

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

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**Project Title:**

**ENRTF ID: 200-F**

Evaluating Forestry Tools for Conserving Minnesota's Tamarack Forest

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**Category:** F. Methods to Protect, Restore, and Enhance Land, Water, and Habitat

**Sub-Category:**

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**Total Project Budget: \$** 864,436

**Proposed Project Time Period for the Funding Requested:** June 30, 2022 (3 yrs)

**Summary:**

Over 440,000 of Minnesota's 1.1 million acres of tamarack forests have been damaged by eastern larch beetle. We will implement and evaluate forestry tools to restore and conserve tamarack forests.

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**Name:** Mike Reinikainen

**Sponsoring Organization:** MN DNR

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**Location**

**Region:** Northwest, Northeast

**County Name:** Aitkin, Beltrami, Clearwater, Itasca, Koochiching, Lake of the Woods, Roseau, St. Louis

**City / Township:**

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**Alternate Text for Visual:**

An aerial photo shows hundreds of acres of beetle-damaged tamarack. Infographics display the massive scale of the outbreak, and the potential disruption to wildlife habitat and natural tree regeneration cycles.

<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	<input type="checkbox"/>	Readiness	<input type="checkbox"/>	Leverage	<input type="checkbox"/>	TOTAL <input type="checkbox"/> %
<input type="checkbox"/> If under \$200,000, waive presentation?							



**PROJECT TITLE:** Evaluating forestry tools for conserving Minnesota's tamarack forests

## I. PROJECT STATEMENT

**Over 440,000 of Minnesota's 1.1 million acres of tamarack forests have been damaged by the eastern larch beetle (ELB); we will implement and evaluate forestry tools that will conserve these forests in Minnesota.**

This project will provide forest and wildlife managers needed information concerning plant community change and habitat quality of damaged tamarack forest. This project has four objectives aimed at restoring and conserving Minnesota's tamarack forest, and they are:

- Evaluate cost-effective strategies for **surveying the health status** of damaged stands (Activity 1)
- **Survey native bird populations** to assess habitat quality of damaged stands (Activity 1)
- Evaluate aerial seeding as a tool to **restore tamarack** seedlings and saplings in dead tamarack (Activity 2)
- **Establish a seed production area** to supply a tamarack seed source for restoration efforts (Activity 2)

**Beetle damage and weak wood markets for tamarack make it difficult to renew these acres through harvest.** ELB continues to expand in MN from Lake of the Woods to Aitkin County, resulting in significant mortality and disruption to natural tree regeneration cycles. Current forest inventory data from dead, damaged, unharvested forests are lacking. Without this information, it is difficult to justify management intervention.

**We seek to renew damaged acres by seeding as to maintain the myriad ecosystem and economic benefits.**

Tamarack forests are valuable for wildlife habitat, ecosystem services like clean water, and forest products like timber, fuelwood, and chemical extractives. The impact of this beetle outbreak on species, like the tamarack-dependent Connecticut warbler, and ecosystem services are unknown. The future of tamarack, an iconic Minnesota species, is uncertain.

## II. PROJECT ACTIVITIES AND OUTCOMES

**Activity 1: Assess plant and wildlife response in beetle-killed tamarack forests** ENRTF BUDGET: \$ 446,043

We will identify 120 sites dominated by tamarack across ownerships. We will:

- Field inventory vegetation to determine whether tree seedlings present could replace dead tamarack
- Survey the bird community over the course of the growing season to evaluate habitat
- Inventory vegetation using Unmanned Aerial Systems (UAS) that collect high resolution photography

These activities will result in the following outcomes and products:

- Inventories will confirm whether or not beetle-damaged tamarack are able to replace themselves or whether intervention is needed to increase the number of seedlings and saplings in damaged forests.
- UAS-collected data will be compared to field-collected data to identify a more efficient way to evaluate the hundreds of thousands of damaged tamarack acres.
- We will develop protocol for cost-effectively sampling tree regeneration using remote sensing.
- All findings will be summarized and shared via the MNDNR Division of Forestry Webpage, a regional source for forest management guidance, and the SFEC Forest and Wildlife Research Review conference.

