



# Environment and Natural Resources Trust Fund (ENRTF)

## M.L. 2019 ENRTF Work Plan (Main Document)

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**Today's Date:** August 27, 2018

**Date of Next Status Update Report:** March 1, 2020

**Date of Work Plan Approval:**

**Project Completion Date:** June 30, 2021

**Does this submission include an amendment request?** No

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**PROJECT TITLE:** Artificial Den Boxes for Fishers

**Project Manager:** Dr. Michael Joyce

**Organization:** U of MN - Duluth

**College/Department/Division:** Natural Resources Research Institute

**Mailing Address:** 5013 Miller Trunk Hwy

**City/State/Zip Code:** Duluth, MN 55811-1442

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**Email Address:** joyc0073@d.umn.edu

**Web Address:**

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**Location:**

**Region:** Central, Metro, Northwest, Northeast

**County Name:** Aitkin, Anoka, Becker, Beltrami, Benton, Carlton, Cass, Chisago, Clay, Clearwater, Cook, Crow Wing, Douglas, Hubbard, Isanti, Itasca, Kanabec, Kittson, Koochiching, Lake, Lake of the Woods, Marshall, Mille Lacs, Morrison, Norman, Otter Tail, Pennington, Pine, Polk, Red Lake, Roseau, Sherburne, St. Louis, Stearns, Todd, Wadena, and Washington

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**Total Project Budget:** \$190,000

**Amount Spent:** \$0

**Balance:** \$190,000

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**Legal Citation:** M.L. 2019, Chp. xx, Sec. xx, Subd. xx

**Appropriation Language:**

## I. PROJECT STATEMENT:

### Overview:

The fisher population in Minnesota has declined by about 50% over the past 20 years, and we will deploy den boxes to determine if cavity trees are limiting production of kits. A recent Minnesota DNR study on fishers showed that cavity trees are critically important for female fishers to raise kits. Because large trees with cavities are rare in managed forest landscapes, the DNR study concluded that lack of large trees with cavities may be a limiting resource that contributed to the fisher population decline. Artificial den boxes could help meet the needs of female fishers where natural cavities are rare. If used by fishers, den boxes could enhance fisher habitat and promote population persistence and expansion.

Our project will use what was learned from the DNR project to address whether cavity trees are a limiting resource for fishers in Minnesota and evaluate artificial den boxes as a potential solution if cavity trees are limiting. We will build and install at least 60 den boxes in Minnesota, monitor use by fishers and other wildlife species, and determine what factors influence whether fishers use boxes. We will also use existing data from the DNR fisher study to identify areas with low fisher habitat suitability where den boxes could potentially be used to enhance fisher habitat. Finally, we will develop instructions on how to build artificial den boxes for fishers and best management guidelines for their use and disseminate our instructions and guidelines to wildlife managers, foresters, private landowners, trappers, and other members of the public interested in enhancing fisher habitat. This project will generate the knowledge necessary to develop strategic plans for fisher habitat management and could lead to a novel method for monitoring the fisher population in Minnesota.

### Project Statement:

Fishers are mid-sized carnivores that live in the forested region of Minnesota. Minnesota DNR data shows that the fisher population has declined by about 50% over the last 20 years (see figure on map page).

**The fisher population decline has not received as much attention as the northeast Minnesota moose population decline has, even though populations are about half of what they were 20 years ago.**

In response to the fisher population decline the DNR conducted a research project from 2008-2015 to learn more about fisher ecology in Minnesota. The DNR project found that for fishers in Minnesota:

- Females raise their kits in cavities of large-diameter trees (see map page)
- Cavity trees are critically important for reproduction
- Large cavity trees are relatively scarce in managed forests

The DNR study identified denning habitat as a possible limiting factor, and concluded that a lack of suitable cavities may have contributed to the fisher population decline. Our project will use what was learned from the DNR project to address whether cavity trees are a limiting resource for fishers in Minnesota and evaluate artificial den boxes as a potential solution if cavity trees are limiting.

Fishers are the largest animal in Minnesota that requires cavities to raise their young. Large diameter trees with cavities big enough to hold fishers take years to grow. In managed forests, trees may be harvested before any tree has time to develop a heart-rot cavity, and existing cavity trees may be lost during logging or wind storms. Fishers do not use leave trees in openings in harvested forests, instead using trees in interior forests.

