Environment and Natural Resources Trust Fund

M.L. 2020 Approved Work Plan

General Information

ID Number: 2020-087

Staff Lead: Becca Nash

Date this document submitted to LCCMR: August 27, 2021

Project Title: CWD Prion Research in Soils

Project Budget: $336,000

Project Manager Information

Name: Tiffany Wolf

Organization: U of MN - College of Veterinary Medicine

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Project Reporting

Date Work Plan Approved by LCCMR: August 26, 2021

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

Project Completion: June 30, 2023

Final Report Due Date: August 14, 2023

Legal Information

Legal Citation: M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 20a5

Appropriation Language: The appropriation in Laws 2019, First Special Session chapter 4, article 2, section 2, subdivision 8, paragraph (c), Sauk River Dam Removal and Rock Rapids Replacement, in the amount of $2,768,000, no longer needed for its original purpose is transferred as follows:

(5) $336,000 is transferred to the Board of Regents of the University of Minnesota to study chronic wasting disease prions in soils, including the assessment of sites where carcasses with chronic wasting disease have been disposed.

(d) Transfers and Availability
The transfers under this subdivision are effective June 30, 2021, and the transferred amounts are available until June 30, 2023.

Appropriation End Date: June 30, 2023

Narrative

Project Summary: The goal of this project is to advance research related to the contamination, persistence, and risk of transmission related to CWD prions in soil.

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

Chronic Wasting Disease is a contagious, 100% fatal neurological disease affecting deer. On 28 April 2021 our team was notified by the MN Department of Natural Resources (DNR) that deer carcasses originating from a CWD-positive deer farm in Beltrami County had been dumped on public land. Following a request from the DNR, we secured many samples, including bones, hides, soil cores, and plants from the location. Our Minnesota Center for Prion Research and Outreach (MNPRO) laboratory has RT-QuIC testing functionality, a highly advanced and sensitive prion detection assay that can be used for forensics research and environmental samples. We have completed an initial RT-QuIC analysis of select bone marrow and nervous tissues collected from the site and have identified at least two carcasses that are CWD positive. These results indicate CWD prions are at the dump site and have the potential to be transmitted to wild deer in the region through contact with the contaminated environment. An outbreak of CWD in wild white-tailed deer herds in northern Minnesota would negatively impact all deer related activities in the region, especially culturally and traditionally important recreational and subsistence hunting.

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.

CWD prions are resistant to degradation and can remain infectious in the environment for years. Therefore, it is critical that we determine the extent of CWD prion contamination across the Beltrami Co. carcass dump site to inform remediation and exclusion processes. In light of the positive carcass results, our team proposes to conduct soil sampling research to optimize RT-QuIC for prion detection in soil under different conditions with direct application to the Beltrami County farm associated dump site. These efforts will help: 1) to inform the DNR as to the distribution of CWD-causing prions at the site; 2) with devising key mitigation strategies aimed at preventing CWD from spreading to wild white-tailed deer herds within the region; and 3) to understand the ecology of CWD

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?

Specific outcomes of this project include: 1) the optimization of methods for prion detection in soils, under different conditions and of different compositions, which is critical to advancing future environmental research around CWD prion persistence, degradation, and remediation in Minnesota; and 2) a baseline seasonal survey of prion contamination in the soils of the Beltrami Co. carcass dumpsite to characterize the extent of prion contamination.

Project Location

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

County(s): Beltrami

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: Research and development for the detection of CWD prions in soil

Activity Budget: $168,000

Activity Description:
RT-QuIC is a CWD screening test that is capable of detecting prions in live and dead animals (including carcass remains), as well as the environment - samples such as plants, soil, and water. Yet environmental detection of prions using RT-QuIC technology is still early in its development. Given the complex matrices of soils, there is much to learn in regard to the optimization of RT-QuIC detection across soils with different mineral and organic content. In this project the MNPRO team will partner with the Pedersen Lab of University of Wisconsin - Madison, a leading laboratory in the study of prion binding, persistence, and transmission in soils, to study prion binding, detection, and transmission in a variety of different soil types and under different environmental conditions. This work will enhance our understanding of the persistence and transmission of CWD in the soil environment.

Activity Milestones:

Description	Completion Date
Development and optimization for CWD prion detection in soil by RT-QuIC in the MNPRO	January 31, 2022
Experimental study of CWD prion binding and detection across different soil types and compositions.	December 31, 2022
Development and submission of scientific manuscript summarizing project findings.	June 30, 2023

Activity 2: Characterize prions in soil at the Beltrami County farm dump site.

