

**Environment and Natural Resources Trust Fund**

# M.L. 2025 Final Work Plan

## **General Information**

**ID Number:** 2025-151

**Staff Lead:** Lisa Bigaouette

**Date this document submitted to LCCMR:** June 8, 2025

**Project Title:** Mapping Human-Carnivore Conflicts in Human-Dominated Landscapes

**Project Budget:** $563,000

## **Project Manager Information**

**Name:** Michael Joyce

**Organization:** U of MN - Duluth - NRRI

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## **Project Reporting**

**Reporting Schedule:** March 1 / September 1 of each year.

**Project Completion:** June 30, 2029

**Final Report Due Date:** August 14, 2029

## **Legal Information**

**Legal Citation:** M.L. 2025, First Special Session, Chp. 1, Art. 2, Sec. 2, Subd. 03o

**Appropriation Language:** $563,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota for the Natural Resources Research Institute in Duluth to evaluate bear, bobcat, and coyote habitat use, activity, and diet in Duluth and surrounding areas to map hotspots for human-carnivore conflicts and fill knowledge gaps to reduce conflicts. This appropriation is available until June 30, 2029, by which time the project must be completed and final products delivered.

**Appropriation End Date:** June 30, 2029

## **Narrative**

**Project Summary:** We will evaluate bear, bobcat, and coyote habitat use, activity, and diet in Duluth and surrounding areas to map hotspots for human-carnivore conflicts and fill knowledge gaps to reduce conflicts.

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

Carnivores are charismatic wildlife of public interest and value but can cause conflicts where they live close to humans. In many areas, human-carnivore conflicts are increasing due to simultaneous expansion of human and carnivore populations. Conflicts can result in property damage, which can be costly, and lead to fear of carnivores. In Duluth, several species of carnivore cause regular concern and conflicts with people:  
  
1. Bears are attracted to birdseed and food items in garbage and can cause plant and property damage. Over the last 20 years, there have been ~2,500 bear-related conflict calls in the greater Duluth area.   
2. Coyotes can get into trash cans, kill small livestock, and pose a risk to domestic cats and small dogs.  
3. Bobcats can kill small livestock and hunt close to human dwellings, causing fear and concern over small livestock and pet safety.   
  
Preventing and resolving human-carnivore conflicts requires detailed information on how carnivores are using human-dominated landscapes to identify where mitigation strategies are most likely to be effective. Additionally, such information can improve public awareness of conflict risk and effective mitigation strategies. Data on human-carnivore conflicts are needed to reduce conflicts and improve human-carnivore coexistence in Minnesota.

**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.**

We will evaluate habitat use, activity patterns, and diets of bears, bobcats, and coyotes in the greater Duluth area to better understand causes of human-carnivore conflicts and identify where conflict mitigation strategies should be targeted to reduce conflicts. The results will have high management value for improving human-carnivore coexistence in Minnesota.  
  
We will work with partners and the public to deploy GPS collars on all three carnivores and track their movements and habitat selection relative to humans. We will use the data we collect to:  
  
1. Evaluate carnivore movements and map hotspots for human-carnivore conflicts  
2. Evaluate carnivore attractants, diet, and foraging behavior of carnivores to determine factors promoting conflicts  
3. Determine how frequently carnivores move into and out of urban and suburban areas to evaluate a range of lethal (harvest in current hunting areas) or non-lethal management strategies to prevent human-carnivore conflicts.   
4. Provide the information needed to improve conflict management and raise public awareness of conflict mitigation needs and strategies  
  
This project will be the first study on bears and bobcats in a human-dominated landscape in Minnesota and will address key knowledge gaps with respect to human-carnivore conflict, ensuring that the results will have high management value.

**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 provide foundational data on human-carnivore conflicts to better understand the causes and identify opportunities for improved mitigation and human-carnivore coexistence. Additionally, it will provide the first formal evaluation of urban and suburban bear and bobcat ecology in Minnesota. Given the nature and frequency of conflicts between humans and carnivores in the Duluth area, the data we will collect will be used to help prioritize outreach and conflict prevention and mitigation efforts by wildlife managers. Specifically, this information will help managers work more effectively and efficiently with the public and municipalities to reduce and resolve human-carnivore conflicts.

