



PROJECT TITLE: Assess and Improve Ecological Health of Trust Lands

I. PROJECT STATEMENT

Minnesota’s forests cover over 16 million acres, including over one million acres of School Trust lands, and provide myriad ecological and economic benefits, including wildlife habitat, carbon storage, biodiversity protection, clean water, and forest products. Recent interests in increasing revenue generation from Trust Lands and other forest ownerships have raised important questions regarding the ecological impacts of increased levels of forest harvesting on habitat, carbon storage, water, and long-term productivity. An understanding of these impacts, both positive and negative, is critical for ensuring the long-term ecological integrity of forest lands in the state.

Management practices that have been suggested for increasing revenues on Trust Lands and other ownerships include: 1) harvesting swampland forest ecosystems, 2) shortening the age at which forests are harvested (rotation age), and 3) thinning dense forests and planting high value species to improve forest ecological health (Figure 1). ***This proposed project will directly assess the ecological feasibility and impacts of applying these practices to Trust Lands and other forest lands by:***

- Assessing the current ecological health of forests on Trust Lands
- Evaluating the impacts of forest management strategies on the health, ecological integrity, and productivity of upland and lowland forests on Trust Lands
- Projecting future and long-term ecological conditions, including habitat and carbon storage, on Trust Lands based on several different management scenarios

To achieve these goals, we will make use of existing and enhanced (by this project) ecological assessments of Trust Lands and existing silvicultural trials and research plots in upland and lowland forest systems. These assessments, trials, and data records, coupled with forest growth and change models, forest planning, and wildlife habitat models will allow us to generate robust and truly instructive estimates of the immediate and long-term ecological impacts of increased management intensity on Trust Lands and other forest lands over the next 25 years and longer. Although Trust Lands are the focus of this project, these areas are largely representative of many forested ownerships in the state allowing findings to be readily transferable to other DNR, county, federal, and private lands.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Assess the current ecological health of Trust Land forests **Budget: \$133,624**

We will generate estimates of the forest ecological conditions on Trust Lands, including current ecological communities, carbon storage, and productivity with the assistance of MNDNR. These estimates will be used to evaluate current ecological health and habitat potentials of Trust Lands and will serve as inputs for models projecting future management scenarios on these lands (Activity 3)

Outcome	Completion Date
1. Work with MNDNR to develop assessment of forests on over 1 million acres of Trust Lands	November 2014
2. Compile forest and ecological inventories	June 2015
3. Integrate data into harvest scheduling models for evaluating future scenarios	October 2015

Activity 2: Evaluate impacts of forest management strategies on the health, ecological integrity, and productivity of upland and lowland forests on Trust Lands **Budget: \$290,003**

To assess the impacts of forest management strategies on the ecological conditions of Trust Lands, including carbon storage and native biodiversity, we will assess the plant communities, growth, quality, and health of an extensive network of long-term management experiments, trials, and managed forests.



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Measured areas will include lowland forest habitats given the prevalence and importance of those ecosystems on Trust Lands. Comparisons of ecological conditions under different management regimes will allow us to determine the degree to which productivity can be increased on Trust Lands and the associated ecological and economic impacts.

Outcome	Completion Date
1. Collect field data from existing silviculture trials and managed areas representative of forest conditions covering over 7 million acres of the state	December 2015
2. Analyze ecological conditions, impacts, and productivity associated with different management practices	February 2016
3. Final report of activity results submitted	July 2016

Activity 3: Project future ecological conditions, including habitat and carbon storage, based on different management scenarios for Trust Lands

Budget: \$90,768

We will integrate findings from Activities 1 and 2 into commonly used, well-validated forest growth and change and forest planning models to determine the future ecological conditions on Trust Lands under a range of future management scenarios. These will include increased harvesting of lowland forest habitats, shortened rotation ages, and improved ecological health via thinning and planting.

Outcome	Completion Date
1. Incorporate findings research reviews and from long-term forest research and study plots into forest growth and change and forest planning models	September 2016
2. Determine ecological conditions under different management scenarios	March 2017
3. Final report of activity results submitted	June 2017

III. PROJECT STRATEGY

A. Project Team/Partners

The research team will be led by scientists at the University of Minnesota, Dept. of Forest Resources, including Professors Anthony D’Amato, Michael Kilgore, Howard Hoganson, and Alan Ek, and a scientist with the USFS, namely Dr. Brian Palik, and Dr. Rob Slesak of the MFRC. Cooperators will include forestry, ecological services, resource assessment, and wildlife staff with MNDNR. Funding will be received by the University of Minnesota scientists.

