

**Environment and Natural Resources Trust Fund  
2016 Request for Proposals (RFP)**

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**Project Title:**

**ENRTF ID: 026-A**

Tree Retention Following Harvest: Maximizing Benefits for Wildlife

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**Category:** A. Foundational Natural Resource Data and Information

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**Total Project Budget:** \$ 232,310

**Proposed Project Time Period for the Funding Requested:** 3 years, July 2016 to June 2019

**Summary:**

Project assesses effectiveness of MFRC tree retention guidelines in sustaining Minnesota's wildlife populations. Results will quantify and evaluate impacts of leave tree configurations on bird, small mammal, and amphibian diversity.

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

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**Location**

**Region:** Statewide

**County Name:** Statewide

**City / Township:**

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**Alternate Text for Visual:**

Spatial configurations of trees retained after harvests have important impacts on MN forest wildlife; map of harvest sites monitored by MNDNR from 1999-2011 and two sample photos.

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____ %



**PROJECT TITLE:** Tree retention following harvest: maximizing benefits for wildlife

**I. PROJECT STATEMENT**

We propose to examine and quantify the benefits of tree retention after logging to Minnesota’s wildlife. It is essential to measure and assess the effectiveness of retention guidelines to maximize the intended benefit to Minnesota’s wildlife. Minnesota’s Forest Management Guidelines ([http://mn.gov/frc/documents/council/site-level/MFRC\\_Forest\\_Management\\_Field\\_Guides\\_2014.pdf](http://mn.gov/frc/documents/council/site-level/MFRC_Forest_Management_Field_Guides_2014.pdf) ) were established in 1998 and intended to reduce the potential for negative environmental impacts resulting from forest harvesting on all forest lands in the state. Recommendations in Minnesota’s Forest Management Guidelines to retain trees during harvesting are considered key to sustaining wildlife species of greatest conservation concern including many mammals, birds, and amphibians. Applications of guidelines during harvesting operations are voluntary, but if implemented, can mitigate impacts to wildlife habitat and help maintain healthy populations into the future.

The current guidelines recommend that 6-12 trees per acre or 5 percent of the harvest area be left uncut. The spatial structures of retained trees and their characteristics influence local habitat suitability and long-term forest structure. Thus, spatial configurations of leave trees likely have important impacts on forest wildlife diversity and forest stand development. Tree retention guidelines are grounded in best available scientific judgment, but there is little data available to support their true impacts or the spatial configuration of “leave trees” necessary to support wildlife diversity. Evaluating these impacts will provide valuable information on which configurations are most beneficial for mitigating the impacts of harvesting to wildlife. The MN DNR has monitored over 1000 harvest sites from 2000-2011 to determine the percent of harvest sites that have implemented the recommended leave tree guidelines. However, detailed wildlife data have not been assessed at these sites. The goals of this proposed project are to:

- 1) Assess and quantify wildlife communities of birds, small mammals, and amphibians, in relation to tree retention configurations following harvest; and
- 2) Improve ecological benefits of Minnesota’s Forest Management Guidelines.

The desired outcome of this project is to ensure that recommended tree retention guidelines are effective and efficient at mitigating harvest-related impacts on wildlife in the state.

**II. PROJECT ACTIVITIES AND OUTCOMES**

**Activity 1: Measure leave tree configuration and quantify habitat characteristics of 60 harvest sites with LiDAR. Budget: \$89,599**

We will compile implementation monitoring data for over 1000 harvest sites collected by MN DNR Forestry over the period 2000-2011 and select a subset of 60 sites that cover a range of tree retention levels and harvest sizes. We will then use available LiDAR and high resolution imagery data to quantify habitat characteristics and spatial configurations of leave trees at each of the sites.

Outcome	Completion Date
1. Identify 60 sample sites.	October 2016
2. Quantify habitat characteristics and spatial configurations of 60 harvest sites.	September 2018



**Activity 2: Quantify effects of leave tree configurations on bird, small mammal, and amphibian communities**

**Budget: \$ 142,711**

We will measure bird, small mammal, and amphibian diversity by conducting systematic counts at 60 harvest sites over 2 field seasons. Identical protocols at sites with a range of leave trees or with no tree retention will enable a powerful test of the effectiveness of various leave tree configurations on wildlife abundance and diversity following harvesting. Spatial pattern metrics of leave trees (Activity 1), harvest size, and time since harvest will be related to field data. The results of this effort will allow us to assess the impact of tree retention levels and harvest size on the long-term abundance and diversity of Minnesota’s wildlife. Findings will be presented to the Minnesota Forest Resources Council, and recommendations will be made for modifications to the Forest Management Guidelines as warranted.

Outcome	Completion Date
1. Quantify bird, small mammal, and amphibian abundance and diversity at 60 research sites.	September 2018
2. Evaluate effects of leave tree configurations on species abundance and diversity.	April 2019
3. Develop recommendations and present findings to the Minnesota Forest Resources Council.	June 2019

**III. PROJECT STRATEGY**

**A. Project Team/Partners**

The project team includes Dr. Gerald Niemi, Dr. Alexis Grinde, and Ed Zlonis from the Natural Resources Research Institute, Dr. Michael Falkowski at the University of Minnesota, and Dr. Rob Slesak from the MN Forest Resources Council. Cooperators will include the DNR Division of Forestry and Division of Fish & Wildlife who we will work closely with to incorporate the findings into operational practice on state lands.