## **Project Location**

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

**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: Determine habitat use, activity, and diet of bears, bobcats, and coyotes in the greater Duluth area**

**Activity Budget:** $563,000

**Activity Description:**We will evaluate habitat use, activity, and diet of carnivores living close to people by live-trapping and deploying GPS collars on 15 bears, 15 bobcats, and 15 coyotes living in Duluth and the surrounding areas. GPS location data will help us evaluate the extent of time spent between natural and human-altered landscapes and identify areas and resources attracting carnivores to human-dominated areas for food acquisition and reproduction. Specifically, identifying areas used by carnivores for reproductive denning and raising of young in human-dominated environments will add to our ecological knowledge base, and further inform human-carnivore coexistence strategies to improve human safety and carnivore persistence. We will combine GPS telemetry data with reported conflicts from the public to map hotspots for conflicts between people and each of the three focal carnivore species. We will quantify availability of natural foods to determine how natural food availability influences use of human food sources such as garbage, bird seed, domestic fruiting plants, and small livestock. We will use a combination of scat and stable isotope analyses to measure carnivore diets. Finally, we will perform targeted outreach to stakeholders and the public to ensure the results of this study inform efforts to reduce human-carnivore conflicts.

**Activity Milestones:**

|  |  |
| --- | --- |
| **Description** | **Approximate Completion Date** |
| Summarize all diet, habitat use, and activity data collected from the first year of study | June 30, 2026 |
| Deploy GPS collars on 15 bears, 15 bobcats, and 15 coyotes over 2 capture seasons | March 31, 2027 |
| Measure diets of carnivores to determine use of natural and anthropogenic food sources | June 30, 2027 |
| Summarize all data collected from the second year of the study | June 30, 2027 |
| Create conflict hotspot maps for each species and finish all analyses and reports | December 31, 2028 |

## **Project Partners and Collaborators**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Organization** | **Role** | **Receiving Funds** |
| Dr. Michael Joyce | UMD-NRRI | Project manager overseeing all aspects of this project including coordinating field work, data management, analysis, and reporting. | Yes |
| Dr. Andrew Tri | MN DNR | Providing input and in-kind support on the project, including design, field work, and data-analysis for the components of the project focusing on bears. | 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.**Our results will be of high value to wildlife managers tasked with fielding reports and responding to carnivore conflicts from the public. We will engage with DNR wildlife managers, especially those who cover our study area, at all stages of this project to communicate objectives, gain feedback on project design and methods, and share results. Additionally, we will engage with local municipalities to obtain permits, share objectives, obtain feedback, and share project results. We will provide formal and informal updates to stakeholders via state and local meetings, email communications, and other means. We will present project results to the larger scientific community at state, regional, and national scientific meetings. Travel to meetings outside of Minnesota will not be paid for by project funding. We will also prepare and submit manuscripts for publication in peer-reviewed scientific journals.   
  
We will conduct outreach with tribal authorities including 1854 Treaty Authority to share our project objectives and invite tribal input and collaboration. We will also share data directly with tribal authorities.   
  
We anticipate that this project will be of high interest and value to the public. We will engage with the public to share project background and updates as the project progresses. We will create a website to distribute information to the public. We will also disseminate results to the public via webinars and other outreach events. As part of public outreach, we will solicit reports of bear, bobcat, and coyote activity to help focus trapping locations and efforts. Any carnivore conflict reports shared with us will be routed through the DNR’s existing reporting system.   
  
We will likely have periodic contact with print and broadcast media. These contacts will be documented as they occur.   
  
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, 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 work be funded?**This project will use well-developed methods and collaboration with the MN DNR to generate foundational data on carnivores in human-dominated landscapes in Minnesota. Collaboration with the MN DNR will ensure that results will have high management value and address key knowledge gaps. Engagement with municipalities before, during, and after the project will ensure that local policy-makers have full access to our results, while targeted outreach activities will ensure that results will help raise public awareness of effective carnivore-conflict mitigation strategies.

