

**Environment and Natural Resources Trust Fund**

# 2021 Request for Proposal

## **General Information**

**Proposal ID:** 2021-104

**Proposal Title:** Habitat Use and Recruitment Rates in Exurban Wolves

## **Project Manager Information**

**Name:** Jacob Haus

**Organization:** Minnesota State Colleges and Universities - Bemidji State University

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## **Project Basic Information**

**Project Summary:** This project will investigate wolf resource selection, home range size, pack interactions, and population dynamics within an agriculturally fragmented exurban landscape with high potential for human-wolf conflict.

**Funds Requested:** $263,000

**Proposed Project Completion:** 2024-01-31

**LCCMR Funding Category:** Foundational Natural Resource Data and Information (A)

## **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

## **Narrative**

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

The presence and management of wolves in Minnesota has been divisive and controversial. Issues related to human-wolf conflict, including livestock depredation, a perceived reduction in hunting opportunities, and a perceived risk to humans and domestic pets all influence population management. Within Minnesota, research into wolf behavior, habitat use, and population dynamics has mostly occurred in the northeast and north-central regions of the state, which consist primarily of rural wilderness areas with limited human development. Expansions of the primary wolf range over the last several decades has increasingly included regions with agriculturally fragmented landscapes and exurban development, however a paucity of information exists concerning how wolves utilize resources on these landscapes. As part of a pilot study, we captured and placed a GPS collar on an adult male 5km outside the city limits of Bemidji, MN (Pop. 15,500) in July 2019. The home range extended from the edge of Bemidji city limits to include the entirety of Cass Lake, MN (Pop. 800; figure 1). Location data suggested the wolf regularly utilized anthropogenic resources, including residential yards. An understanding of wolf resource use and population dynamics within human dominated landscapes is necessary to minimize human-wolf conflict, but data are currently lacking.

**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.**

We plan to capture and place GPS collars on a minimum of 10 adult wolves, in 8 distinct packs, over 2 years. (1 July 2021 – 30 June 2023). Capture activities will occur within 25 km of Bemidji city limits. We will record a location fix on each individual every 4 hours for a minimum of 1 year. We will use mixed-effect resource selection functions to quantify how the use of agricultural and residential areas by wolves varies as a function of human development (e.g., road and housing density, land cover type). Additionally, we will use GPS location data to identify den sites and place expandable very-high frequency collars on 20 neonate wolves shortly after birth. We will estimate home range sizes and mortality rates on an annual and seasonal basis for both adult and juvenile wolves.

**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?**

This project will identify patterns in wolf selection or avoidance of resources associated with human activity, as well as examine population dynamics among both adult and juvenile age classes in more human dominated landscapes. Results of this study will be used to optimize state and federal wolf management practices, identify high-risk areas for wolf-human conflict, and to inform future harvest regulations and quotas. The Minnesota Department of Natural Resources will also use findings from this study related to wolf pack and territory size to update their estimate of statewide population abundance.

## **Activities and Milestones**

### **Activity 1: Examine adult wolf resource selection in response to human development and agriculture**

**Activity Budget:** $140,950

**Activity Description:**The amount of developed land cover is variable throughout the range of wolves in northern Minnesota, and wolf use of habitats and resources likely varies as a function of development. We will evaluate how wolves utilize their habitat in regions where human development is common and potential for wolf human conflict is high. Additionally, we will examine home range sizes and pack composition within a human dominated landscapes, which are important parameters used by the Minnesota DNR to estimate wolf density.

**Activity Milestones:**

|  |  |
| --- | --- |
| **Description** | **Completion Date** |
| Complete first year of adult wolf capture and monitoring | 2022-06-30 |
| Complete second year of adult wolf capture and monitoring | 2023-06-30 |
| Analyze habitat selection and provide management recommendations | 2024-01-31 |

### **Activity 2: Examine juvenile wolf survival, recruitment, and movement as a function of human development.**

**Activity Budget:** $122,050

**Activity Description:**Pup survival and recruitment are the primary factors driving wolf population dynamics, but are poorly understood. Sources of mortality are likely variable across habitats and land cover types. We will examine the primary sources of mortality among juvenile wolves during the first year of their life, with a focus on the influence of human development on survival rates.