Artificial den boxes could help meet the needs of female fishers where natural cavities are rare. Den boxes could be used to enhance fisher habitat and promote population persistence in managed landscapes. Placing a den

box on the edge of a harvested forest where prey species occur might actually create new fisher habitat. Signs that this project will benefit Minnesota wildlife include:

1. **Wildlife managers have observed fishers using wood duck nest boxes in Minnesota**
2. **Fishers have raised litters in artificial den boxes in western Canada**
3. **Den box use by fishers could be an indicator of whether cavity trees are a limiting resource**
4. **Den boxes could provide an additional method for monitoring fisher populations in Minnesota**
5. **Private landowners have requested information on building den boxes for fishers from the DNR**

At this stage, we know den boxes are used by fishers, but we do not know what influences whether individual den boxes are used or whether installing den boxes where large cavity trees are rare will allow fishers to better use areas that lack natural cavities. Results of this project could be used by wildlife managers, private landowners, trappers, and other concerned citizens to promote fisher population expansion. In the future, den boxes could be used for public engagement and might even be a way for citizen-scientists to help monitor fisher populations in Minnesota.

We have coordinated with the DNR to develop this proposal, and one of the real strengths of this project is it will help determine how artificial den boxes can be a tool for fisher habitat management. We will use den boxes to further evaluate whether cavity trees are a limiting resource that contributed to recent fisher population declines in Minnesota. The specific goals of this project on fisher artificial denning boxes are to:

1. **Build and install at least 60 artificial den boxes in Minnesota.**
2. **Monitor visitation and use of den boxes by fishers and other wildlife.**
3. **Determine what factors influence use of den boxes by fishers.**
4. **Develop guidelines and best management practices for use of artificial den boxes for fishers.**
5. **Identify areas with low habitat suitability as potential sites for future fisher habitat management.**

## II. OVERALL PROJECT STATUS UPDATES:

**First Update March 1, 2020**

**Second Update September 1, 2021**

**Third Update March 1, 2021**

**Final Report between project end (June 30) and August 15, 2021**

## III. PROJECT ACTIVITIES AND OUTCOMES:

### **ACTIVITY 1 Title: Determine visitation and use of artificial den boxes by fishers and other wildlife species**

**Description:** We will build and install at least 60 den boxes in two study areas where previous fisher research has taken place. Den boxes will be installed in different forest types and ages. We will use remote cameras and field-visits to monitor visitation and use by fishers. We will visit den boxes during the breeding season to document reproduction in den boxes using an inspection camera mounted on a pole to determine whether kits are present. If kits are present, we will obtain a litter count. We will also monitor visitation and use by other wildlife species, including other cavity-dependent species such as squirrels, wood ducks, and other cavity-nesting birds. Lastly, we will use existing data from the DNR fisher study to identify areas with low fisher habitat suitability where den boxes could potentially be used to enhance fisher habitat and prioritize areas for future habitat management.

**ACTIVITY 1 ENRTF BUDGET: \$190,000**

Outcome	Completion Date
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1. Installation of artificial den boxes	November 2019
2. Determine visitation and use of den boxes by fishers and other wildlife species	May 2021
3. Identify factors influencing use of den boxes by fishers	May 2021
4. Identify and prioritize areas with low habitat suitability where den boxes could potentially be used to enhance fisher habitat in the future	June 2021
5. Develop and disseminate instructions on how to build artificial den boxes for fishers and best management guidelines for their use	June 2021

**First Update March 1, 2020**

**Second Update September 1, 2021**

**Third Update March 1, 2021**

**Final Report between project end (June 30) and August 15, 2021**

#### **IV. DISSEMINATION:**

**Description:** We will create a website to distribute information to the public, but this will be done after the project starts. The website will be modelled after other websites we maintain (e.g., [www.nrri.umn.edu/moose](http://www.nrri.umn.edu/moose) or [www.nrri.umn.edu/bats](http://www.nrri.umn.edu/bats)).

We will also use our results to develop and disseminate instructions on how to build artificial den boxes for fishers and best management guidelines for their use. These instructions and guidelines will be intended for use by wildlife managers, foresters, private land owners, trappers, and other members of the public interested in enhancing fisher habitat. We will share our instructions and guidelines directly with these groups and also post it on our website.

In addition, we will present project results at local and regional scientific meetings and prepare and submit papers for publication in peer-reviewed journals.

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, signage, and other communications per the [ENRTF Acknowledgement Guidelines](#).

**First Update March 1, 2020**

**Second Update September 1, 2021**

**Third Update March 1, 2021**

**Final Report between project end (June 30) and August 15, 2021**

#### **V. ADDITIONAL BUDGET INFORMATION:**

##### **A. Personnel and Capital Expenditures**

**Explanation of Capital Expenditures Greater Than \$5,000:** N/A

**Explanation of Use of Classified Staff:** N/A

**Total Number of Full-time Equivalent (FTE) Directly Funded with this ENRTF Appropriation:**

Enter Total Estimated Personnel Hours for entire duration of project: 5,450	Divide total personnel hours by 2,080 hours in 1 yr = = TOTAL FTE: 2.62
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**Total Number of Full-time Equivalent (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation:**

Enter Total Estimated Contract Personnel Hours for entire duration of project: N/A	Divide total contract hours by 2,080 hours in 1 yr = TOTAL FTE: N/A
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**VI. PROJECT PARTNERS:**

**A. Partners outside of project manager’s organization receiving ENRTF funding** N/A

**B. Partners outside of project manager’s organization NOT receiving ENRTF funding**

Dr. John Erb (MN DNR) will provide input and in-kind support on this project, with intent to use results to help inform fisher habitat management recommendations.

