Environment and Natural Resources Trust Fund

M.L. 2023 Approved Work Plan

General Information

ID Number: 2023-256

Staff Lead: Michael Varien

Date this document submitted to LCCMR: July 12, 2023

Project Title: Neonicotinoid Impacts on Minnesota Deer and Prairie Chickens

Project Budget: $177,000

Project Manager Information

Name: Charlotte Roy

Organization: MN DNR - Fish and Wildlife Division

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Project Reporting

Date Work Plan Approved by LCCMR: July 20, 2023

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

Project Completion: December 31, 2026

Final Report Due Date: February 14, 2027

Legal Information

Legal Citation: M.L. 2023, Chp. 60, Art. 2, Sec. 2, Subd. 19

Appropriation Language: The unencumbered amount, estimated to be $176,000, in Laws 2021, First Special Session chapter 6, article 6, section 2, subdivision 8, paragraph (f), Restoring Upland Forests for Birds, is for examining the impacts of neonicotinoid exposure on the reproduction and survival of Minnesota's game species, including deer and prairie chicken. This amount is in addition to the appropriation under article 1, section 3, subdivision 6, for these purposes and is available until June 30, 2027.

Appropriation End Date: June 30, 2027

Narrative

Project Summary: We will examine impacts of neonicotinoid exposure on greater prairie-chickens in Minnesota by radio-marking hens, collecting samples, and monitoring hen survival, nest success and brood survival.

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

Neonicotinoids are the most commonly used insecticides worldwide. Recent studies in Minnesota detected neonicotinoids in livers of harvested greater prairie-chickens. Neonicotinoid-treated seed consumption by wildlife was documented at levels that might produce sub-lethal effects on survival and reproduction, which could act over time to reduce populations. Our proposed research will evaluate the impact of neonicotinoid exposure on greater prairie-chickens to determine how neonicotinoid exposure relates to survival and reproductive success, key contributors to changes in population size. Importantly, prairie-chickens have declined over the last decade largely due to landscape-scale habitat loss. Multiple population stressors such as habitat loss, disease, and pesticides can compound to affect populations more than one factor acting alone. Understanding factors that contribute to the health and sustainability of wildlife populations is essential to long-term population management. Sustainable wild game populations are necessary to maintain Minnesota's hunting heritage and natural resources for all Minnesotans.

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.

Our previous research documented 71% of harvested prairie-chickens and 86% of spring samples from prairie-chicken mating-display grounds were positive for >1 neonicotinoid. We will relate neonicotinoid concentrations in prairie-chickens to hen survival, nest success, and brood survival. Because neonicotinoids are excreted and do not bioaccumulate in mammals and birds like other pesticides, a negative detection does not mean the animal was not exposed, it just means exposure was not recent. Thus, repeated samples will be collected from radio-marked prairie-chickens throughout the spring and summer to examine neonicotinoid exposure throughout nesting and brood-rearing to determine if females exposed to neonicotinoids have lower reproductive success.

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?

We know from our previous research that prairie-chickens are exposed to neonicotinoids in Minnesota. However, that earlier work did not determine whether these exposures translate to impacts at the population-level by impacting survival and reproduction. The work described in this proposal will help determine whether prairie-chickens are exposed to neonicotinoids at levels that could translate into larger population effects that could ultimately impact wildlife populations and the hunting opportunities that Minnesotans enjoy. This information is needed to manage and conserve wildlife populations in Minnesota.

Project Location

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

Region(s): NW

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: Capture and radio-mark greater prairie-chickens, collect samples, and monitor hen survival, nest success, and brood survival

Activity Budget: $129,648

Activity Description:
In the spring, we will capture hens in walk-in funnel traps. During capture, a few breast feathers and a fecal pellet sample will be collected. We will attach a transmitter so that we can monitor survival and movements of prairie-chickens throughout the breeding season. When a hen is repeatedly located at the same site over several days, we will determine her nest location. If a hen is located off the nest outside the usual incubation recess periods in the morning and early evening, we will approach the nest to determine whether the nest is still active or has failed. If the nest has failed, we will try to identify a cause of failure from evidence at the site. We will collect egg remains for neonicotinoid analysis of embryo tissues and for genetic confirmation of maternity by the incubating hen, to examine relationships between hen exposure and embryo exposure. When a nest is successful (>1 egg hatches), we will record egg hatching success, collect eggshell remains to determine eggshell thickness, and verify that the incubating hen laid all the eggs in the clutch using genetic techniques. We will attempt to get brood counts ~10 days to monitor brood survival.

Activity Milestones:

Description	Approximate Completion Date
Capture and radio-mark greater prairie-chickens	May 31, 2024
Monitor hen survival	August 31, 2024
Monitor nest and brood survival	August 31, 2024

Activity 2: Analyze samples for neonicotinoids

Activity Budget: $30,896

Activity Description:
We will ship samples to Southern Illinois University at Carbondale for analysis by Dr. Jia Liu. She will analyze samples for 5 neonicotinoids and 2 metabolites of imidacloprid. Concentrations of neonicotinoids and metabolites will be determined for comparisons among exposed and unexposed hens and also as a function of detected neonicotinoid concentrations and the number of exposures.