Outcome	Completion Date
1. Identify 120 sample sites to conduct regeneration surveys	Feb. 2020
2. Collect data on vegetation (6,000 acres) and native bird response (30 sites)	Oct. 2020
3. Analyze, publish, and share findings with natural resource managers; incorporate findings into Activity 2	June 2021



**Environment and Natural Resources Trust Fund (ENRTF)**  
**2019 Main Proposal**

**Activity 2: Restore tamarack in beetle-killed tamarack forests**

**ENRTF BUDGET: \$ 418,393**

Information from Activity 1 will identify forests needing treatment to establish the next tree generation. We will:

- Restore understocked, or seedling-less, forest stands using aerial seeding methods. Sites will be seeded by helicopter with a mixture of tamarack, black spruce, and northern white cedar
- Use MNDNR [Regeneration Monitoring Procedures and Standards](#) to track site seedling growth and survival. All sites will be entered and tracked in our Silviculture Geodatabase.

Tamarack seed is often scarce and difficult to collect for reforestation efforts, so we will:

- Establish a 5-acre seed production area at our MN DNR General Andrews Tree Improvement Center
- Supply seed to all major land managing organizations in northern Minnesota. The seed production area will support reforestation across ownerships.

Outcome	Completion Date
1. Identify subset (~90) of sample sites with poor recruitment of young tamarack	Feb. 2021
2. Aerial seed identified sites (4,500 acres) with mix of tamarack, black spruce, and cedar	May 2020/2021
3. Establish tamarack seed production area (5 ac.) to supply seed for future restoration	June 2022

**III. PROJECT PARTNERS:**

**A. Partners receiving ENRTF funding**

*Dr. Windmuller-Campione, Assistant Professor, University of Minnesota, Data collection, analysis, and delivery*  
*Dr. Alexis Grinde, Wildlife Ecologist, Natural Resources Research Institute, Data collection, analysis, and delivery*  
*Jonathan Beck, Unmanned Systems Program Manager, Northland Comm. and Tech. Coll., Data collection*  
*MN DNR Resource Assessment, Data analysis*  
*MN State Forest Nursery, Seed collection and cleaning*

**B. Partners NOT receiving ENRTF funding**

*Sawyer Scherer, Forest Ecologist, UPM Blandin, Providing sites (Support Letter)*  
*Danae Schafer, Assistant County Land Commissioner, Koochiching County, Providing sites (Support Letter)*  
*Richard Moore, County Land Commissioner, Beltrami County, Providing sites (Support Letter)*

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

Results will be incorporated into MNDNR Division of Forestry's (DOF) tamarack forest management guidelines as it will represent the most robust source of information describing how these damaged tamarack forests are changing post-beetle infestation. The DOF's Silviculture Program has the capacity to implement findings into our aerial seeding and regeneration projects and track sites long-term using our Silviculture Geodatabase. Future reforestation will be sustained with DOF Silviculture operational funds.

As expressed in the accompanying support letters, results will influence how County and Industry manage their vast tamarack resource in the wake of this state-wide outbreak. The seed production site will supply all regional agencies with seed and be maintained by MNDNR Tree Improvement Program.

To ensure results are known and implemented both inside and outside of the partnering agencies, results will be delivered to regional natural resource managers through conferences (USFS Forest Health Workshop and SFEC Forest and Wildlife Research Review), webinars, and the MNDNR Forest Management Academy.