**B. Project Impact and Long-Term Strategy**

This proposal is a part of a larger strategy to assess the effectiveness of Minnesota’s Forest Management Guidelines. Findings will be incorporated into Minnesota’s Forest Management Guidelines, and recommendations widely implemented across the state by DNR, US Forest Service, Counties, industry, and other forestry partners.

**C. Timeline Requirements**

The project duration is three years. It will require two field seasons to sample the proposed sites, and an additional eight months for data analysis and reporting.

**2016 Detailed Project Budget**

**Project Title: Tree retention following harvest: maximizing benefits for wildlife**

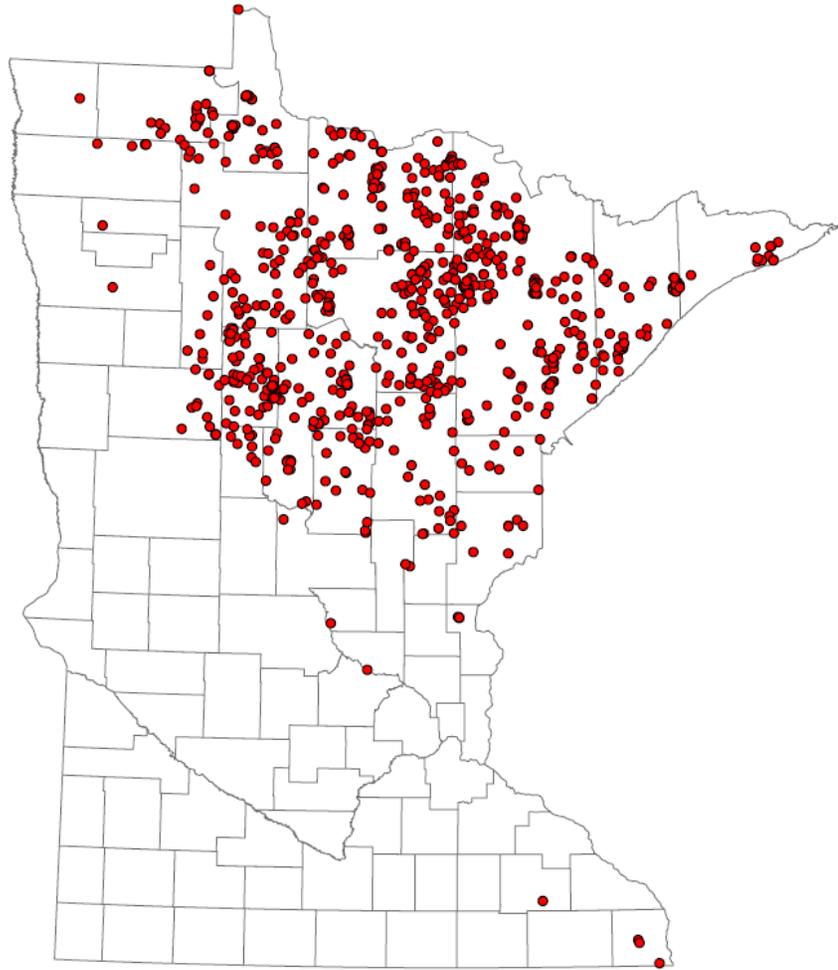
**IV. TOTAL ENRTF REQUEST BUDGET 3 years**

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
<b>Personnel:</b>	
Gerald Niemi, Natural Resources Research Institute (NRRI), and faculty at University of Minnesota Duluth (UMD), Project Manager: \$3,380 (66.3% salary, 33.7% benefits); 0.3% FTE each year for 3 years	\$ 2,026
Alexis Grinde, NRRI, Co-Investigator: Study design and data analysis. \$71,672 (82.4% salary, 17.6% benefits); ~27.3% FTE each year for 3 years	\$ 53,753
Ed Zlonis, NRRI, Co-Investigator: Study design and analysis (66.3% salary, 33.7% benefits); 30% FTE each year for 3 years	\$ 51,243
Michael Falkowski, University of Minnesota (UM), Research Associate: Lidar and spatial analysis (66.3% salary, 33.7% benefits); 10% FTE each year for 3 years	\$ 33,782
1 Post-doctoral Reseacher, UM: Lidar and spatial analysis, (77.6% salary, 22.4% benefits); 50% FTE for year 1	\$ 31,164
2 Field Technicians, NRRI: Data collection, monitoring, data input (92.1% salary, 7.9% benefits); 20% FTE each year for 3 years	\$ 35,376
Undergraduate Research Assistant, UMD: Assist field technician (100% salary, 0% benefits); 25% FTE for year 2	\$ 6,933
Kim Rewinkel, NRRI: Administrative support (72.6% salary, 27.4% benefits); 2% FTE each year for 3 years	\$ 3,707
<b>Equipment/Tools/Supplies:</b>	
50 Sherman traps (\$25.00 each) for small mammal monitoring	\$ 1,250
<b>Travel:</b>	
Travel for fieldwork, including mileage (75%) and lodging (25%) for researchers, field technicians, and graduate and undergraduate students. Mileage costs are associated with rental of a field vehicle through the University of Minnesota motorpool for four field sessions per year for 3 years. Travel reimbursement will follow University of Minnesota protocols.	\$ 13,076
<b>Additional Budget Items:</b>	
<b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>	\$ 232,310

