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

Project Title: **ENRTF ID: 170-F**

Sustaining Long-lived Pines on Minnesota's Landscape

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

Total Project Budget: $ 443,576

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

Summary:

Diplodia poses a major threat to red pine. Strategies will be developed and field-tested for sustaining older pines on the landscape long-term, better coordinating red pine and white pine management

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Location

Region: Central, NW, NE

County Name: Aitkin, Becker, Beltrami, Carlton, Cass, Clearwater, Cook, Crow Wing, Hubbard, Itasca, Koochiching, Lake, Lake of the Woods, Mille Lacs, Morrison, Otter Tail, Pennington, Pine, Red Lake, Roseau, St. Louis, Todd, Wadena

City / Township:

Alternate Text for Visual:

Photo showing Diplodia impact under drought & climate change, plus graph showing lack of younger red pine

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

PROJECT TITLE: Sustaining Long-lived Pines on Minnesota's Landscape

I. PROJECT STATEMENT

Diplodia pinea, a fungal pathogen, now poses a major threat to managing red pine (*Pinus resinosa*), Minnesota's state tree and most planted tree species. The presence of *Diplodia* in Minnesota has increased dramatically and is now found in most red pine stands. Increased annual droughts expected with climate change will exasperate *Diplodia* impacts on red pine. Minnesota's site-level management guide now suggests removing all red pine when harvesting if red pine is to be re-established. *Diplodia* also infects young red pine if red pine cones remain on a site after harvesting. Minnesota has over 600,000 acres in the red pine cover type. Compared to aspen, Minnesota's most harvested species, red pine grows more than twice as fast with more than double the stumpage value per cord. This study will identify and evaluate strategies for retaining an old red pine overstory by regenerating white pine (*Pinus strobus*) underneath. Also important will be transitioning other stand types to red pine where *Diplodia* is not a problem. Statewide strategies will be analyzed and important site-level detail will be field-tested. White pine, another key long-lived pine, also has regeneration challenges (blister rust and deer browsing). Local communities, environmental groups, and forest industry have a strong desire for sustaining pines on the landscape. Information is needed to help better understand how that can be accomplished. Pine regeneration over the last twenty years has been well below levels necessary to sustain pine long term. Opportunities for better coordinating strategies for red pine and white pine are potentially key.

Strong ties to the forest community will leverage funding and accelerate the project. Itasca Community College's forestry program will help implement site-level tests and integrate concepts derived into courses in forest management and silviculture. The University of Minnesota's North Central Research and Outreach Center (NCROC) will provide mature red pine sites for testing and is centrally located for long-term research, demonstration and education. Models developed by NCROC via support from the Blandin Foundation will provide scientific and technical detail important for addressing broad statewide strategies. Key staff from the Minnesota DNR and Minnesota's Forest Resources Council will help realize the broad extent of project benefits. The Project addresses LCCMR funding priority areas associated with Foundational Information (A), Environmental Education (C), Invasive Species (D), Climate Change (E), and Land Restoration (F).

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Testing mixed-species, two-aged red pine/ white pine options **Budget: $245,218**

Field tests will be installed at NCROC to examine alternatives for transitioning middle-aged red pine plantations to multi-aged stands with a red pine over story and white pine understory. Intent is to examine, from an individual stand perspective, ways of overcoming *Diplodia* challenges while also realizing 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 after-harvest, understory light conditions. After partial harvests, middle-aged, over-story red pines have potential to grow substantially for many years, much like red pine trees that grow well in natural stands after fire disturbance. Minnesota forests would benefit ecologically from management systems that transition pine plantations more towards natural conditions, having older pines and younger trees of multiple (mixed) species, important for wildlife and resilient to climate change. 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 field tests established	June, 2017
2. Summary of tree survival and growth – growing year 1.	December, 2017
3. Summary of tree survival and growth – growing year 2.	December, 2018
4. Final Report and communication of results	June, 2019

Activity 2 Pine restoration opportunities from a system-wide perspective **Budget: $ 198,358**