**Activity Milestones:**

|  |  |
| --- | --- |
| **Description** | **Completion Date** |
| Initiate year 1 juvenile capture and monitoring activities | 2022-04-30 |
| Initiate year 2 juvenile capture and monitoring activities | 2023-04-30 |
| Analyze juvenile survival and movement and provide management recommendation | 2024-01-31 |

## **Project Partners and Collaborators**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Organization** | **Role** | **Receiving Funds** |
| Brian Hiller | Bemidji State University | Dr. Brian Hiller is a professor of wildlife biology at Bemidji State University and will serve as co-principle investigator on the project. He has previously managed a state-funded research project in the greater Bemidji area involving wolf capture and monitoring. | Yes |

## **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?**Although 2 years of funding are requested, this project is intended to initiate a comprehensive, long-term (5-7 year) study in the Bemidji region to further explore wolf ecology and management in the context of human development and habitat fragmentation. Data collection and analysis from animals included in this research will extend beyond 2.5 years, and future research objectives will be funded through additional external grant proposals. The data collected will add to the Minnesota Department of Natural Resources long-term dataset and knowledge of wolf ecology throughout the state.

## **Project Manager and Organization Qualifications**

**Project Manager Name:** Jacob Haus

**Job Title:** Assistant Professor

**Provide description of the project manager’s qualifications to manage the proposed project.**Dr. Jacob Haus is a Certified Wildlife Biologist® and assistant professor at Bemidji State University specializing in large mammal ecology. He earned a B.S. in biology from Bemidji State University in 2010, an M.S. in wildlife ecology from the University of Delaware in 2013, and a Ph.D. in wildlife ecology with certificate in applied statistics from the University of Delaware in 2017. His 2 years of postdoctoral work examined survival and spatial ecology of white-tailed deer, wild turkeys, and bobcats. He has 10 years of experience capturing large mammals and analyzing movement and survival data. He has been the principle investigator or co-investigator on 5 previous externally-funded wildlife research projects totaling over $750,000 in awarded grants. He regularly publishes in high-impact journals and presents research results at national and international wildlife conferences.

**Organization:** Minnesota State Colleges and Universities - Bemidji State University

**Organization Description:**Nestled in Northern Minnesota’s wooded region and located on the shore of Lake Bemidji, Bemidji State University serves over 5,100 students in undergraduate, graduate and online degree programs. The University's core philosophy is built upon a commitment to environmental stewardship, community service and global understanding. Bemidji is the cultural and commercial hub for north central Minnesota and is located within the state's primary wolf range. The Biology department awards both BS and MS degrees in the field of wildlife biology, making Bemidji State University an excellent location to conduct research focused on wolf ecology.

