

**Environment and Natural Resources Trust Fund
2019 Request for Proposals (RFP)**

Project Title:

Artificial Den Boxes for Fishers

ENRTF ID: 032-AH

Category: H. Proposals seeking \$200,000 or less in funding

Sub-Category: A. Foundational Natural Resource Data and Information

Total Project Budget: \$ 190,000

Proposed Project Time Period for the Funding Requested: June 30, 2021 (2 yrs)

Summary:

DNR data show that fisher in Minnesota have declined 50% since 2000. Den sites may be limiting reproduction. We will test if den boxes can help the fisher population increase.

Name: Ron Moen

Sponsoring Organization: U of MN - Duluth

Title: Associate Professor and Senior Research Associate

Department: Natural Resources Research Institute

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Duluth MN 55811-1442

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Web Address

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, P

City / Township:

Alternate Text for Visual:

Fisher distribution in Minnesota mapped, 50% population decline since 2000 graphed. Pictures of fishers, den cavity, and den box with fisher. Brief goals of project listed as final bullet points.

<input type="checkbox"/>	Funding Priorities	<input type="checkbox"/>	Multiple Benefits	<input type="checkbox"/>	Outcomes	<input type="checkbox"/>	Knowledge Base
<input type="checkbox"/>	Extent of Impact	<input type="checkbox"/>	Innovation	<input type="checkbox"/>	Scientific/Tech Basis	<input type="checkbox"/>	Urgency
<input type="checkbox"/>	Capacity Readiness	<input type="checkbox"/>	Leverage	<input type="checkbox"/>		TOTAL	<input type="checkbox"/> %
<input type="checkbox"/> If under \$200,000, waive presentation?							



PROJECT TITLE: Artificial Den Boxes for Fishers

I. 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. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Determine visitation and use of artificial den boxes by fishers and other wildlife species

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.

ENRTF Budget: \$190,000

Outcome	Completion Date
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

III. PROJECT STRATEGY

A. Project Team/Partners

Dr. Ron Moen (NRRRI-UMD) is overall project manager and will help with different aspects of the project.

Michael Joyce (NRRRI-UMD) will design den box deployment, field-monitoring protocols, and habitat analysis.

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.

B. Project Impact and Long-Term Strategy

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. One NE MN county has already deployed one fisher den box after hearing about our project, 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.

C. Timeline Requirements

This project would require 24 months of ENRTF funding from 7/1/2019 to 6/30/2021. We are ready to begin this project with existing equipment and facilities.

2019 Proposal Budget Spreadsheet

Project Title: Artificial Den Boxes for Fishers

IV. TOTAL ENRTF REQUEST BUDGET 2 years

BUDGET ITEM	AMOUNT
Personnel:	\$ 152,000
Ron Moen, Principal Investigator: \$3,173 (fringe rate 33.5%); 1% FTE each year for 2 years	
Michael Joyce, Post-Doctoral Researcher: \$97,604 (fringe rate 21.4%); 67% 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	
Professional/Technical/Service Contracts:	\$ -
Equipment/Tools/Supplies:	\$ 20,000
Nest boxes, batteries for GPS units, field cameras	
Acquisition (Fee Title or Permanent Easements):	\$ -
Travel:	\$ 18,000
Travel for fieldwork, including mileage (75%) and lodging for technician, post-doc, and undergraduate research assistant. Mileage will be reimbursed at \$0.545/mile (U of M rate). Lodging is estimated between \$90 and \$110 per night, less if camping is possible. Some trips will involve longer-distance travel and require overnight expenses (camping or motel) and food expenses.	
Additional Budget Items:	\$ -
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 190,000

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:		
Unrecovered indirect: 54% on total direct costs (\$190,000 base)	\$ 102,600	Secured
DNR will provide in-kind support to monitor den boxes near Grand Rapids. Value of support unknown at this time.		Pending
Past and Current ENRTF Appropriation:	\$ -	N/A
Other Funding History:		
DNR Fisher research project from 2008–2015 that established need for this project was about \$600,000 in federal funds.	\$ 600,000	Secured

