%	0.12		\$8,057
GRA, summer and academic year		Assist with sample collection and conduct lab analysis, data analysis, manuscript preparation.			45%	1		\$110,870
Undergrad research assistant		Lab & Field Assistants; Assist with sample collection and lab analysis; gain lab and field experience. Funding for 4 undergraduate field assistant at 50% time (20 hours per week) for 12 weeks during both summers, and funding for undergraduate lab assistant(s) (total of 15 hours per week) for 15 weeks in fall and 15 weeks in spring semesters in each academic year			0%	1.36		\$43,649
							<b>Sub Total</b>	<b>\$176,892</b>
<b>Contracts and Services</b>								
							<b>Sub Total</b>	<b>-</b>
<b>Equipment, Tools, and Supplies</b>								
	Tools and Supplies	Miscellaneous lab supplies include DNA extraction kits (\$500 per 100 samples), AI ELISA kits (\$1,000 per 100 samples), PCR supplies (\$500 per 100 samples), storage vials & pipette tips (\$100 per 100 samples), and disposable lab materials (\$100 per 100 samples) for a total of \$2,200 per 100 samples and	Expendable items used to process samples, kits are used to extract DNA and test for influenza. Benchtop portable ultracold freezer is needed to transport & store samples from field.					\$31,977

		we assume 500 samples per year (450 per year and additional 50 samples for assay refinement) for a total of \$22,000 (\$11,000 per year) and \$3,777 in year 1 to purchase a benchtop portable ultracold freezer to transport & store samples from the field, along with \$6,200 (\$3,100 per year) for sequencing 50 samples (based on \$62 per sample) each year.						
	Tools and Supplies	Miscellaneous field supplies include capture nets, poles and ropes (\$2,000 per year), notebooks, handling bags, banding material, blood & tissue collection items (\$2,000 per year) for a total of \$8,000.	Various field supplies needed for sampling and storage of blood and mucous samples.					\$8,000
							<b>Sub Total</b>	<b>\$39,977</b>
<b>Capital Equipment</b>								
		Ultra-cold lab freezer to increase sample storage volume	Large volume (6 cu ft) freezer to hold samples at -80 C to prevent protein/DNA/RNA damage. We are requesting \$6,000 for a larger ultra-cold freezer to hold samples at appropriate temperature (-80 C) prior to analysis that will be dedicated exclusively to the project. Ultra-cold storage of samples is necessary to prevent protein degradation prior to analysis. Frequently opening storage freezers can also compromise sample quality, and a dedicated freezer will minimize opening of the freezer while providing maximum storage capacity for project samples which can then be removed in single batches for analysis (minimizing inter-assay variation). Our lab at UMD frequently collects biological material from wildlife species as part of our larger ecological research on individual variation and population dynamics. The ultra-cold freezer will be used beyond the project period by our lab and others at UMD for storage of biological samples containing proteins (e.g., DNA,	X				\$6,000

			antibodies) requiring ultra-low temperatures to prevent degradation.					
							<b>Sub Total</b>	<b>\$6,000</b>
<b>Acquisitions and Stewardship</b>								
							<b>Sub Total</b>	<b>-</b>
<b>Travel In Minnesota</b>								
	Conference Registration Miles/ Meals/ Lodging	We have budgeted for a graduate student to attend a local scientific meeting with 3 nights of lodging (\$137 per night) and 3 days per diem charges (\$69 per day) and conference registration costs for student (\$335). Total cost of \$953.	Funds for one individual to attend scientific meeting in Minnesota and present results to local resource managers.					\$953
	Miles/ Meals/ Lodging	We assume 40 miles per trip @ \$0.70 per mile for 4 days per week of 20 weeks to collect samples during 2 summers. Total cost of \$4,480.	Collect samples from birds captured during spring/summer period.					\$4,480
							<b>Sub Total</b>	<b>\$5,433</b>
<b>Travel Outside Minnesota</b>								
	Conference Registration Miles/ Meals/ Lodging	We have budgeted airfare costs of \$500 for 1 person, along with 3 nights of lodging (\$137 per night) and 2 days per diem charges (\$69 per day) and 2 travel days per diem (\$52 per day), conference registration costs for PI or Co-I (\$545) for total cost of \$1,698.	To attend a national meeting at the end of the project to present findings of the study	X				\$1,698
							<b>Sub Total</b>	<b>\$1,698</b>
<b>Printing and Publication</b>								
	Publication	Publication; page chares; OA fees. At least 2 manuscripts for scientific journals are anticipated from the study, with publication costs of \$2,000 per manuscript.	Dissemination of findings through peer-reviewed scientific journals.					\$4,000
							<b>Sub Total</b>	<b>\$4,000</b>
<b>Other Expenses</b>								

