Environment and Natural Resources Trust Fund
2018 Request for Proposals (RFP)

Project Title: **ENRTF ID: 007-A**

Deer Movement Related to potential CWD Prion Transmission

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: $ 552,456

Proposed Project Time Period for the Funding Requested: 3 years, July 2018 to June 2021

Summary:

Movement ecology of white-tailed deer in southeastern Minnesota as related to chronic wasting disease prion transmission. DNR will radiocollar deer to evaluate deer movements and disease transmission potential.

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Sponsoring Organization: MN DNR

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Forest Lake MN 55025

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Web Address

Location

Region: Southeast

County Name: Fillmore, Goodhue, Houston, Wabasha

City / Township:

Alternate Text for Visual:

Map of the southeastern Minnesota showing the disease management area (dark gray) and study area (crosshatched area)

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____%

PROJECT TITLE: Movement ecology of white-tailed deer and potential prion transmission related to a chronic wasting disease outbreak in southeastern Minnesota

I. PROJECT STATEMENT

We were awarded $350,000 from the M.L., Chp. 76, Sec. 2, Subd. 10 "Emerging Issues Account" from the Environment and Natural Resources Trust Fund to investigate dispersal patterns and movements of white-tailed deer in southeastern Minnesota. This work will inform our understanding of dispersal and movement patterns of deer around the chronic wasting disease management zone, permitting a much improved chance of successfully managing the threat of CWD in wild deer through science-informed surveillance and management efforts. We request additional funding to more fully characterize deer dispersal movements because there is annual variability driven in part by weather patterns beyond our control that will influence movement processes. Multi-year funding will permit examination of valuable annual replicates of these dispersal patterns.

In November 2016, MNDNR discovered chronic wasting disease (CWD) in wild white-tailed deer of southeastern Minnesota. We propose to extend our study of deer movement ecology in southeastern Minnesota around the chronic wasting disease (CWD) management area. Limited information exists about deer contact rates and their relationship to transmission rates, especially in areas recently infected. The presumed main driver of spatial spread among wild deer is movement. Currently, there is no research that demonstrates the extent to which potentially infected deer move across the landscape and interact with each other in southeastern Minnesota.

Deer behavior and movements vary by biological and environmental conditions, along with deer population demographics and social structure. Two types of movement likely facilitate disease spread across the landscape, recurrent seasonal movements and one-time dispersal or foray events. The most substantial long-distance movements involve dispersal from birth to adult ranges, most likely to occur in 1-year-old deer. Because deer densities can be altered by management actions, a better understanding of both deer density and movement tendencies related to density will enhance our ability to effectively manage disease risk in the Minnesota deer population. This research is also particularly important due to the increased risk of disease spread from Wisconsin and Iowa as the findings will help the MNDNR understand those risk factors as well.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Dispersal patterns and movements of GPS-collared deer **Budget: $279,250**

Deer (7-8 months old) will be captured and fitted with GPS collars to collect multiple daily locations for up to 3 years. We will estimate seasonal and annual home ranges, and dispersal movements during biologically critical time periods of the year; namely spring, fall, and winter. Collars will be programmed seasonally to identify precise movements from natal range and emigrations to new ranges. This data will inform estimation of activity ranges, dispersal distances, and dispersal corridors to be used in modeling likely paths of CWD landscape spread.

Outcomes of Activity 1	Completion Date
1. Capture and radiocollar 60 deer.	03/31/2019
2. Capture and radiocollar 60 deer.	03/31/2020
3. Analyze location data to determine movements and home ranges.	03/31/2021
4. Report findings in research summaries and peer-reviewed publications.	06/30/2021

Activity 2: CWD spatial pathways mapping and cause-specific mortality rates **Budget: $245,000**

We will quantify GIS land cover data, temporal covariates, and deer density and demographic information for southeastern Minnesota in order to temporally relate deer resource use and movement tendencies with landscape features and population demographics. We will produce a deer movement propensity map stratified by age and sex cohort, which will be used in directing future CWD surveillance and management efforts.