Activity Milestones:

Description	Approximate Completion Date
Ship samples	September 30, 2024
Receive results	June 30, 2025

Activity 3: Interpret results and disseminate

Activity Budget: $16,456

Activity Description:
We will analyze the relationship between neonicotinoid concentrations and hen fate, nest fate, and brood fate to determine if birds that have been exposed to neonicotinoids on 1 or more occasions have measurable differences in reproduction and survival metrics than birds that have not been exposed. We will interpret these results in the context of the current literature and prepare presentations, write reports and manuscripts for peer-reviewed publication.

Activity Milestones:

Description	Approximate Completion Date
Complete analysis	May 31, 2026
Write reports and disseminate information	June 30, 2026
Give presentations	June 30, 2026

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Jia Liu	Southern Illinois University Carbondale	Analyzing samples for neonicotinoids and aiding in interpretation for reports, manuscripts, presentations, and other methods of dissemination.	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.
We will develop a communications plan and engage the media and stakeholders. Peer-reviewed publications and research reports will be prepared and made available online. We will give presentations at professional conferences, to stakeholder groups, MNDNR staff, U.S. Environmental Protection Agency, and the Minnesota Prairie-chicken Society, and other stakeholder groups.

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?
This project will provide information on reproduction and survival or prairie-chickens in Minnesota. Prairie-chicken populations have declined over the past decade. Understanding how neonicotinoids affect their reproduction and survival will help to manage populations. Additional funding comes from the Minnesota DNR through a legislative appropriation that funds a much larger study involving other game species.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Natural Resource Technician		Conduct field work and collect and enter data during trapping season			0%	0.27		$12,320
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Natural Resource Technician		Conduct field work and collect and enter data during trapping season			0%	0.27		$12,320
Natural Resource Technician		Conduct field work and collect and enter data during trapping and monitoring periods			0%	0.4		$18,760
Natural Resource Technician		Conduct field work and collect and enter data during trapping and monitoring periods			0%	0.4		$18,760
							Sub Total	**$86,800**
Contracts and Services								
Southern Illinois University Carbondale	Sub award	Analysis of neonicotinoid samples				-		$30,000
							Sub Total	**$30,000**
Equipment, Tools, and Supplies								
	Tools and Supplies	Shipping	Shipping samples to lab at Southern Illinois University Carbondale					$396
	Tools and Supplies	Liquid nitrogen	For preserving samples while in the field					$500

							Sub Total	**$896**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	8 vehicles at 1500 miles per month for 3.25 months @$0.75 per mile	Conducting field work during March-June					$29,250
	Miles/ Meals/ Lodging	2 vehicles at 1500 miles per month for 1.75 months @ $0.75/mile	Conducting field work during July and August					$3,938
	Miles/ Meals/ Lodging	Meals for 2 people at $36/person/day for 30 days	Meals for 2 biologists in travel status to conduct field work in west-central and NW Minnesota					$2,160
	Miles/ Meals/ Lodging	Lodging for 2 people at $125/person/day for 30 days	Lodging for 2 biologists to do field work in west-central and NW Minnesota					$7,500
							Sub Total	**$42,848**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
							Sub Total	**-**
Other Expenses								
		Direct and Necessary Costs	HR Support, Safety Support, Financial Support, Communication Support, IT Support, Planning Support					$16,456
							Sub Total	**$16,456**
							Grand Total	**$177,000**

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				
In-Kind	Legislative Appropriation; Heritage Enhancement	Genetic analysis of samples to confirm maternity of young	Secured	$14,000
In-Kind	Minnesota Game and Fish Fund; Minn Statutes sec 97A.055, subd. 4b.	Charlotte Roy, 15% effort for 1 year	Secured	$12,980
In-Kind	Minnesota Game and Fish Fund	Support of sample analysis of prairie-chicken samples collected during 2021-2023	Secured	$99,390
In-Kind	Legislative Appropriation; Heritage Enhancement	Transmitters (GPS or cellular) to examine prairie-chicken landscape use	Secured	$120,000
			State Sub Total	**$246,370**
Non-State				
			Non State Sub Total	**-**
			Funds Total	**$246,370**

Attachments

Required Attachments

Visual Component

File: 02aa41cc-5d3.pdf

Alternate Text for Visual Component

Map depicting relative concentrations of neonicotinoids in prairie chickens in Minnesota. Photos of prairie chicken and typical seed spill with seeds coated in neonicotinoids....

Optional Attachments

Support Letter, Photos, Media, Other

Title	File
Background check form- signed	47678556-16a.pdf
Revised Research Addendum	57f9165b-d2b.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

We removed the deer portion of the proposal due to budget changes and peer review recommendations. We took the remaining Activity on prairie-chickens and split it into multiple activities that are consistent with the original proposed activity.

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