## **Other ENRTF Appropriations Awarded in the Last Six Years**

|  |  |  |
| --- | --- | --- |
| **Name** | **Appropriation** | **Amount Awarded** |
| Den Boxes for Fishers and other Nesting Wildlife | M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03i | $190,000 |
| Bobcat And Fisher Habitat Use And Interactions | M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 03i | $400,000 |
| Distribution and Movements of Fishers in Southern Minnesota | M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 03f | $340,000 |
| Changing Distribution of Flying Squirrel Species in Minnesota | M.L. 2023, , Chp. 60, Art. 2, Sec. 2, Subd. 03e | $186,000 |

## **Budget Summary**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Category / Name** | **Subcategory or Type** | **Description** | **Purpose** | **Gen. Ineli gible** | **% Bene fits** | **# FTE** | **Class ified Staff?** | **$ Amount** |
| **Personnel** |  |  |  |  |  |  |  |  |
| Michael Joyce, Researcher 6 |  | Project Manager |  |  | 26.9% | 0.39 |  | $54,725 |
| TBD Researcher 3 |  | Field and lab work |  |  | 24.2% | 2.01 |  | $169,500 |
| Wildlife Technician |  | Field and lab data collection |  |  | 7.1% | 2.28 |  | $111,277 |
| Undergraduate research assistant |  | Field and lab work |  |  | 0% | 0.36 |  | $13,848 |
| Masters Graduate Student |  | Complete MS on project |  |  | 46% | 0.75 |  | $34,396 |
|  |  |  |  |  |  |  | **Sub Total** | **$383,746** |
| **Contracts and Services** |  |  |  |  |  |  |  |  |
| TBD | Service Contract | Analysis of diet composition at stable isotope laboratory ($11/sample x 45 carnivore samples + 200 food samples) |  |  |  | 0.09 |  | $2,695 |
| TBD | Service Contract | GPS data downloads for carnivore collars ($40 activation fee + $15/month for estimated life of collar). |  |  |  | 0.09 |  | $14,760 |
| MN DNR | Subaward | The subaward will pay MN DNR enforcement pilots to search for any missing study animals who's collars are not reporting back to us. Requirements are a pilots license and experience with aerial radiotelemetry. $360/hr for ~21 (standard fee covers flight costs) |  |  |  | 0.03 |  | $7,690 |
|  |  |  |  |  |  |  | **Sub Total** | **$25,145** |
| **Equipment, Tools, and Supplies** |  |  |  |  |  |  |  |  |
|  | Equipment | GPS collars for bears ($2,600 x 15 collars), bobcats ($2,250 x 15 collars), and coyotes ($2,250 x 15 collars) | To collect movement, habitat selection, and activity data from carnivores |  |  |  |  | $106,500 |
|  | Tools and Supplies | Trail cameras and supplies (SD cards, locks) to aid in carnivore trapping and monitor use sites | 35 cell cameras will be used to find bobcats and coyotes to target, help monitor traps to captured carnivores are processed promptly, and monitor reproductive sites of study animals. |  |  |  |  | $4,025 |
|  | Tools and Supplies | Live-capture, handling, and field monitoring supplies (e.g., pharmaceuticals, sample collection gear, trapping bait/lure, traps, etc.) | Critical for live-trapping and anesthetizing carnivores to deploy GPS collars |  |  |  |  | $7,084 |
|  | Tools and Supplies | Laboratory supplies for processing diet samples | Help process scats and hair samples for diet analysis |  |  |  |  | $2,800 |
|  |  |  |  |  |  |  | **Sub Total** | **$120,409** |
| **Capital Expenditures** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
| **Acquisitions and Stewardship** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
| **Travel In Minnesota** |  |  |  |  |  |  |  |  |
|  | Miles/ Meals/ Lodging | Field work for trapping and tracking study animals | To deploy collars and intensive field-monitoring of study animals |  |  |  |  | $33,500 |
|  |  |  |  |  |  |  | **Sub Total** | **$33,500** |
| **Travel Outside Minnesota** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
| **Printing and Publication** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
| **Other Expenses** |  |  |  |  |  |  |  |  |
|  |  | Shipping fees | Fees for shipping samples to the stable isotope lab for diet analysis |  |  |  |  | $200 |
|  |  |  |  |  |  |  | **Sub Total** | **$200** |
|  |  |  |  |  |  |  | **Grand Total** | **$563,000** |