**V. TIME LINE REQUIREMENTS: Three years**

## 2019 Proposal Budget Spreadsheet

**Project Title: Evaluating forestry tools for conserving Minnesota's tamarack forest**

### IV. TOTAL ENRTF REQUEST BUDGET 3 years

BUDGET ITEM (See "Guidance on Allowable Expenses")	AMOUNT
<b>Personnel:</b> MNDNR: 8 Field Interns, 1.25 FTE total, 1 summer field data collection, 400 hrs. each at \$15/hr. (Activity 1; vegetation surveys)	\$ 48,000
MNDNR: Silviculture Prog. Coord. and Consultant, 0.10 FTE (73% salary, 27% fringe), 3 yrs., co-managing project including site selection, data collection, analysis, and product delivery	\$ 15,000
MNDNR: Regional Ecological Classification System Specialist and Forest Health Specialist, 0.04 FTE (73% salary, 27% fringe), 1 yr., site selection and data interpretation (Activity 1)	\$ 4,000
MNDNR: Tree Improvement Staff, 0.05 FTE (73% salary, 27% fringe), 3 yrs., initial maintenance of Seed Production Area (Activity 2)	\$ 15,000
<b>Professional/Technical/Service Contracts:</b> U of M: 1 MS Student, 0.50 FTE, 3 yrs., site selection, data collection, data analysis, and product delivery (Activity 1; vegetation survey)	\$ 168,210
U of M: Marcella Windmuller-Campione, PhD., 0.02 FTE (75% salary, 25% benefits), 3 yrs., supervision and direction for MS student research (Activity 1; vegetation survey)	\$ 37,000
NRRI: Research Scientists (2), 0.10 FTE (66.5% salary, 33.5% benefits), 3 yrs., deploy survey equipment, collect data, analyze data, and deliver findings (Activity 1; bird survey)	\$ 25,224
NRRI: Alexis Grinde, PhD. (NRRI) 0.02 FTE (66.5% salary, 33.5% benefits), 3 yrs., supervision and direction for Research Scientists (Activity 1; bird survey)	\$ 6,695
DNR Resource Assessment Consulting: 500 hrs. at \$95/hr, processing and analyzing field collected and UAS collected data (Activity 1; vegetation survey)	\$ 47,500
Northland Community Technical College Consulting: Unmanned Aerial Systems data collection, 120 sites at \$500/site (Activity 1; UAS vegetation survey)	\$ 60,000
State Forest Nursery: collect, clean, and prepare tamarack seed for aerial seeding at \$60.00/ac. for 4500 ac. (Activity 2; aerial seeding)	\$ 270,000
Aerial Seeding Contractor: contract with helicopter to seed 4500 ac. at \$12.90/ac. (Activity 2)	\$ 70,950
Regional Planting and Site-Prep Contractor: seed production area site prep, \$200/ac. for 6 ac., tree planting at \$5/tree and 950 trees (Activity 2, seed production area)	\$ 5,950
<b>Equipment/Tools/Supplies:</b> MNDNR, Vegetation Survey: cruising vests, prisms, diameter taps, clip boards, writing utensils, \$300 per intern and 8 interns (Activity 1; vegetation survey)	\$ 2,400
NRRI, Bird Survey: 5 Digital Audio Recorders (DARs, 25 DARs will be used from previous research projects) at \$950 each (\$4,750) + batteries and SD cards (\$250; Activity 2; bird survey)	\$ 5,000
Seed Production Area: 2 gal. tamarack containerized trees for seed production area, 950 trees at \$40/tree (Activity 2)	\$ 38,000
<b>Travel:</b>	\$ -
MNDNR, vegetation survey: 4 vehicles for 40 work days with 80 miles of travel per day at \$1.09/mile and lodging for 8 interns for 60 nights at \$30/night (Activity 1)	\$ 28,352
NRRI, bird survey: fieldwork and planning meetings, including mileage (75%) and lodging (25%) for researchers. Mileage reimbursed at \$0.545/mile, lodging \$90-\$130/night (Activity 1)	\$ 3,000
<b>DNR's direct and necessary costs:</b> (~\$14,155 total) pay for activities that are directly related to and necessary for accomplishing appropriated programs/projects. Direct and necessary costs cover HR Support (~\$2,571), Safety Support (~\$533), Financial Support (~\$2,919), Communication Support (~\$1,251), IT Support (~\$5,822), Planning Support (~\$1,059)	\$ 14,155
<b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>	<b>\$ 864,436</b>

### V. OTHER FUNDS (This entire section must be filled out. Do not delete rows. Indicate "N/A" if row is not applicable.)