Older pines are important components of Minnesota forests. Recently, much focus has been on retaining older pine stands by using thinnings and limiting "end-of-rotation" harvesting. Yet sustaining older pines long-term depends on establishing young pines. Pines are expensive to establish, with competition strong for forest management dollars, making it critical to provide a strong and effective case for investments to restore and sustain pine long term. A stronger case can be made by considering a broader forest-wide perspective, recognizing both important environmental and economic benefits. Investments in site-level restoration options have broad, forest-wide (system-wide) impacts. For example, intensifying management on better sites can reduce harvesting pressures on sensitive lands or increase overall sustainable harvest levels, thereby potentially realizing economic returns much sooner than achieved directly from the long-term nature of individual site-level investments. When considered only from an individual-stand perspective, the value of forestry investments is often substantially underestimated. Recently, the Blandin Foundation funded a study to update the baseline statewide analysis and models that were used for the 1994 Minnesota Generic Environmental Impact Statement (GEIS) on timber harvesting and forest management in Minnesota. This activity will extend that work to identify and evaluate effective statewide strategies for better utilizing red pine and white pine restoration options and how such options might be better integrated across landscapes to help overcome *Diplodia* by changing (rotating) forest cover types over time. Results will link pine restoration with potential opportunities to improve forest productivity and support local economies.

Outcome	Completion Date
1. Draft report comparing initial statewide strategies	October, 2018
2. Final report comparing revised strategies	April, 2019
3. Presentations of results to forest community &Minnesota Forest Resources Council	June 2019

III. PROJECT STRATEGY

A. Project Team/Partners

Project PI: Dr. Howard Hoganson, Professor, Dept. of Forest Resources & NCROC , Univ. of MN., Grand Rapids. Hoganson has 30-year history in analyses for forest management. Hoganson will oversee activities.
Key Collaborator: Mr. Brad Jones (silviculture), Itasca Community College (ICC). Jones has over 30 years practical field experience. He currently leads ICC forestry program and knows the NCROC forest well.
Key Collaborator: Dr. Curtis VanderSchaaf (forest growth expert and DNR leader in forest planning analysis), MN DNR, Grand Rapids. VanderSchaaf provides key ties with DNR planning & data.
Key Collaborator: Dr. Calder Hibbard (forest policy), Minnesota Forest Resources Council (MFRC) St Paul. Hibbard will help coordinate project with MFRC members and the forestry community.

Computers for analysis will be supplied by U of MN and MN DNR. Valuable and timely base support originates from $135,000 Blandin Foundation study to be completed by December, 2015.

B. Project Impact and Long-Term Strategy

Project will improve understanding of potential opportunities to increase pine component in Minnesota's forests. Site-level and systems-level approaches will help integrate environmental and economic objectives over broad landscapes and ownerships. Strong ties with Minnesota DNR and Minnesota Forest Resource Council to help utilize and implement results. NCROC forest provides centrally located, long-term sites for demonstration and continuing education.

C. Timeline Requirements

Project will be completed in three years.

2016 Detailed Project Budget

Project Title: Sustaining Long-lived Pines on Minnesota's Landscape

IV. TOTAL ENRTF REQUEST BUDGET 3.0 years

BUDGET ITEM	AMOUNT
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/year Includes 33.7% fringe and assumed 2.5% salary increase/yr	$ 51,072
Personnel: Research Scientist/Fellow -- University of Minnesota NCROC. Assists in all activities. Salary is 100% time each year and includes 33.7% fringe and 2.5 % salary incease per year. Position may split time between Grand Rapids and St Paul.	$ 222,054
Personnel: Seasonal labor -- NCROC, University of Minnesota , Grand Rapids. Two full-time for summer and two part-time (10 hours/wk) for part of school year. Salary is estimated at $13/hr with 2.5% salary increase per year. Fringe rate is 7.9%.	$ 47,456
Contract: Itasca Community College (ICC) -- Forestry Instructor Brad Jones will help coordinate field activities & communicate results. Contract includes 200/hours per year @ $77/hour (fringe included) with 2.5% increase per year	$ 49,210
Contract With Minnesota DNR Dr. Curtis VanderSchaaf, lead forest planning analyst for DNR, will help integrate study with DNR planning, providing best available DNR data on growth and yield of pine, and current DNR planning assumptions. VanderSchaff is located in Grand Rapids. Contract includes 120 hr/yr @ $90/hr including all fringe with 2.5% increase per year .	$ 33,217
Contract With Minnesota Forest Resources Council (MFRC): Dr. Calder Hibbard, Policy Analyst, MFRC, will provide data and insights on current Minnesota forest policies, plausible adjustments to policy and input from MFRC members and staff. Hibbard will help present findings to stakeholders. Contract will require less than 100 hours of Hibbard's time each year.	$ 23,067
Equipment/Tools/Supplies: Tree seedlings for test plantings.	$ 5,000
Equipment/Tools/Supplies: : Deer protection supplies, fencing, tree posts and netting.	$ 7,500
Travel: 4 trips/year between Grand Rapids and St Paul Campus.	$ 5,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 443,576