Activity Budget: $168,000

Activity Description:
CWD prions can remain infectious in the environment for years, binding to soil. Given that at least one CWD-positive was determined to have been dumped there, the Beltrami Co. dump site represents a clear risk as a possible source for CWD transmission from the environment into wild deer, even after the removal of carcass material. During our initial investigation of the Beltrami Farm dump site, our team secured soil samples from below carcasses and will continue sampling soil in and around these point locations of high risk seasonally over the next year. These samples incorporate both upland and lowland soils, which are important soil types relevant to northern MN. Experiments in Activity 1, will be informed by the soil composition of the Beltrami Co. dump site, such that following closely on the success of Activity 1, we will begin screening the Beltrami soil samples. The results of the soil screening from around the dump site will be added to an overall assessment of ecological risk, informing DNR efforts for ongoing environmental and biosurveillance as well as future remediation.

Activity Milestones:

Description	Completion Date
Characterize soil composition of the Beltrami Co. farm dump site to prioritize additional prion sampling	January 31, 2022
Screen soil samples from the Beltrami Co. farm dump site for CWD prions using RT-QuIC.	December 31, 2022
Prepare a risk assessment report of soil contamination of Beltrami dump site and future recommendations.	June 30, 2023

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Joel Pederson	University of Wisconsin	Collaborator	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.
The environmental dimension of CWD transmission is a critical area for CWD research. This unique project, combining forensics and environmental assessments, is a first of its kind. The methods and approach taken will be of broad interest to those tasked with characterizing the potential risks associated with CWD-positive carcasses left on the landscape, and the findings critical to the work of our own state and tribal agencies in protecting our wild deer herds and the surrounding ecosystem. Findings will be shared directly with state and tribal agencies (MN DNR, MN Board of Animal Health, MN Pollution Control Agency, Leech Lake Band of Ojibwe, Red Lake Band of Chippewa, White Earth Nation) through project reports. We will also use the following opportunities to share methods and findings more broadly:

1) dissemination via the MNPRO website: https://mnpro.umn.edu/
2) presentation at local, regional, and national scientific, management, and public/stakeholder meetings
3) publication of findings in peer-reviewed scientific (e.g. Science of the Total Environment) and professional journals (e.g. The Wildlife Professional)
4) dissemination to the media via press releases and UMN Research Briefs
5) testimonials to LCCMR and other policy platforms

The Minnesota Environment and Natural Resources Trust Fund (ENRTF) will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the ENRTF Acknowledgement 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?
The environmental dimension of CWD transmission is a critical area for CWD research. This unique project, combining forensics and environmental assessments, is a first of its kind. The methods and approach taken will be of broad interest and lay a strong foundation for future hypothesis-driven research related to prion contamination, persistence, degradation and remediation. The Beltrami Co. dump site itself, depending on results produced from this project, has the potential to become a long-term environmental prion research demonstration site. Thus, the results from this project will be leveraged for funding from federal agencies, including USDA, USFWS, and NSF.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Assistant Professor		Two assistant professors will serve in the role of Primary Investigator (Project manager) and Co-PI to manage the project and guide research.			33.5%	0.34		$59,304
MNPRO Researcher 4		Protein scientist will perform all lab analyses of soil for prion detection.			33.5%	2		$175,286
Student researchers		Student researchers will facilitate data collection and analysis			0%	0.26		$8,400
							Sub Total	**$242,990**
Contracts and Services								
Joel Pedersen, University of WI	Sub award	Collaborative sample testing, and assistance in R&D related to application of RT-QuIC to soil samples				0.22		$35,000
							Sub Total	**$35,000**
Equipment, Tools, and Supplies								
	Tools and Supplies	Soil sampling and analysis supplies	Expenses include consumables and other supplies needed for transect surveys, soil sampling, and laboratory testing.					$32,010
	Tools and Supplies	Recombinant protein production	Expenses related to the production of protein substrate needed for RT-QuIC reactions.					$12,000
							Sub Total	**$44,010**
Capital Expenditures								
							Sub Total	**-**

Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	*Lodging $96/night, M&E at $46/day for teams of 5, $42/day 2 vehicles rental, for ~4, 3-day trips of 500mi roundtrip each.	Travel between UMN and Beltrami Co. farm for sampling purposes.					$9,000
							Sub Total	**$9,000**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
	Publication	Publication costs range $2-3,000 per manuscript; we anticipate the publication of 2-3 manuscripts from this original research.	Publication will allow broad dissemination of research results to the scientific community to build on our findings.					$5,000
							Sub Total	**$5,000**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$336,000**

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: 3d93bd9c-390.docx

Alternate Text for Visual Component

The visual graphic contains a map of the Beltrami County carcass dumpsite and summarizes project goals and outcomes....

Optional Attachments

Support Letter or Other

Title	File
Background Check Certification Form	947c3154-a14.pdf
Regents of University of Minnesota Support Letter	782d1a40-691.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

NA

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?

Yes

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

Yes

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

No

Does your project include original, hypothesis-driven research?