SOURCE OF FUNDS	AMOUNT	Status
<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	
<b>In-kind Services To Be Applied To Project During Project Period:</b> MN DNR Argo, tracked vehicle for accessing wet sites 90 days at \$100/day	\$ 9,000	Secured
MN DNR Field Foresters and Aerial Operations time for setting up and administering aerial seeding contract. 0.10 FTE for 2 years	\$ 20,000	Secured
UPM Blandin Forest Ecologist, 10 hrs per year for 3 yrs, site selection and consultation	\$ 3,000	Secured
<b>Past and Current ENRTF Appropriation:</b>	NA	
<b>Other Funding History:</b>	NA	



## EVALUATING FORESTRY TOOLS FOR

# Conserving Minnesota's Tamarack Forests

### THE PROBLEM

Minnesota is experiencing a 17-year eastern larch beetle (ELB) outbreak that is devastating our unique tamarack forests. These forests are valuable for habitat, clean water, and forest products. ELB continues to expand, and the future of mature tamarack forests, an iconic Minnesota forest type, is uncertain.

#### SCALE

440k

Over **440,000 acres of tamarack have been affected** by ELB in an outbreak spanning 17 years. Over half of those acres belong to The State of Minnesota.

#### HABITAT



Tamarack provides critical habitat for many **Species of Greatest Conservation Need** including the Connecticut warbler, olive-sided flycatcher, bog copper butterfly, and northern bog lemming.

#### REGENERATION



There is concern that **tamarack may not be replacing itself** because mature trees are killed before they produce seed to grow the next generation of tamarack trees -- this could mean large losses of forest.

**“We’ve never recorded an outbreak like this before,” said Brian Schwingle, a forest health specialist with the Minnesota Department of Natural Resources. “It’s unprecedented.”**

THE STAR TRIBUNE, 8/13/2017

### THE SOLUTION

**SURVEY** and determine the habitat quality of dead and damaged tamarack forests.

**RESTORE** tamarack where it is not replacing itself.

**PRODUCE** seed to secure the future of tamarack in Minnesota.



**Project Co-Managers:** Paul Dubuque / Mike Reinikainen

**Affiliation:** Silviculture Program Consultant / Coordinator, MN DNR Division of Forestry,

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**Dubuque** has worked for the DNR Division of Forestry for twenty years and is currently responsible for reforestation activities on 4.2 million acres of state forest land. He serves on several interdisciplinary forest management teams in DNR and provides program leadership to Division personnel to ensure forest management and research activities are cost effective, rooted in scientific principles, and aligned with DNR goals.

#### **Dubuque Recent Work Experience**

1998-2009	Forester
2009-2013	Ecological Classification and Silviculture Region Specialist
2014-2016	Timber Program Coordinator
2016-2017	Silviculture Program Coordinator
2017-Present	Silviculture Program Consultant

#### **Dubuque Education**

U of MN Twin Cities	St. Paul, MN, US	Forest Resource Management	B.S., 1997
USDA Forest Service	Milwaukee WI, US	Adv. Studies in Silviculture	Certificate 2004
MN Management & Budget	St. Paul, MN	Emerging Leaders Institute	Certificate 2011

**Reinikainen** has worked in forestry in the Lake States for eleven years. He has experience as a field forester working across Minnesota for State, County, and University forestry programs. He has 6 years of experience managing large-scale silviculture projects as a forester and Research Fellow with the UMN.

#### **Reinikainen Recent Work Experience**

2011	Research Fellow, Research Forester, Dept. of Forest Resources, UMN
2015	Senior Forester, Hennepin County Environment and Energy
2016	Senior Forester, Private Forest Management, MNDNR
2017	Silviculture Program Coordinator, MNDNR

#### **Education**

U of MN Twin Cities	St. Paul, MN, US	Natural Resources and Forestry	B.S., 2008
U of MN Twin Cities	St. Paul, MN, US	Applied Forest Ecology and Silviculture	M.S., 2011

#### **Project Responsibilities**

Reinikainen will assist in coordinating study design and implementation with partners. Dubuque will provide administrative support for Mike Reinikainen and the University of Minnesota Researchers. They will assist with site selection, establishing data collection procedures, and leading efforts to incorporate findings into DNR guidance and policy documents. Reinikainen and Dubuque will work with all cooperators to share findings internally and widely in Minnesota with other land managers.

#### **Organization Description**

The Minnesota Department of Natural Resources (DNR)'s mission is to work with citizens to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life. The Division of Forestry's Silviculture Program mission is to utilize forest science, expertise, experience, and tools to develop and apply site-level management plans that will meet management objectives while addressing forest health and productivity in a sustainable manner.