## **Budget Summary**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Category / Name** | **Subcategory or Type** | **Description** | **Purpose** | **Gen. Ineli gible** | **% Bene fits** | **# FTE** | **Class ified Staff?** | **$ Amount** |
| **Personnel** |  |  |  |  |  |  |  |  |
| Haus; Co-investigator |  | Manage, analyze, write, outreach |  |  | 20% | 0.2 |  | $16,078 |
| Hiller; Co-investigator |  | analyze, write, outreach |  |  | 20% | 0.2 |  | $16,966 |
| Graduate Assistant |  | Coordinate field work, data management, analyze, write |  |  | 13% | 2 |  | $45,978 |
| Graduate Assistant |  | Tuition and fees |  |  | 0% | 2 |  | $12,200 |
| Technician support |  | Part time research technician |  |  | 13% | 1.5 |  | $38,620 |
| Undergraduate Research Assistant |  | Undergraduate student worker |  |  | 7% | 1 |  | $20,600 |
|  |  |  |  |  |  |  | **Sub Total** | **$150,442** |
| **Contracts and Services** |  |  |  |  |  |  |  |  |
| TBD | Professional or Technical Service Contract | Contract with veterinary lab for wildlife necropsy/histology/pathology to determine sources of wolf mortality. |  |  |  | 2 |  | $6,000 |
| TBD | Professional or Technical Service Contract | GPS collar satellite monitoring service fee contract (10 collars @ $540/year) |  |  |  | 2 |  | $5,400 |
|  |  |  |  |  |  |  | **Sub Total** | **$11,400** |
| **Equipment, Tools, and Supplies** |  |  |  |  |  |  |  |  |
|  | Equipment | 10 GPS collars | GPS tracking collars for adult wolves |  |  |  |  | $23,000 |
|  | Equipment | 20 expandable VHF collars | Collars for wolf pups |  |  |  |  | $6,000 |
|  | Equipment | Telemetry equipment | 3 receivers and 4 Yagi antennas |  |  |  |  | $2,100 |
|  | Equipment | 10 Browning trail cameras | Monitor wolf dens and observe behaviors |  |  |  |  | $2,500 |
|  | Equipment | 3 remote telemetry data logging towers | Monitor wolf pup survival remotly without disturbing den sites |  |  |  |  | $12,000 |
|  | Tools and Supplies | Pharmaceuticals for wolf capture (10 captures) | Immobilizing drugs for safe wolf capture and handeling |  |  |  |  | $8,500 |
|  | Tools and Supplies | Miscellaneous trapping supplies (traps, GPS units, drug delivery systems, ect) | Tools and supplies required for safe wolf capture and handeling ($7,500/year) |  |  |  |  | $14,958 |
|  |  |  |  |  |  |  | **Sub Total** | **$69,058** |
| **Capital Expenditures** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
| **Acquisitions and Stewardship** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
| **Travel In Minnesota** |  |  |  |  |  |  |  |  |
|  | Miles/ Meals/ Lodging | Field travel to/from study sites, miles (40,000 miles at 0.58/mile), food, lodging | Travel to support field research |  |  |  |  | $27,000 |
|  | Conference Registration Miles/ Meals/ Lodging | Conference expenses for Minnesota WIldlife Society Conference | Funding for the graduate student to present research findings to local Minnesota wildlife biologists |  |  |  |  | $1,500 |
|  |  |  |  |  |  |  | **Sub Total** | **$28,500** |
| **Travel Outside Minnesota** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
| **Printing and Publication** |  |  |  |  |  |  |  |  |
|  | Publication | Page charges for 3 peer-reviewed journal publications | Results from this project will be communicated to the broader scientific community through publication in peer-reviewed journal outlets. |  |  |  |  | $3,600 |
|  |  |  |  |  |  |  | **Sub Total** | **$3,600** |
| **Other Expenses** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
|  |  |  |  |  |  |  | **Grand Total** | **$263,000** |

### **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** |  |  |  |  |
| In-Kind | Bemidji State University | Bemidji State University will provide indirect costs (32.5%) as in-kind match | Secured | $85,475 |
| In-Kind | Bemidji State University | Drs. Haus and Hiller will provide additional trail cameras, telemetry receivers, antennas, and a data logging tower. | Secured | $8,500 |
|  |  |  | **Non State Sub Total** | **$93,975** |
|  |  |  | **Funds Total** | **$93,975** |

## **Attachments**

### **Required Attachments**

#### **Visual Component**

File: [077ec179-e14.pdf](https://lccmrprojectmgmt.leg.mn/media/map/077ec179-e14.pdf)

#### **Alternate Text for Visual Component**

Kernel density estimate of the home range (95%) and core area (50%) for an adult male wolf captured 10-km east of Bemidji, MN (pop. 15,500) in July 2019. The southeast core area overlaps portions of Cass Lake, MN city limits (pop. 800) and includes a popular hotel location and a lakeside resort.

### **Optional Attachments**

#### **Support Letter or Other**

|  |  |
| --- | --- |
| **Title** | **File** |
| Map of wolf home range | [ae064c0c-04c.pdf](https://lccmrprojectmgmt.leg.mn/media/attachments/ae064c0c-04c.pdf) |

## **Administrative Use**

**Does your project include restoration or acquisition of land rights?**   
 No

**Does your project have patent, royalties, or revenue potential?**   
 No

**Does your project include research?**   
 Yes

**Does the organization have a fiscal agent for this project?**   
 No