Environment and Natural Resources Trust Fund

M.L. 2023 Draft Work Plan

General Information

ID Number: 2023-169

Staff Lead: Mike Campana

Date this document submitted to LCCMR: December 27, 2022

Project Title: Efficacy of Urban Archery Hunting to Manage Deer

Project Budget: $393,000

Project Manager Information

Name: Jacob Haus

Organization: Minnesota State Colleges and Universities - Bemidji State University

Office Telephone: (218) 755-4372

Email: jacob.haus@bemidjistate.edu

Web Address: https://www.bemidjistate.edu/

Project Reporting

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

Project Completion: March 31, 2026

Final Report Due Date: May 15, 2026

Legal Information

Legal Citation:

Appropriation Language:

Appropriation End Date: June 30, 2026

Narrative

Project Summary: Several municipalities across Minnesota conduct special deer hunts within city-limits, but the efficacy is unknown. An analysis of deer survival and habitat use will improve management practices in these regions.

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

Deer population within urbanized areas cause substantial socioeconomic burdens to municipalities. Overabundant deer populations result in greater rates of deer-vehicle collisions, landscape damage, and increased risk of disease transmission (e.g., Lyme Disease, CWD). Urban deer are difficult to manage as anthropogenic food sources can maintain artificially high population densities, and management practices such as a firearm hunting cannot be safely conducted. Many municipalities throughout Minnesota utilize 'special city archery hunts' that allow for more liberalized harvest regulations than during regular archery seasons. The Bemidji City Council formed the Deer Management Committee in 2005 to operate special archery hunts within 3 city districts to limit negative impacts from overabundant deer populations for city residents. The hunt has removed 478 deer from within city limits since implementation, with greater rates of harvest in more recent years. Annual spotlight surveys suggest deer populations are increasing within all 3 districts however. Deer may alter their behavior or movement in response to hunting pressure, or the number of deer harvested may simply be inadequate to prevent population growth. Special archery hunts may be able to manage urban deer populations, but more research is needed to evaluate the factors affecting their efficacy.

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.

During the winter (January – March) of 2024 and 2025, we will live-capture a total of 40-50 adult female deer within city limits and affix individuals with GPS collars. Collars will provide information on both deer behavioral response to the city hunt as well as mortality data. Annual mortality rate of adult females is the most influential driver of deer population growth, and deer abundance is best managed by adjusting harvest rates of adult females. We will estimate overall rate of mortality as well as mortality due to harvest inside city limits, harvest outside city limits, wounding loss, vehicle collision, and natural causes. We will track the number of special hunt permits issued, hunter effort, and spatial distribution of hunting pressure using both mandatory logs submitted by hunters at the end of the season as well as small GPS units with participating hunters.

Collars on deer will be programmed to record a GPS location fix on individual deer every 30 minutes from 1 August to 31 January each year. We will examine changes in deer behavior in response to the city hunt using resource selection functions before, during, and after the hunting season.

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?

Most research involving urban deer management evaluates human attitudes towards deer and options for non-lethal management. Minnesota is unique in that support of regulated lethal deer management is strong among suburban residents, but there is a paucity of guidelines for effective suburban archery hunting programs. This research will develop best management practices for special city archery hunts, including the spatial distribution of hunting pressure, harvest objectives, and the necessary number of issued permits to achieve management objectives. The guidelines established during this research can be implemented to improve harvest management the special archery hunts throughout the State.

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, collar, and monitor adult female white-tailed deer within Bemidji city limits

Activity Budget: $285,000

Activity Description:
We will capture deer using 25'×25' drop nets and netted Clover traps throughout Bemidji City limits between 1 January and 31 March in both 2024 and 2025. We will chemically immobilize deer before removing them from the trap and affixing GPS collars and uniquely identifiable ear tags. Capture locations will be representative of the available habitats within city limits, and we will select locations that prioritize animal safety during the capture process. Deer will be monitored for 2 years or until the conclusion of the study (12-31-2025), with collars recording a GPS location every 30 minutes. At the conclusion of the study, any remaining collars will be removed from the study animals via a remote break-off mechanism in the collar. We will inform participants of the special city hunt that all collared animals are available for harvest, and the presence of the collar should not influence their harvest decisions.