**VII. LONG-TERM- IMPLEMENTATION AND FUNDING:**

This proposal is part of a larger effort to understand fisher and pine marten ecology in Minnesota. We envision this as a project that builds off the results of the DNR fisher project and develops techniques to enhance fisher habitat. This project will generate the knowledge necessary to develop strategic plans for fisher habitat management. Den boxes will last many years and could provide a new method for monitoring fisher populations in Minnesota.

We will use our results to develop guidelines for use of fisher den boxes, including instructions on how to build boxes. These guidelines and instructions are meant to be used by wildlife managers, private land owners, trappers and other members of the public interested in enhancing fisher habitat. The Land Resources Department in Carlton County has already deployed one fisher den box that we built after hearing about our project, and they have already indicated that they would like to deploy more boxes in 2018. We expect interest by other agencies and the public as well.

This project could lead to a future opportunity for public engagement through a large-scale citizen-science project. Using what we learn in this project, we could establish a network of fisher den boxes that could be maintained and monitored by citizens to collect samples and data to contribute to fisher habitat and population monitoring efforts.

**VIII. REPORTING REQUIREMENTS:**

- Project status update reports will be submitted March 1 and September 1 each year of the project
- A final report and associated products will be submitted between June 30 and August 15, 2021

**IX. SEE ADDITIONAL WORK PLAN COMPONENTS:**

- A. Budget Spreadsheet:** See Attachment A
- B. Visual Component or Map:** See Attachment B
- C. Parcel List Spreadsheet:** N/A
- D. Acquisition, Easements, and Restoration Requirements:** N/A

**Attachment A:**  
**Environment and Natural Resources Trust Fund**  
**M.L. 2019 Budget Spreadsheet**



**Legal Citation:**

**Project Manager:** Dr. Michael Joyce

**Project Title:** Artificial Den Boxes for Fishers

**Organization:** U of MN - Duluth

**Project Budget:** \$190,000

**Project Length and Completion Date:** 2 Years, June 30, 2021

**Today's Date:** August 21, 2018

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
<b>BUDGET ITEM</b>			
<b>Personnel (Wages and Benefits)</b>	\$ 152,000	\$ -	\$ 152,000
Michael Joyce, Principal Investigator: \$97,604 (fringe rate 21.4%); ~67% FTE each year for 2 years			
Ron Moen, Project Partner: \$3,173 (fringe rate 33.5%); 1% FTE each year for 2 years			
Technician: \$36,747 (fringe rate 27.2%); ~34% FTE each year for 2 years			
Undergraduate Research Assistant: \$14,476 (100% salary); 29% FTE each year for 2 years			
<b>Equipment/Tools/Supplies</b>			
Den boxes (60 @ estimated \$80/box): includes materials for building and hanging boxes and	\$ 4,800	\$ -	\$ 4,800
Cameras (75 @ estimated \$182)	\$ 13,650		\$ 13,650
Field supplies (e.g., batteries for cameras, bug dope, gps, GoPro and pole for den box checks)	\$ 1,550		\$ 1,550
<b>Travel expenses in Minnesota</b>			
Travel for fieldwork, including mileage (75%) and lodging for technician, post-doc, and undergraduate	\$ 18,000	\$ -	\$ 18,000
<b>COLUMN TOTAL</b>	\$ 190,000	\$ -	\$ 190,000

OTHER FUNDS CONTRIBUTED TO THE PROJECT	Status (secured or pending)	Budget	Spent	Balance
<b>Non-State:</b>		\$ -	\$ -	\$ -
<b>State:</b>		\$ -	\$ -	\$ -
<b>In kind:</b>		\$ -	\$ -	\$ -
Unrecovered indirect: 54% on total direct costs (\$190,000 base)	Secured	\$ 102,600		\$ 102,600
In-kind support from DNR biologist John Erb: 80 hours of in-kind support over 2 years	Secured	\$ 4,500		\$ 4,500
HOBO temperature loggers (30 @ \$60)	Secured	\$ 1,800	\$ 1,800	\$ -

PAST AND CURRENT ENRTF APPROPRIATIONS	Amount legally obligated but not yet spent	Budget	Spent	Balance
<b>Current appropriation:</b>		\$ -	\$ -	\$ -
<b>Past appropriations:</b>		\$ -	\$ -	\$ -