

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

Project Title:

ENRTF ID: 130-F

Transitioning Pine Plantations to Multi-Aged, Mixed-Species Pine Stands

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

Total Project Budget: \$ 260,222

Proposed Project Time Period for the Funding Requested: 2 years, July 2015 - June 2017

Summary:

Project helps design, test and demonstrate stand-level management for transitioning red pine plantations to multi-aged, mixed-species pine stands. Project includes deer control research and enhances educational site in central location

Name: Howard Hoganson

Sponsoring Organization: U of MN

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Location

Region: Central, NW, NE

County Name: Aitkin, Becker, Beltrami, Benton, Carlton, Cass, Chisago, Clearwater, Cook, Crow Wing, Hubbard, Isanti, Itasca, Kanabec, Kandiyohi, Koochiching, Lake, Lake of the Woods, Mille Lacs, Morrison, Otter Tail, Pine, St. Louis, Todd, Wadena

City / Township:

Alternate Text for Visual:

Pictures showing multi-aged pine with understory, deer protection, and deer damage

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



I. PROJECT TITLE: Transitioning Pine Plantations to Multi-aged, Mixed-Species Stands

PROJECT STATEMENT

Project will help design, test and demonstrate stand-level management actions for transitioning red pine plantations to multi-aged, mixed-species pine stands. For 80+ years, red pine has been the most planted tree species in Minnesota. Red pine plantations lack diversity in tree species, tree ages and tree sizes, all important characteristics for wildlife habitat and for reducing risks of natural disturbances, including insects, disease, and uncertain future climate changes. Results of project will provide guidance to help foresters transition single-aged red pine plantations to multi-aged stands with large red pine trees remaining to provide important wildlife benefits. Partial harvests will increase light needed for successful regeneration and growth of mixed understory tree species including white pine and northern white cedar. To be successful, transition treatments must also include activities to control deer damage. Deer control requires a multiple year commitment to grow trees above browse height and the most cost effective way to do that is unclear.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Testing mixed-species, two-aged red pine options

Budget: \$260,222

Minnesota has an estimated 390,000 acres of red pine plantations, many over sixty years old. This activity will install tests at the University of Minnesota North Central Research and Outreach Center (NCROC) to examine alternatives for transitioning middle-aged red pine plantations to multi-age stands with a red pine overstory and mixed-species understory. Intent is to examine, from an individual stand perspective, ways of achieving both economic returns and environmental values derived from more tree species diversity and a greater range of tree ages. Tests will examine growth response over a gradient of understory light conditions created after partial harvest of a red pine overstory. After partial harvests, middle-aged overstory red pines have potential to grow substantially for many years, much like red pine trees that survive and grow well in natural stands after fire disturbance. With forest fires controlled and far less frequent today, Minnesota forests will benefit ecologically from management systems that transition pine plantations more towards natural conditions, having older trees and younger trees of multiple (mixed) species. Treatments will be compared economically to projections of thinning options that maintain plantations longer, but do not focus on conditions of the understory. The study will pool results with ongoing studies of red pine management by partners on the Chippewa National Forest. Understory plantings will include conifer species native to northern Minnesota. Project will be linked with Minnesota Tree Improvement Cooperative to include multiple seed sources.

Project is uniquely positioned to utilize the forest of the University of Minnesota, NCROC. The Center has a long history of supporting forest management research. It is home to the Chapman Plantation, the oldest red pine research plantation in the US. A number of NCROC red pine plantations established in the early 1950s are currently at an ideal age for studying transition to mixed-species stands. White pine understory studies have been implemented at NCROC in recent years, including strategies for controlling deer browse. The NCROC forest is adjacent to both Itasca Community College (ICC) and the USDA Forest Service Northern Research Station. Faculty and forestry students from ICC will play an active role, helping implement plantings and monitor results. USDA Forest Service ecologists will help in experimental design, field measurements, analysis, advising graduate students and linkages with other ecological studies on USDA National Forest lands. The project site is centrally located, making it easily accessible to many Minnesota's forest landowners. NCROC emphasizes the land grant mission of the University through its commitment to long-term studies of sustainable management of Minnesota's Natural Resources.