V. OTHER FUNDS

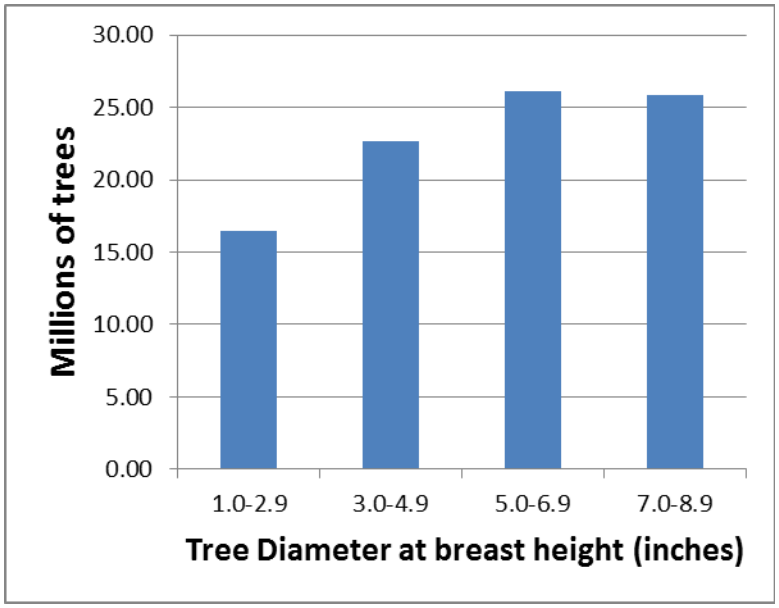
SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ To Be Applied To Project During Project Period:	$ -	N/A
Other State $ To Be Applied To Project During Project Period: /	$ -	N/A
In-kind Services To Be Applied To Project During Project Period: Unrecovered indirect direct costs, calculated at the University's federally negotiated rate of 52% Modified Total Direct Costs	$230,660	Secured
Funding History: Funding from the Blandin Foundation to support statewide forest resource assessment. Project to be completed December, 2015 and provide stateline baseline analysis that will help provide important detail for this poject	$ -	135,000
Remaining $ From Current ENRTF Appropriation:	$ -	N/A

What is the ultimate fate of infected red pine seedlings under an infected overstory?

Occasional drought years activate the latent infections and also allow the shoot blight infections to grow down the stem. *Diplodia* infections wipe out all the RP regeneration in a year or two. Then the drought/disease cycle repeats itself.

From: http://www.dnr.state.mn.us/fid/nov2014/articles.html#diplodia

Historically, red pine regenerated naturally after fire. With fires now greatly suppressed, red pine depends on planting, a long-term investment and difficult to do extensively under tight budgets. The figure below shows the most recent statewide estimate of the number of red pine trees by diameter (dbh) class for smaller trees in stands artificially regenerated. The graph strongly suggests that investments in red pine reforestation have declined substantially statewide in recent years. Generally, for a steady-state (sustainable) condition for red pine, more trees are needed in the smaller diameter classes for the diameter classes shown below -- because some trees die before growing larger, and because trees in the dbh classes shown, grow faster as they get larger, thus spending less time in each successive diameter class.



Developed using: http://apps.fs.fed.us/Evalidator/evalidator.jsp.

Project Manager Qualifications/Organization

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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 U of MN faculty 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 the 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 committed to 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 project, emphasizing integration of site-level detail with broad statewide and long-term environmental objectives. Hoganson will provide important link with Blandin Foundation study to be completed by December 2015 to describe current and projected statewide forest conditions. Brad Jones, Forestry Program Leader, Itasca Community College (ICC) is recognized leader in MN in applied aspects of forest management and will play a key role in testing new site-level strategies. Statewide linkages are in place with forest policy efforts of the Minnesota Forest Resource Council (MFRC) via Dr. Calder Hibbard. Dr. Curtis VanderSchaaf, lead planning analyst, with the Minnesota DNR will help in utilizing best data available. The importance and interdisciplinary nature of the project will help attract a top research scientist. Overall emphasis by project team will be on recognizing the full value of pine restoration activities, including potential interactions with other important facets of the forest management situation including risks associated with climate change.