							<b>Sub Total</b>	-
							<b>Grand Total</b>	<b>\$234,000</b>

## Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
<b>Capital Equipment</b>		Ultra-cold lab freezer to increase sample storage volume	Our lab at UMD Biology currently does not have an ultra-cold freezer necessary for storage of DNA, RNA and other biological proteins. <b>Additional Explanation :</b> Our lab at UMD frequently collects biological material from wildlife species as part of our larger ecological research on individual variation and population dynamics, including blood samples from birds that will be used in the future to monitor influenza and parasite incidence. The ultra-cold freezer will be used beyond the project period by our lab and others at UMD for storage of biological samples containing proteins (e.g., DNA, antibodies) requiring ultra-low temperatures to prevent degradation.
<b>Travel Outside Minnesota</b>	Conference Registration Miles/Meals/Lodging	We have budgeted airfare costs of \$500 for 1 person, along with 3 nights of lodging (\$137 per night) and 2 days per diem charges (\$69 per day) and 2 travel days per diem (\$52 per day), conference registration costs for PI or Co-I (\$545) for total cost of \$1,698.	Presenting our findings at a national meeting will allow us to compare results with scientists monitoring AI in other areas. Most of the songbirds we propose to sample are migratory, and therefore comparing findings among other researchers on a continental scale is critical to understanding implications for future disease dynamics. For example, if incidence is low in birds in breeding in Minnesota, but high in breeding populations elsewhere, outbreaks in Minnesota could emerge later if the populations occupy the same wintering habitat.

## Non ENRTF Funds

Category	Specific Source	Use	Status	\$ Amount
<b>State</b>				
			<b>State Sub Total</b>	-
<b>Non-State</b>				
In-Kind	UMN unrecovered indirect costs are calculated at the UMN negotiated rate for research of 54% modified total direct costs.	Indirect costs are those costs incurred for common or joint objectives that cannot be readily identified with a specific sponsored program or institutional activity. Examples include utilities, building maintenance, clerical salaries, and general supplies. ( <a href="https://research.umn.edu/units/oca/fa-costs/direct-indirect-costs">https://research.umn.edu/units/oca/fa-costs/direct-indirect-costs</a> )	Secured	\$93,417
			<b>Non State Sub Total</b>	<b>\$93,417</b>
			<b>Funds Total</b>	<b>\$93,417</b>

**Total Project Cost: \$327,417**

**This amount accurately reflects total project cost?**

Yes

## Attachments

### Required Attachments

#### *Visual Component*

File: [3441588c-9d8.docx](#)

#### *Alternate Text for Visual Component*

Avian influenza in poultry has been costly to Minnesota farmers and continues to infect many birds as indicated from the newspaper headline and incidence in poultry. However, incidence in songbirds is not well known because surveillance in wild birds relies on hunter harvest or finding carcasses....

### Supplemental Attachments

#### *Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other*

Title	File
UMN Authorization Letter	<a href="#">468a6c37-081.pdf</a>
2026-506 LCCMR AI in Forest Birds Clark 2025 2nd Revised Addendum_Final	<a href="#">ddf71780-864.docx</a>

### Difference between Proposal and Work Plan

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

We have added details related to dissemination of our findings, confirmed locations for proposed activities, and confirmed the status reporting update schedule. There were no comments or requested revisions to address.

## 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?**

Yes

**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 UMN Policy on travel 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 project:**

Claudia Carranza UMD, Michael Jacob UMD, Alexis Grinde NRR and UMD, Emily Pavlovic 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