Outcomes of Activity 2	Completion Date
1. Collect and characterize GIS files and temporal data used to model mortality rates	12/31/2019
2. Construct and refine movement models using deer location data	12/31/2020
3. Construct CWD spatial pathway map and estimate cause-specific mortality rates	12/31/2020
4. Report findings in research summaries and peer-reviewed publications	06/30/2021

Activity 3: Estimate deer-to-deer contact rates **Budget: $28,206**

We will fit yearling and adult deer with collar cameras to estimate deer-to-deer seasonal contact rates. We will place twenty remote camera traps within the study area stratified by land cover type to augment information on deer contact rates. Together these data will be used to estimate an index to infectious deer contact rate, critical to inform infectious disease models, for predicting CWD risk to deer cohorts in space and time.

Outcomes of Activity 3	Completion Date
1. Place remote camera traps on landscape	03/31/2019
2. Outfit GPS collar-cameras and apply to randomly selected captured deer	03/31/2019
3. Estimate contact rate index	12/31/2020
4. Report findings in research summaries and peer-reviewed publications	06/30/2021

III. PROJECT STRATEGY

A. Project Team/Partners

- Chris Jennelle, PhD, MNDNR Wildlife Health Research Scientist - project manager, co-PI. Study designer, oversight of project, statistical analysis, and report/manuscript writing
- Andrew Norton, PhD, MNDNR Ungulate Research Scientist – co-PI. Study designer, technology evaluation/equipment purchasing, statistical analysis, and report/manuscript writing
- Michelle Carstensen, PhD, MNDNR Wildlife Health Program Supervisor – collaborator. Providing technical guidance, study design assistance, and other in-kind support
- Lou Cornicelli, PhD, MNDNR Wildlife Research Manager – collaborator. Providing logistical support, contract administration, and other in-kind support

B. Project Impact and Long-Term Strategy

The products of this research will have national and international significance by providing critical information on movements related to CWD prion transmission to new areas. These data will inform future surveillance and management strategies related to white-tailed deer; a $500,000,000 annual resource in Minnesota. In addition, we will collect survival information used to inform population models.

C. Timeline Requirements

The full length the LCCMR-funded study is 5 years (2017 – 2021) from planning to final reporting of results. Emerging issues account funding from 2017 will initiate this project. Additional funding is needed to maintain an adequate sample of collared deer to address the research questions. Capture of deer is weather dependent and will occur starting in January 2018, using secured emerging issues funds. Deer capture will occur in subsequent years to maintain a sample size of at least 115 GPS collared animals. Data collection via GPS collars will be on-going for the length of the project. Final data analysis and reporting will be completed by June 2021.

2018 Detailed Project Budget

Project Title: Movement ecology of white-tailed deer and potential prion transmission related to a chronic wasting disease outbreak in southeastern Minnesota