Outcome	Completion Date
1. Partial harvesting completed and plantings established	October 2015
2. Summary of tree survival and growth – year 1.	May 2016
3. Summary of tree survival and growth – year 2.	May 2017
4. Final Report and communication of results	June 2017

III. PROJECT STRATEGY

A. Project Team/Partners

Project PI: Dr. Howard Hoganson (forest management), Dept. of Forest Resources & North Central Research and Outreach Center, Univ. of MN. Hoganson will lead in design to integrate ecological and economic objectives and to compare treatments to more traditional plantation management involving long rotations, thinnings and limited regeneration in the understory.

Key Collaborator: Mr. Brad Jones (silviculture), Itasca Community College (ICC). Jones has over 30 years practical field experience, working many years for the Itasca County Land Department. He currently leads ICC forestry program and knows the NCROC forest as well as anyone. He sees this as a valuable project for helping train new foresters.

Key Collaborators: Dr. Brian Palik and Dr. Christel Kern, USDA Forest Service. Palik is a nationally recognized leader in forest ecology and silviculture research. Kern, recently trained, has studied red pine ecology and silviculture. Both Palik and Kern will be instrumental in project design and interpretation of results.

Budget includes only partial summer salaries for Hoganson and Jones. Majority of funding request is to support a graduate student and a half-time University research scientist. USDA Forest Service will make available high-quality light meters for tests. The University is supplying test sites at no cost to the project and waiving all indirect costs. Students from Itasca Community College will help with site prep, planting monitoring and deer protection at minimal cost.

B. Project Impact and Long-Term Strategy

Project has potential to impact management of existing red pine plantations of all ownership groups in Minnesota. It is this potential that brings this diverse group together. The University of Minnesota’s NCROC forest is managed to emphasize long-term research and education. Support for this project will help demonstrate the importance of this long-term mission. The University will work with the USDA Forest Service and Itasca Community College on transferring results to forest managers, students, and landowners. The NCROC forest is open to the public with hiking trails in the summer and ski trails in the winter. The North Country National Scenic Trail is planned to traverse the NCROC forest, creating additional educational opportunities soon. NCROC is home to a regional University of Minnesota Extension Office with forestry education activities occurring often onsite. Long-term expenses specific for this project are expected to be minimal. NCROC intends to maintain tests by protecting plantings from deer browse until tress grow above deer browse – likely an additional 5-8 year commitment.

C. Timeline Requirements

The project will be completed in two years with 2 winters to address tree growth and survival. Intent is for the collaborating organizations to monitor plantings long-term with monitoring activities providing excellent experiential learning opportunities for students from both the University of Minnesota and Itasca County Community College.

2015 Detailed Project Budget

Project Title: Transitioning Red Pine Plantations to Multi-aged Mixed-Species Pine Stands

IV. TOTAL ENRTF REQUEST BUDGET 2.0 years

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel: PI Hoganson -- U of MN faculty, Department of Forest Resources & North Central Research & Outreach Center (NCROC) in Grand Rapids -- one month of summary salary in 2015 and 1 month in 2016. Includes 33.6% fringe and assumed 2.5% salary increase/yr	\$ 32,712
Personnel: Research Scientist -- University of Minnesota NCROC. Forest at NCROC is well suited for this project with research scientist assisting in implementation. Salary is 50% time for each year and includes 26.4% fringe and 2.5 % salary increase per year.	\$ 79,505
Personnel: Graduate Research Assistant -- Department of Forest Resources , University of Minnesota , St Paul. Half-time research assistship for 2 years, with work serving as basis of masters thesis. Salary includes 215% fringe + \$17.84/hr tuition benefit assuming full-time graduate student status during 2 academic years.	\$ 80,000
Personnel: Undergraduate Research Assistants -- North Central Research and Outreach Center, University of Minnesota , Grand Rapids. Two Full-time for summer, two part-time for school year @ 10 hours/wk. Salary is estimated at \$12/hr with estimated 2.5% salary increase per year. Fringe rate is 7.4%.	\$ 26,323
Contract: Itasca Community College (ICC) -- Forestry Instructor Brad Jones will help coordinate field activities and work with ICC forestry students (960 hours/yr) Contract includes 160/hours per year @ \$75/hour (fringe included) with 2.5% salary increase per year	\$ 24,908
Equipment/Tools/Supplies: Tree seedlings for test plantings.	\$ 5,000
Equipment/Tools/Supplies: : Deer protection supplies, primarily tree posts and netting.	\$ 7,000
Travel: Partial support for meals and summer lodging for graduate student (30 days/yr) in Grand Rapids, and mileage reimbursment for 4 trips/year between Grand Rapids and St Paul Campus. Estimates assume 2.5% increase/yr	\$ 4,774
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 260,222

