

**Environment and Natural Resources Trust Fund
2015 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 100-E

Development of Forest Seed Transfer Guidelines for Minnesota

Category: E. Air Quality, Climate Change, and Renewable Energy

Total Project Budget: \$ 327,602

Proposed Project Time Period for the Funding Requested: 3 years, July 2015 - June 2018

Summary:

This proposal provides public and private landowners with scientifically based forest seed transfer guidelines for Minnesota to protect and enhance forest productivity against changes associated with a warming climate.

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Sponsoring Organization: U of MN

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Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

Map shows six current seed zones for Minnesota and 4 locations across the state where trials will be installed; TBD, Eveleth, Sandstone, TBD.

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

PROJECT TITLE: Development of forest seed transfer guidelines for Minnesota

I. PROJECT STATEMENT

Minnesota’s forests are part of our common heritage and provide economic, ecological, cultural and aesthetic value to the state and its inhabitants. This proposal will provide scientifically based seed transfer guidelines for forest tree species in Minnesota to protect and enhance forest productivity against changes associated with a warming climate.

Minnesota’s forests provide a wide range of values. Economically they are the driver for a robust forest products industry (8.6 billion dollars annually, 36,000 employees, 1.6 billion dollars in wages) and act as a draw for many to recreate. Ecologically, forests determine the presence and abundance of understory plants and animals and together these fulfill important cultural roles. Climate change is expected to reduce the productivity of Minnesota’s forests through warmer than normal temperatures, increased variability in precipitation and an increased incidence of exotic diseases and insect pests like emerald ash borer.

Forests are especially vulnerable to climatic warming because they cannot move. As a result forest productivity suffers because the trees are not adapted to the new conditions. These threats can be mitigated if we know the best seed sources to plant to maximize survival and growth.

The MN DNR divides the state into six seed zones (see map). Currently these zones guide seed collection and planting throughout the state under the untested assumption that local seed is best adapted to local growing conditions. However, with a warming climate, seed collected from southern or central Minnesota may be more appropriate to plant in northern areas. ***Only by scientifically testing these seed zones under changing environmental conditions will we gain the basic knowledge and understanding needed to make recommendations for seed transfer guidelines.*** Both public and private landowners need seed transfer guidelines that have been rigorously tested so they can make informed decisions about future seed sourcing.

The goal of this project is to improve forest productivity throughout Minnesota by providing scientifically based seed transfer guidelines for forest tree species. To accomplish this goal we will test three different tree species in common garden trials at four locations throughout the state. Each common garden will be planted with seedlings sourced from three to four MN DNR seed zones as appropriate. We will compare the effects of seedling movement on productivity and adaptation traits (survival, height, diameter, bud break and bud set) for three representative tree species; 1) red pine, the most commonly planted tree in Minnesota, 2) white spruce, a high value pulpwood species and 3) red oak, a high valued hardwood species. These species were chosen for their range of genetic variation, and the fact that they are broadly representative of tree species most likely to be planted in Minnesota. The outcome of this research will be a new seed zone map with associated seed transfer guidelines directly applicable to these three species and broadly applicable to other species with similar life history traits.

All results will be shared through a combination of sources designed to reach the widest array of private and public landowners and natural resource professionals, e.g. Minnesota Tree Improvement Cooperative, MN Nursery Landscape Association, www.MyMinnesotaWoods.com, MN Chapter Society of American Foresters, Private Woodland Owners Association, MN Consulting Foresters Association and peer-reviewed applied forestry journals.

II. DESCRIPTION OF PROJECT ACTIVITIES

Budget: \$ 91,217

Activity 1: Locate and prepare four sites

Choose suitable sites for common garden trials on secured MN DNR lands near Eveleth and Sandstone. Identify two more sites in zones 102 and 106 on DNR and/or University of Minnesota property. Prepare all four sites for planting: chemical site preparation, tilling, fencing and order seedlings.

Outcome	Completion Date
<i>1. Locate 4 sites for common garden trials and order seedlings</i>	<i>July 2015</i>
<i>2. Site preparation and fencing</i>	<i>November 2015</i>

Activity 2: Install and maintain trial at four sites.

Budget: \$ 97,871

Plant seedlings, manage competing vegetation, water seedlings and repair fencing as necessary. Collect and analyze first year data on survival and total height growth.