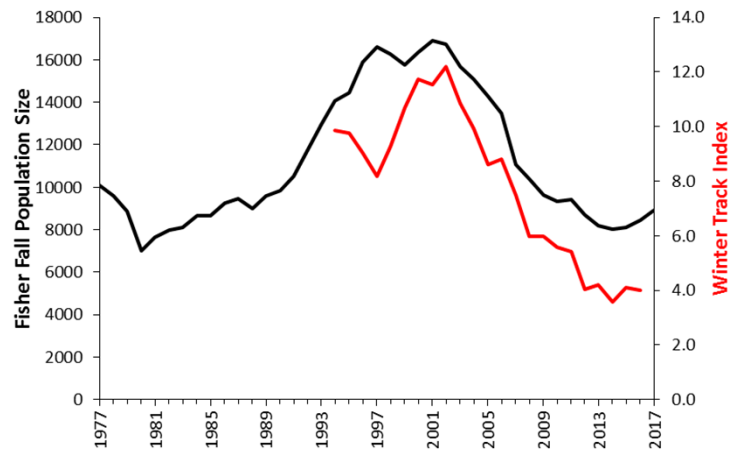
Fishers in Minnesota

Fishers live in the forested region of Minnesota



Counties where fishers were harvested in 2015

The fisher population declined 50% over 20 years



Minnesota DNR Fisher Study

Male fisher in Lake County



117 fishers radiocollared

Female fisher and kit in St. Louis County



Identified 77 dens

- 96% of dens were in cavities
- Den trees averaged 20" diameter
- Less than 2% of trees in forest stand

Fisher kits in den in tree



Critical Question:

Are den cavities a limiting resource contributing to the fisher population decline?

NEW: Artificial Den Box Project

Fisher den boxes are similar to wood duck nest boxes



Build and install den boxes
Page 5 of 6

Fisher using den box in Canada



Monitor use of den boxes to:

- Document reproduction in boxes
- Determine factors influencing use of boxes by fishers and other wildlife

Project Goals:

Evaluate den boxes as a management tool to enhance fisher habitat

Investigate whether den cavity scarcity is limiting fishers in Minnesota

Identify areas where den boxes could be limiting

Identify areas for potential habitat management to improve fisher habitat

ENRTF ID: 032-AH

05/06/2018



**Environment and Natural Resources Trust Fund (ENRTF)
2019 Project Manager Qualifications and Organization Description**

PROJECT TITLE: Artificial Den Boxes for Fishers

Dr. Ron Moen, Natural Resources Research Institute, University of Minnesota Duluth

Key Qualifications: Ron is a Wildlife Ecologist and Research Lab Manager at the Natural Resources Research Institute, University of Minnesota Duluth. He has over 25 years of research experience focusing on mammals, telemetry, and wildlife ecology.

EDUCATION:

Ph.D., 1995. University of Minnesota, Wildlife Conservation.
M.S., 1988. University of Minnesota, Wildlife. Plant Physiology Minor.
B.S., 1984. Cornell University, Division of Biological Sciences.

Michael Joyce, Natural Resources Research Institute, University of Minnesota Duluth

Key Qualifications: Michael is finishing his Ph.D. on American marten and habitat analysis using LiDAR data. Michael has worked on several projects at NRRI as a graduate student and has also worked extensively with Dr. John Erb, the MN DNR furbearer biologist.

EDUCATION:

M.S., 2013. University of Minnesota, Integrated Biological Sciences.
B.A., 2008. University of Wisconsin, Madison, Molecular Biology.

RELEVANT RESEARCH EXPERIENCE:

Dr. Moen has worked on and managed research projects on many different species while at NRRI, with over \$4 million of research projects funded. Michael has worked on several of these projects since beginning his graduate research at NRRI in 2011. Most relevant to this project is his M.S. work on marten dens, and extensive field work and data analysis on the MN DNR marten and fisher project led by Dr. John Erb.

PUBLICATIONS (Directly related to fisher research):

Joyce, M. J., Zalewski, A., Erb, J., & Moen, R.A. (2017). Use of resting microsites by members of the Martes Complex: the role of thermal stress across species and regions. *The Martes complex in the 21st Century: Ecology and Conservation* (pp. 181-220).

Green, R., Joyce, M.J., Matthews, S., Purcell, K., Higley, J., & Zalewski, A. (2017). Guidelines and techniques for studying the reproductive ecology of wild fishers, American martens, and other members of the Martes complex. *The Martes complex in the 21st Century: Ecology and Conservation* (pp. 313-358).

ORGANIZATION DESCRIPTION

The Natural Resources Research Institute is a University of Minnesota Duluth applied research organization. NRRI's mission is to deliver research solutions to balance Minnesota's economy, resources and environment for resilient communities.