**V. OTHER FUNDS**

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
<b>Other Non-State \$ To Be Applied To Project During Project Period:</b>	NA	
<b>Other State \$ To Be Applied To Project During Project Period:</b>	NA	
If awarded, NRRI will contribute with time/effort as needed for successful completion of project without requesting further funds from LCCMR for the following: Gerald Niemi, Project Manager, additional time to each year of the project. Funded by other NRRI sources, which can be used to support this type of research.	\$ -	Pending
Foregone F&A funding of 52% of MTDC	\$ 114,417	Secured
<b>In-kind Services To Be Applied To Project During Project Period:</b>		
Robert Slesak effort, MN Forest Resources Council, salary and fringe of 0.1 FTE for each year for 3 years	\$ 35,000	Secured
<b>Funding History:</b>	NA	
<b>Remaining \$ From Current ENRTF Appropriation:</b>	NA	

# Spatial configurations of trees retained after harvest have important impacts on Minnesota's forest wildlife.



Harvest sites monitored by the MNDNR from 1999 – 2011.



MNFRC guidelines provide two options for meeting the leave tree recommendations: a.) scattered individual trees, or b.) clumps.

## **Project Title: EAB impacts on forest wildlife and adaptive management**

### **2016 LCCMR Project Manager Qualifications and Organization Description**

Dr. Gerald Niemi, University of Minnesota Duluth.

#### **Key Qualifications**

Dr. Niemi is a Senior Research Associate at the Natural Resources Research Institute and Professor in the Department of Biology at the University of Minnesota Duluth. He also has graduate appointments in Integrated BioSciences (UM-Duluth) and Conservation Biology (UM-Twin Cities).

#### **Education**

Florida State University, Biology, Ph.D. 1983, University of Minnesota, Zoology, M.S. 1977, University of Minnesota, Biology, B.S. 1974

#### **Selected Grants**

- 2012-2015. Developing Habitat Models and Habitat Maps for boreal bird species in the Agassiz Lowlands Subsection. MN DNR. Principal Investigator, \$65,630.
- 2010-2016. Implementing Great Lakes Coastal Wetland Monitoring. US EPA, Co-Principal Investigator, \$10,000,000, U of MN subcontract, \$2,500,000.
- 2008-present. Minnesota breeding bird atlas project. Principal Investigator. \$262,000 (2008-2012); \$191,000 (2012-2014), \$100,000 (2014-2017) Funding from Legislative Citizen's Commission for Minnesota Resources, MN Audubon and Minnesota Department of Natural Resources.
- 1991-present. Monitoring bird populations in Minnesota and Wisconsin national forests. Chequamegon, Chippewa, and Superior National Forest, USDA Forest Service and U.S. Fish and Wildlife Service. \$875,508.

#### **Selected Publications**

- Niemi, G.J., R. W. Howe, B.R. Sturtevant, L.R. Parker, A. Grinde, N.P. Danz, M. Nelson, E.J. Zlonis, N. Walton, and E. Gnass. 2015. Analysis of long term forest bird monitoring in national forests of the western Great Lakes region. USDA Forest Service, Northern Research Station, General Technical Report, in press.
- Peterson, A., G. Niemi, D. Johnson. 2015. Patterns in diurnal airspace use by migratory landbirds along an ecological barrier. *Ecological Applications* 25:673-684.
- Zlonis, E. and G.J. Niemi. 2014. Avian communities of managed and wilderness hemiboreal forests. *Forest Ecology and Management* 328:26-34.
- Lapin, C.N., M.A. Etterson, and G.J. Niemi. 2013. Occurrence of Connecticut Warbler increases with coniferous forest patch size. *The Condor* 115:168-177
- Danz, N., P.B. Reich, L.E. Frelich, and G.J. Niemi. 2013. Do vegetation boundaries display smooth or abrupt spatial transitions along environmental gradients? Evidence from the prairie-forest biome boundary of historic Minnesota, USA. *Journal of Vegetation Science* 24:1129-1140.
- Loss, S.R., G.J. Niemi, R.B. Blair. 2012. Invasions of non-native earthworms related to population declines of ground-nesting songbirds across a regional extent in northern hardwood forests of North America. *Landscape Ecology* 27:683-696.

The **Natural Resources Research Institute** is a part of the University of Minnesota Duluth. NRRI's mission is to promote private sector employment based on natural resources in an environmentally sensitive manner.