Outcome: Capture 40-50 study animals in total during 2 winter capture periods (2024 and 2025). Monitor deer through the 2025 hunting season to collect data for Activity 2.

Activity Milestones:

Description	Approximate Completion Date
Identify suitable areas for deer capture within city limits.	November 30, 2023
Conduct capture efforts during winter 2024, with the goal of 25 deployed collars.	March 31, 2024
Conduct capture efforts during winter 2025, with the goal of 25 deployed collars.	March 31, 2025
Collect movement and survival data from collared deer for 1 year or until project termination.	December 31, 2025

Activity 2: Estimate cause-specific mortality rates for monitored deer and determine shifts in habitat use in response to the city hunt

Activity Budget: $82,000

Activity Description:
We will use survival data to determine the percentage of deer being removed from the population through harvest, wounding loss, vehicle collision, and disease, as well as the percentage of deer surviving to the next year. To examine habitat use during the hunt, we will model resource selection using landscape variables (e.g., distance to road, distance to building, percent wetland cover, percent forest cover, ect.) for both day and night time locations before, during, and after the hunting season.

The distribution of hunting pressure through time and space will also be quantified using small GPS location loggers provided to participating hunters. GPS loggers will be activated by pressing a single on/off button before and after each hunt, and will internally store location data. Information on hunting pressure will be included in the analysis of deer movement and survival.

Formal analysis will begin upon the completion of the first hunting season (12/31/24). Databases and statistical models will be updated through the completion of the second hunting season (12/31/25).

Outcome: Determine what percentage of adult females must be removed via harvest to control population growth, and how to most effectively achieve sufficient rates of harvest.

Activity Milestones:

Description	Approximate Completion Date
Analyze rates of deer harvest and mortality in relation to permits issued to hunters.	December 31, 2025
Quantify the habitat use of deer in response to hunting pressure.	December 31, 2025
Record hunter locations via GPS units to estimate the distribution of hunting pressure	December 31, 2025

Activity 3: Identify management practices that effectively control deer population within urban areas using special archery hunts

Activity Budget: $26,000

Activity Description:
Findings from Activity 2 will be integrated with existing, separately collected data from hunter observation logs and harvest reports. We will use the results of this research to develop recommendation for cities planning to implement or continue suburban archery hunting programs. Guidelines will include minimum hunter density and distribution, numbers of allotted tags per hunter, and priority habitats to target during management efforts.

Outcome: Develop guidelines for effective urban deer archery hunts in Minnesota. Dissemination through professional conferences, student thesis, scientific publications, and a publicly available report to city council with management recommendation applicable to other cities and municipalities.

Activity Milestones:

Description	Approximate Completion Date
Provide report to Bemidji City Council with broadly applicable management recommendations.	February 28, 2026
Provide guidelines to regional and state wildlife managers through professional outlets (conferences, publications, etc.)	March 31, 2026
Draft and submit manuscripts of research findings to peer-reviewed scientific journals.	March 31, 2026

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Brian Hiller	Bemidji State University	Dr. Hiller has collected much of the preliminary data on deer density within Bemidji city limits and will continue to cooperate with Dr. Haus regarding the design and execution of the research project.	No
Deer Management Committee	Bemidji City Council	The Deer Management Committee has coordinated the special city archery hunt on behalf of the Bemidji City Council for 15 years. The committee will continue to issue permits, register harvested deer, and record information on hunter permits and hunting locations.	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.
To the professional audience, preliminary findings and recommendations from the project will be disseminated at several wildlife management conferences within the state, including oral and poster presentations. Final results will be prepared in a graduate student thesis at Bemidji State University and submitted to peer-reviewed science journals for publication. For a more general audience and local municipal administrators, project results will be disseminated via a written report to the Bemidji City Council including an executive summary, detailed description of the data and findings, and applicable management recommendations. The report will be made publicly available on the city website and will include general recommendations applicable to other municipalities managing similar controlled archery hunts. The project manager and graduate student will pursue and accept any invitations for media and outreach engagement both within and beyond the Bemidji area. The Environment and Natural Resources Trust Fund will be acknowledged on all communication material through use of the trust fund logo or attribution language on project print and electronic media, publications, and signage.