IV. TOTAL ENRTF REQUEST BUDGET - 3 **years**

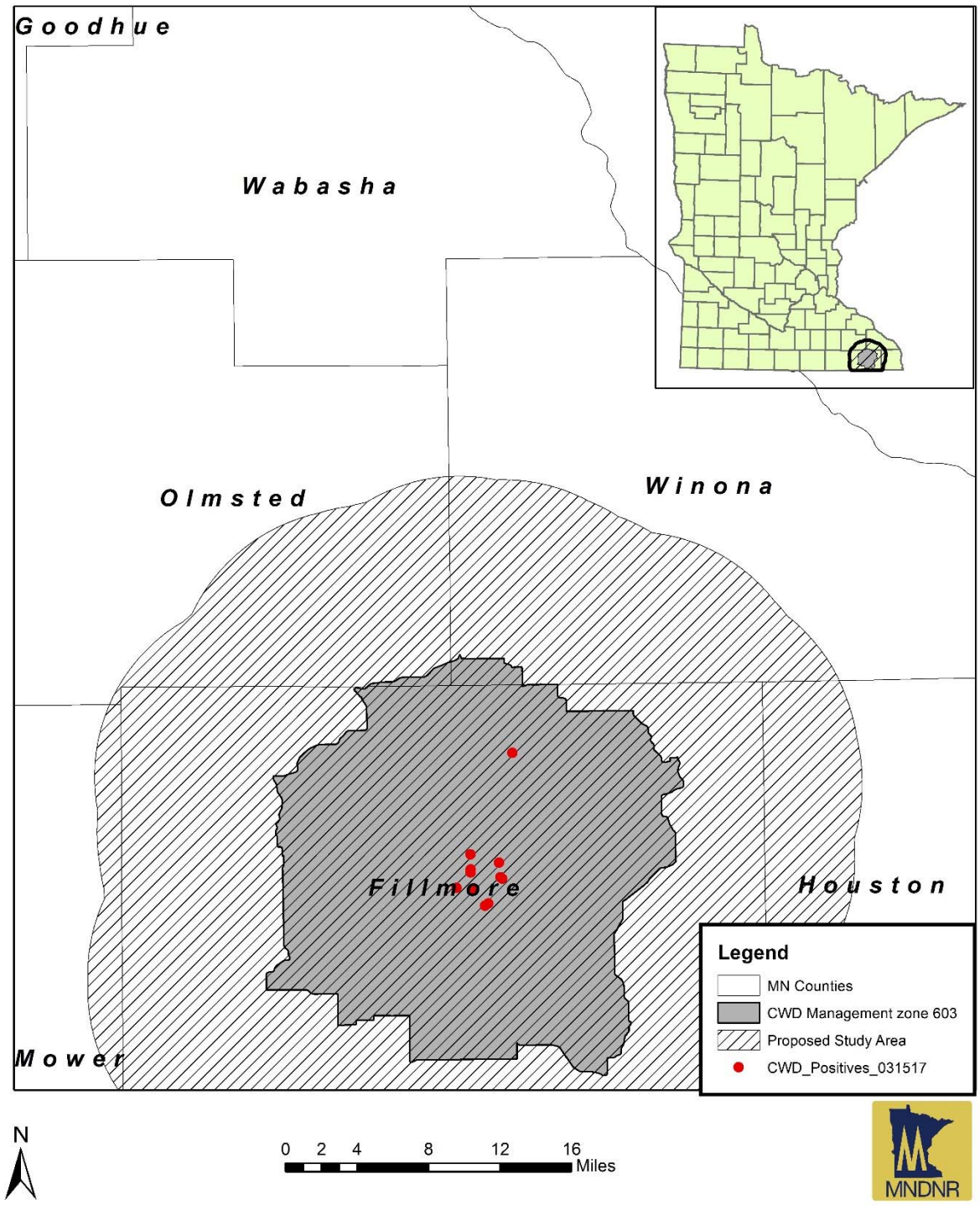
BUDGET ITEM	AMOUNT
Personnel:	**$50,000**
Natural Resource Specialist I (50% FTE) - 2 years	$50,000
Professional/Technical/Service Contracts:	**$222,000**
RFP - Wildlife helicopter capture company (to be determined): Deer capture and handling (60 deer @ 600/deer x 2 years)	$72,000
Iridium satellite deer data acquisition: transmission of locations and mortality messages ($500/year/deer for 2 years)	$150,000
Equipment/Tools/Supplies:	**$218,206**
RFP - GPS deer collars (60 @ $1,500/each); collect location data and mortality notifications	$180,000
RFP - GPS deer collars with camera to estimate contact rates (6 @ $4701/each)	$28,206
Capture and monitoring supplies (GPS units, trail cameras for array)	$10,000
Travel:	**$35,000**
Seasonal vehicle leases through MNDNR, travel to study area by deer project management staff and technician (fleet @$0.55/mi, estimated 30,000 miles)	$25,000
Meals and per diem for deer project management staff and tenchician	$10,000
Additional Budget Items:	**$27,250**
Spotter plane to be used during capture efforts (40 hours@ $250/hr) x 2 years	$20,000
* Direct and Necessary expenses: HR Support (~$1,485), Safety Support (~$341), Financial Support (~$8), Communications Support (~$1,271), IT Support (~$3,074), and Planning Support (~$1,072) necessary to accomplish funded programs/projects	$7,250
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST	**$ 552,456**