Outcome	Completion Date
<i>1. Plant seedlings</i>	<i>June 2016</i>
<i>2. Trial maintenance (3 trips to 4 sites for maintenance)</i>	<i>August 2016</i>
<i>3. Collect first year data and analyze</i>	<i>January 2017</i>

Activity 3: Collect full suite of data and disseminate initial results.

Budget: \$138,514

Additional maintenance will be required in year two. Replace any seedlings that died in first year, repair fencing, manage competing vegetation, collect full suite of data on bud break, bud set, survival, height growth and diameter. Analyze data, write initial full reports and make initial presentations.

Outcome	Completion Date
<i>1. Trial maintenance (3 trips to 4 sites for maintenance)</i>	<i>August 2017</i>
<i>2. Collect data throughout season</i>	<i>May-Sept. 2017</i>
<i>3. Analyze data, write reports, disseminate information</i>	<i>Oct 17-June 2018</i>

III. PROJECT STRATEGY

A. Project Team/Partners

The project team includes: Andrew David (University of Minnesota) project manager to manage work flow. Carolyn Pike (UMN) as data manager and analyst. Egon Humenberger and James Warren (UMN) provide technical assistance in the field. Graduate student (UMN-TBD) to assist with data collection, input, analysis and report writing. (David, Pike, Humenberger, Warren and graduate student all receive some funding from ENRTF.)

Minnesota State Nursery to grow seedlings, Minnesota DNR and UMN to provide 4 sites for 20 years as an in-kind contribution.

B. Timeline Requirements

This project will provide forest seed transfer guidelines to private and public landowners interested in planting trees throughout Minnesota. The trial is designed to last up to 20 years – if tree survival is sufficient. We will establish the trial, collect useful data and report early results at the end of year 3 but because trees are long-lived organisms, and climate effects are cumulative, the most important data will occur after 10-15 years.

C. Long-Term Strategy and Future Funding Needs

The trial is designed to last 20 years but the initial site preparation, fencing and vegetation control is crucial (and expensive) if the trial is to provide useful data. We are asking ENRTF for funding to cover establishment and first analysis - the most expensive portions of any field trial. We anticipate minimal additional costs in subsequent years when the best data becomes available. Travel costs, data collection and analysis in years 4-20 will be incurred by the Minnesota Tree Improvement Cooperative through the Department of Forest Resources at UMN.