Yes

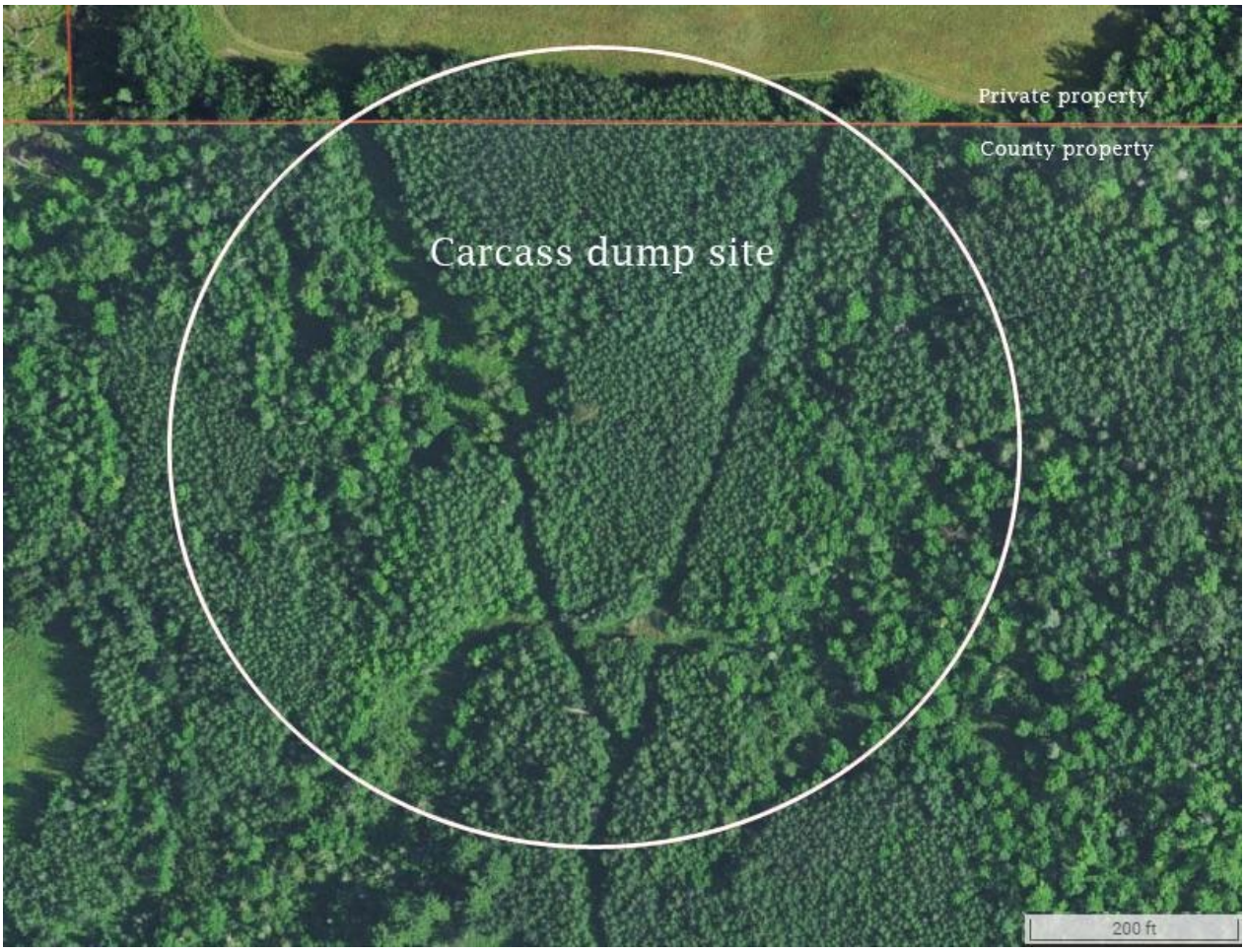
Does the organization have a fiscal agent for this project?

Yes, Sponsored Projects Administration

Investigation of CWD prions in soil

Concerns

In April 2021, a deer carcass dumpsite was discovered on Beltrami County property in proximity to and in conjunction with a chronic wasting disease (CWD) positive farm. Remains from multiple deer were collected across an area of 10 -15 acres. Our Minnesota Center for Prion Research and Outreach (MNPRO) laboratory has begun to test remains for



CWD prions and has discovered positive samples, indicating CWD prions are at the dump site.

Project goals

- Conduct soil sampling research in conjunction with the dump site and associated farm
- Understand the ecology of CWD in an environment such as the study area

College of Veterinary Medicine

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Dr. Peter Larsen, plarsen@umn.edu
Marc Schwabenlander, schwa239@umn.edu

Investigation of CWD prions in soil

- Inform state agencies of CWD prion distribution and potential management strategies

Project outcomes

- Develop and optimize RT -QuIC soil testing protocols and scr een study area soil samples
- Characterize study area soil types and understand prion interactions with soil types
- Provide a risk assessment with future monitoring and remediation recommendations

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