* Direct and Necessary expenses include Department Support Services (Human Resources, IT Support, Safety, Financial Support, Communications Support, and Planning Support). Department Support Services are described in the agency Service Level Agreement and billed internally to divisions based on rates that have been developed for each area of service. These services are directly related to and necessary for the appropriation. Department leadership services (Commisioner's Office and Regional Directors) are not assessed. Those elements of individual projects that put little or no demand on support services such as large single-source contracts, large land acquisistions, and funds that are passed through to other entities are not assessed Direct and Necessary costs for those activities.

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ To Be Applied To Project During Project Period:	$ -	N/A
Other State $ To Be Applied To Project During Project Period:	$ -	N/A
In-kind Services To Be Applied To Project During Project Period: MNDNR Wildlife Health Group, Farmland Populations and Research Group: multiple employee; project management, field work,data analyses, reporting of results, 36 months, 20% effort	$ 114,000	Secured
Past and Current ENRTF Appropriation: We have been awarded $350,000 from the M.L., Chp. 76, Sec. 2, Subd. 10 “Emerging Issues Account” from the Environment and Natural Resources Trust Fund emerging issues ENTRF funding (2017) to investigate white-tailed deer dispersal and seasonal home ranges in southeastern Minnesota. We have not spent any funds.	$ 350,000	Unspent
Other Funding History:	$ -	N/A

Study Area


Goodhue
Wabasha
Olmsted
Winona
Fillmore
Houston
Mower
Legend
MN Counties
CWD Management zone 603
Proposed Study Area
CWD_Positives_031517
N
0 2 4 8 12 16
Miles
MNDNR

Chris Jennelle, PhD, Project manager, co-investigator, is a wildlife disease expert and Research Scientist with the Minnesota Department of Natural Resources. He has a Ph.D. from Cornell University in wildlife disease ecology and has investigated chronic wasting disease transmission dynamics and advanced surveillance methodology for 10 years. He has a strong quantitative background (disease modeling, parameter estimation, study design, survey methodology) and a proven scientific track record with 18 peer-reviewed publications. He is a co-designer of the proposed research project, and will contribute to data management, analysis, and publication of scientific results.

Andrew Norton, PhD, co-investigator, is an Ungulate Research Scientist with the Farmland Wildlife Populations and Research Group at the Minnesota Department of Natural Resources. He has a Ph.D from the University of Wisconsin-Madison in wildlife and quantitative ecology. His background is related to the collection of field data and development of analytical techniques used to estimate and evaluate wildlife population parameters related to cause-specific mortality, reproduction, movement, and abundance. Specifically, his research interests relate to understanding sensitivity and robustness of both population models and population dynamics of game species used to inform science-based management decisions.

Michelle Carstensen, PhD, collaborator, is a wildlife disease expert and Wildlife Health Program Supervisor with the Minnesota Department of Natural Resources. She has a Ph.D. from the University of Minnesota in white-tailed deer ecology and has designed and implemented chronic wasting disease surveillance efforts in Minnesota for 13 years. She has extensive experience with GPS collar technology, capture of large ungulates, and study design. She is a co-designer of the proposed research project, and will contribute to data management, analysis, and publication of scientific results.

Lou Cornicelli, PhD, collaborator, is the Wildlife Research Manager for the Minnesota Department of Natural Resources. He has a Ph.D. from the University of Minnesota in Natural Resources Science and Management. His background has mostly involved researching and managing large ungulates, particularly white-tailed deer, elk, and moose. His research interests are ungulate population ecology, wildlife disease ecology, and the sociological aspects of managing wildlife populations for the public benefit.

The Minnesota Department of Natural Resources (DNR) is the state agency charged with managing the state's wildlife resources for the benefit of the public. Research provides foundational information that allows Agency staff to make sound science-based decisions. The mission of the Minnesota DNR is to work with citizens to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life.