### **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 | UMN unrecovered indirect costs are calculated at the UMN negotiated rate for research of 55% modified total direct costs. | Indirect costs are those costs incurred for common or joint objectives that cannot be readily identified with a specific sponsored program or institutional activity. Examples include utilities, building maintenance, clerical salaries, and general supplies. (https://research.umn.edu/units/oca/fa-costs/direct-indirect-costs) | Secured | $304,020 |
| In-Kind | The Minnesota Department of Natural Resources (MN DNR) | Minnesota DNR Bear Project Leader Andrew Tri will provide 200 hours of in-kind support of this project for each of three years, for a value of $26,106. Dr. Tri will provide advice on trap site selection, assist with fieldwork (bear trapping, anesthesia, collar fitting), assist with communications with DNR and other partners, and serve as the subject matter expert on the urban bear aspect of the project. Minnesota DNR Wildlife Research Specialist Hannah Leeper will provide 160 hours of in-kind support of this project for each of three years, for a value of $12,936. Ms. Leeper will provide fieldwork support (both trapping and den work). | Secured | $39,042 |
|  |  |  | **State Sub Total** | **$343,062** |
| **Non-State** |  |  |  |  |
|  |  |  | **Non State Sub Total** | **-** |
|  |  |  | **Funds Total** | **$343,062** |

**Total Project Cost: $906,062**

**This amount accurately reflects total project cost?**  
 Yes

## **Attachments**

### **Required Attachments**

#### ***Visual Component***

File: [9c1c991e-ebe.pdf](https://lccmrprojectmgmt.leg.mn/media/map/9c1c991e-ebe.pdf)

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

The graphic shows a bobcat with a kitten taken in rural Duluth, a coyote in rural Duluth, a map of bear conflicts across Duluth, and a picture of a radio-collared black bear taken in Minnesota. Text described project activities and impacts....

### **Supplemental Attachments**

#### ***Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other***

|  |  |
| --- | --- |
| **Title** | **File** |
| UMD SPA Transmittal Letter | [e7aa1e4f-229.pdf](https://lccmrprojectmgmt.leg.mn/media/attachments/e7aa1e4f-229.pdf) |
| MN DNR In-Kind Letter | [8dc3dbf1-4e9.pdf](https://lccmrprojectmgmt.leg.mn/media/attachments/8dc3dbf1-4e9.pdf) |
| 2025-151 Research Addendum revised\_Final | [47a422b1-f6a.docx](https://lccmrprojectmgmt.leg.mn/media/attachments/47a422b1-f6a.docx) |

## **Difference between Proposal and Work Plan**

#### ***Describe changes from Proposal to Work Plan Stage***

I updated the location information on the General Information section, updated a past ENRTF appropriation, modified the sample size from 20 bears to 15 bears (10% reduction in total project collars), and adjusted remaining budget categories to align with the recommended funding level. The collar reduction was noted throughout (e.g., in Activities and Milestones section as well as appropriate Budget sections). The 10% reduction in collars resulted in subsequent reductions in related categories (e.g., personnel time, travel, supplies). We will still be able to address our original objectives with the reduction in collars and associated funding.  
  
On June 8, 2025 I changed the Project End Date (Narrative) to match the appropriation end date (6/30/2029) as directed.

## **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 understand that travel expenses are only approved if they 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 understand the UMN Policy on travel applies.

**Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?**   
 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

**Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing $10,000 or more or large-scale stream or wetland restoration?**  
 No

**Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?**  
 No

**Provide the name(s) and organization(s) of additional individuals assisting in the completion of this project:**

Taylor Velander (NRRI), Michael McMahon (NRRI), Anna Mangan (NRRI), Megan Gorder (NRRI), Julie Christopherson (NRRI), UMD Sponsored Project Administration, Andrew Tri (MN DNR)

**Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR’s reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements**  
 Yes, I understand