2015 Detailed Project Budget

Project Title: *Development of Forest Seed Transfer Guidelines for Minnesota*

PI: Andrew David

IV. TOTAL ENRTF REQUEST BUDGET 3 years

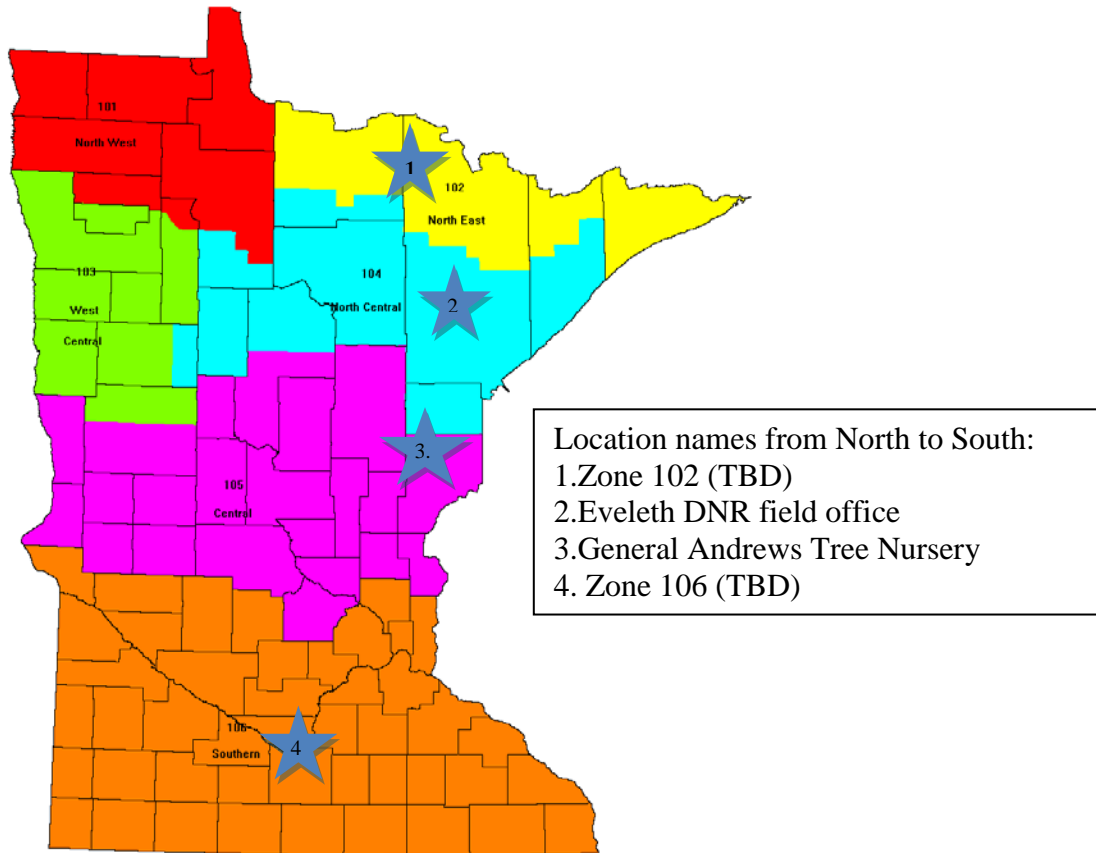
BUDGET ITEM (See "Guidance on Allowable Expenses", p. 13)	AMOUNT
Personnel:	
Andrew David, PI, 0.1 FTE for 3 years (33.11% fringe) to organize and manage work	\$ 29,100
Carolyn Pike, Research Fellow, 0.28 FTE for 3 years (33.6% fringe) to manage and analyze data and assist with report writing	\$ 54,750
James Warren, Research Fellow, 0.2 FTE for 3 years (33.6% fringe) for technical assistance in field, establishing fencing, planting seeds, vegetation control and data collection	\$ 33,600
Egon Humenberger, Assistant Scientist, 0.2 FTE for 3 years (36.8% fringe) for technical assistance in field, establishing fencing, planting seeds, vegetation control and data collection	\$ 42,600
TBD, Grad Research Assistant, 0.5 FTE for 3 years (\$17.34/hr tuition, 15.7% health insurance & 7.4% summer FICA) to collect, input and analyze data and to assist with report writing.	\$ 112,800
Contracts:	
TBD: For site preparation at site locations	\$ 3,000
Equipment/Tools/Supplies:	
Seedlings to plant	\$ 2,000
Fencing to protect seedlings from browse	\$ 24,000
Mower to control vegetation around seedlings	\$ 2,500
Supplies to install and measure seedlings (shovels, pin flags, measuring tapes, etc.)	\$ 3,000
Travel:	
In-state overnight travel (mileage, per diem, lodging, etc.) for reasearch team to travel to establish sites, control vegetation, collect data and repair fencing.	\$ 20,252
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 327,602

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
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:	\$145,718	Secured
Unrecovered indirect costs @ 52% of modified total direct cost base of \$280,226		
Long term (20+ years) site location for 4 sites. Secured 3 of 4 sites on UMN or DNR property. Fourth site pending.	\$0	3 secured 1 pending
Funding History:	N/A	
Remaining \$ From Current ENRTF Appropriation:	N/A	

LCCMR 2015 Visual Map of Influence

Title: Development of forest seed transfer guidelines for Minnesota.



Map of current untested seed zones with location of four test sites indicated by stars. Results will be applicable state-wide.

LCCMR 2015 Project Manager Qualifications

Title: *Development of forest seed transfer guidelines for Minnesota*

Project Manager: Andrew DAVID

Qualifications: Twenty-six years in the field of forest genetics; fifteen years as Director of the Minnesota Tree Improvement Cooperative and faculty member in Department of Forest Resources at the University of Minnesota.

Organization Description

The University of Minnesota is a land-grant institution and research university with a strong tradition of education and service to the state. The Department of Forest Resources is the leading research and educational institution on forest related issues in Minnesota. For over 100 years the department has played a key role in discovering and fostering sustainable forest resource management activities in Minnesota.