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?
There are 28 cities and municipalities throughout Minnesota conducting special archery hunts, including several cities attempting to manage CWD outbreaks. Many additional cities experience negative impacts of overabundant deer populations but do not have the infrastructure to design an effective management program from the ground up. Based on the results of this research, we will develop recommendations for urban archery hunting best management practices. Cities across the state will be able to utilize the results of this research to improve the efficacy of their deer management efforts. The project will require no additional work or funding beyond the proposed timeline.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Graduate Research Assistant		Data collection, analysis, writing			13%	2.5		$78,813
Haus Principle Investigator		Manage, analyze data, write, outreach			20%	0.24		$19,673
Technician support		Seasonal employees to assist graduate student with winter field work			13%	2		$51,415
Undergraduate Research Assistant		Assist graduate student with equipment aquasition, maintenance, and field work			0%	1		$22,600
Hiller Co-Investigator		Manage, write, outreach			20%	0.1		$9,600
							Sub Total	**$182,101**
Contracts and Services								
GPS collar manufacturer	Professional or Technical Service Contract	Deployed GPS collars require a monthly service fee with manufacturer in order to receive data. We are budgeting 30/month/deployed collar.				-		$18,000
							Sub Total	**$18,000**
Equipment, Tools, and Supplies								
	Equipment	GPS collars (35x) at $3250 per unit	Collars to collect data on deer movement and survival					$113,750
	Equipment	Telemetry receivers (3) and antennas (4)	Equipment used to track and relocate GPS collars					$2,100
	Equipment	Equipment to capture deer	drop nets (4x) at $4250 per; clover traps (5x) at $1000 per, pharmaceuticals (55x doses) at $75 per					$26,125
	Tools and Supplies	Supplies to capture deer	Miscellaneous capture supplies (syringes, needles, ear tags, tag					$10,124

			applicators, tool boxes, shelled corn, etc.)					
	Equipment	GPS loggers to track hunters (80x) @ $100 per	Small GPS units provided to hunters to carry on their person while hunting					$8,000
							Sub Total	**$160,099**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	Field travel to, from, and within study sites; miles (40,000 miles at 0.58/mile)	Travel during field research activities; travel to check and set traps 2x/day; travel to obtain field equipment and supplies; travel to monitor collared deer. Based on an estimated distance of 45 miles/day total between grad student and technicians for the duration of the study period.					$23,200
	Conference Registration Miles/ Meals/ Lodging	Registration, travel, lodging, and food for 2 people to attend 2 professional conferences	Travel for graduate student and undergraduate researcher to attend 2 conferences in Minnesota and present results of research	X				$6,000
							Sub Total	**$29,200**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
	Publication	Publication charges for 2 research manuscripts at $1800 per	To publish results in peer-reviewed journals available to the scientific community					$3,600
							Sub Total	**$3,600**

Other Expenses								
							Sub Total	**-**
							Grand Total	**$393,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Travel In Minnesota	Conference Registration Miles/Meals/Lodging	Registration, travel, lodging, and food for 2 people to attend 2 professional conferences	Attendance to the conferences will involve student presentations and formal dissemination of the project results.

Non ENRTF Funds

Category	Specific Source	Use	Status	$ Amount
State				
			State Sub Total	**-**
Non-State				
In-Kind	Bemidji State University	Bemidji State University will provide indirect cost (12%) as in-kind support.	Secured	$47,160
In-Kind	Bemidji State University Wildlife Research Program	Dr. Haus will provide trail cameras (30), telemetry receivers (4), antennas (3), GPS units (2), and other miscellaneous field supplies as in-kind support.	Secured	$20,000
			Non State Sub Total	**$67,160**
			Funds Total	**$67,160**

Attachments

Required Attachments

Visual Component

File: 46e0a881-8fa.pdf

Alternate Text for Visual Component

Title reads “City of Bemidji Deer Spotlight Surveys”. The image shows a graph of increasing estimated deer density over 5 years using spotlight surveys and distance sampling analysis. The x-axis includes a range of years from 2016 to 2019. The y-axis is deer density expressed in deer per square mile....

Optional Attachments

Support Letter or Other

Title	File
Background check certification	4b0358d0-5a3.pdf
Research Addendum	de851341-24a.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

Approved research addendum added

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