V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
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 direct costs, calculated at the University's federally negotiated rate of 52% Modified Total Direct Costs	\$ 119,195	Secured
Funding History:	\$ -	N/A
Remaining \$ From Current ENRTF Appropriation:	\$ -	N/A



Right: Successful pine regeneration under an open white pine overstory. No successful pine regeneration in the foreground on the left because area is not protected from deer. A fence protects the successful pine regeneration. Looking closely, one can see the fence posts.



Left: Budcapping a young white pine to protect from deer

Right: Terminal bud was protected but top lateral buds were browsed by deer. Note lack of pine regeneration in the understory. Budcapping alone is questionable alternative in areas with heavy deer activity. Research will explore effective and efficient ways of getting trees above deer browse heights.





Project Manager Qualifications/Organization

Howard M. Hoganson, Professor

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Background: He has a B.S. degree in forestry from the University of Minnesota, a M.S. degree in forestry from the University of Washington, a M.S degree in operations research from the University of Minnesota and a Ph.D. in forest management from the University of Minnesota. He joined the faculty at Minnesota in 1987 after service as a Principal Economist with the USDA Forest Service North Central Research Experiment Station in Duluth, Minnesota and a faculty member in the Forestry Department at Virginia Polytechnic Institute and State University in Blacksburg, Virginia. He has authored numerous papers on forest management planning and served as an Associate Editor for *Forest Science* for five years. Recently he has served as lead analyst in forest harvest scheduling efforts for Interagency Information Center of the University of Minnesota. He has been recognized internationally for developing solution methods for forest management models that take advantage of the specific mathematical structure of forestry problems. These methods have been used in large-scale applications in US, Canada, Sweden, Brazil and Portugal. He is the instructor for forest management & planning courses for the Department of Forest Resources, University of Minnesota. He led technical timber supply analysis for the Environmental Impact Statement for a proposed \$700 million UPM Blandin Mill Expansion in Grand Rapids, MN and served as the lead analyst for the 2004 Forest Plan for the Chippewa and Superior National Forests in Minnesota. His research results served as the basis for scenario modeling for the Minnesota Generic Impact Statement (GEIS) on Timber Harvesting and Forest Management. Since the GEIS, he has often worked closely with the Minnesota Forest Resources Council (MFRC) and Minnesota DNR. He currently serves on the Information Management Committee of the MFRC. Recent research has emphasized spatial facets of forest management with applications to Kirtland's warbler habitat in Michigan on the Hiawatha National Forest. He is especially interested in linking operational planning and analysis with broad forest-wide objectives involving both environmental and economic objectives.

Responsibilities for the proposed project: Hoganson will oversee all aspects of the project including close collaborations with USDA Forest Service scientists Palik and Kern and the Itasca Community College (ICC) forestry program and its lead instructor, Jones. The USDA Forest Service has substantial knowledge and experience for addressing the environmental facets of managing pines. Jones is a highly regarded silviculturist known for his practical understanding of a wide range of silvicultural activities and associated impacts. The interdisciplinary nature and the important applied aspects of the project will help Hoganson attract a top graduate student to the project. Hoganson will also coordinate work with the Minnesota Tree Improvement Cooperative, and the University of Minnesota, Department of Forest Resources. Emphasis will be on teamwork to help improve Minnesota forests.