B. Timeline Requirements

The duration of the project is three years. The requested time is necessary to develop resource assessments, conduct field work, analyze field and economic data, and determine optimal management approaches for Trust Lands.

C. Long-Term Strategy and Future Funding Needs

Results and recommendations from this work will serve to promote and maintain the ecological health of forests on Trust Lands and will provide important information on compatibility of ecological and economic objectives for these areas. Given the representative nature of State Trust Lands relative to other forested areas in the state, findings will be disseminated to MNDNR, as well as other stakeholders, such as federal, county, and private land managers through workshops, presentations, tours, reports, and publications. This proposed project will take advantage of ongoing research projects examining the ecology and management of Minnesota forests, building on funds provided by LCCMR and USDA. Although we anticipate subsequent proposals to LCCMR, we are also seeking additional funds from the US Dept. of Energy, USDA, and NSF.

2014 Detailed Project Budget

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PIs: Dr. Anthony D'Amato, Dr. Michael Kilgore, Dr. Howard Hoganson, Dr. Alan Ek, University of Minnesota; Dr. Brian Palik, USDA Forest Service; Dr. Robert Slesak, Minnesota Forest Resources Council

IV. TOTAL ENRTF REQUEST BUDGET 3 years

BUDGET ITEM (See "Guidance on Allowable Expenses", p. 13)	AMOUNT
Personnel: One month of faculty summer salary and fringe (0.36) for three years (PI-D'Amato; 0.1FTE)	\$ 37,604
Personnel: One month of faculty summer salary and fringe (0.36) for one year (Co-PI Kilgore; 0.1FTE)	\$ 12,535
Post-doctoral researcher examining ecological conditions of Trust Lands; salary and fringe (0.1812) for two years (1.0 FTE)	\$ 161,058
Salary and fringe (0.836) for a 1 PhD students for three years (1.0 FTE)	\$ 107,410
Research associate coordinating collection of ecological field data from Trust Lands; Salary and fringe (0.3040) for three years (1.0 FTE)	\$ 145,099
Work-study undergraduate student to assist with data collection and processing; Salary and fringe (0.0743) for 3 years	\$ 26,689
Equipment/Tools/Supplies: Equipment includes Haglof distance measuring equipment (\$2400), increment borers for collecting tree-ring samples (\$1050), and supplies for processing tree-ring samples (\$350), soil cores and corer (\$564), scintillation vials for soil analyses (\$730), GPS units for marking plots and ecosystem boundaries (\$465), pH meter for wetland classification (\$441)	\$ 6,000
Travel: Due to the high number of study sites and logistics associated with visiting and measuring Trust Lands and long-term silviculture experiments , \$18,000 is budgeted for domestic travel within Minnesota. This money will be used to pay for mileage (75%) and lodging (25%) for researchers, the field technician, and graduate and undergraduate students. Mileage costs are associated with rental of a field vehicle through the University of Minnesota motorpool for three field seasons. Travel reimbursement will follow University of Minnesota protocols.	\$ 18,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 514,395

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State \$ Being Applied to Project During Project Period: U.S. Department of Agriculture: "Assessing the environmental sustainability and capacity of forest-based biofuel feedstocks within the Lake States region." Funds from this project will be used to enhance ability for determine ecological impacts, including carbon storage, of shortened rotation lengths on Trust Land forests.	\$ 765,000	Secured
In-kind Services During Project Period: In-kind salaries provided by U.S. Forest Service Researcher (0.5 FTE; B. Palik), as well as in-kind use of Forest Service ATV, vehicle, and trailer.	\$ 90,000	Secured
In-kind salaries provided by UMN Researchers (0.01 FTE; A. Ek, H. Hoganson)	\$ 10,009	Secured
Funding History: LCCMR: "Improved Rapid Forest Ecosystem and Habitat Inventory" \$294,000 June 2013-2015	\$ 262,000	
Funding History: LCCMR: "Ecological and Hydrological Impacts of Emerald Ash Borer." June 2009-2015"	\$ 636,000	

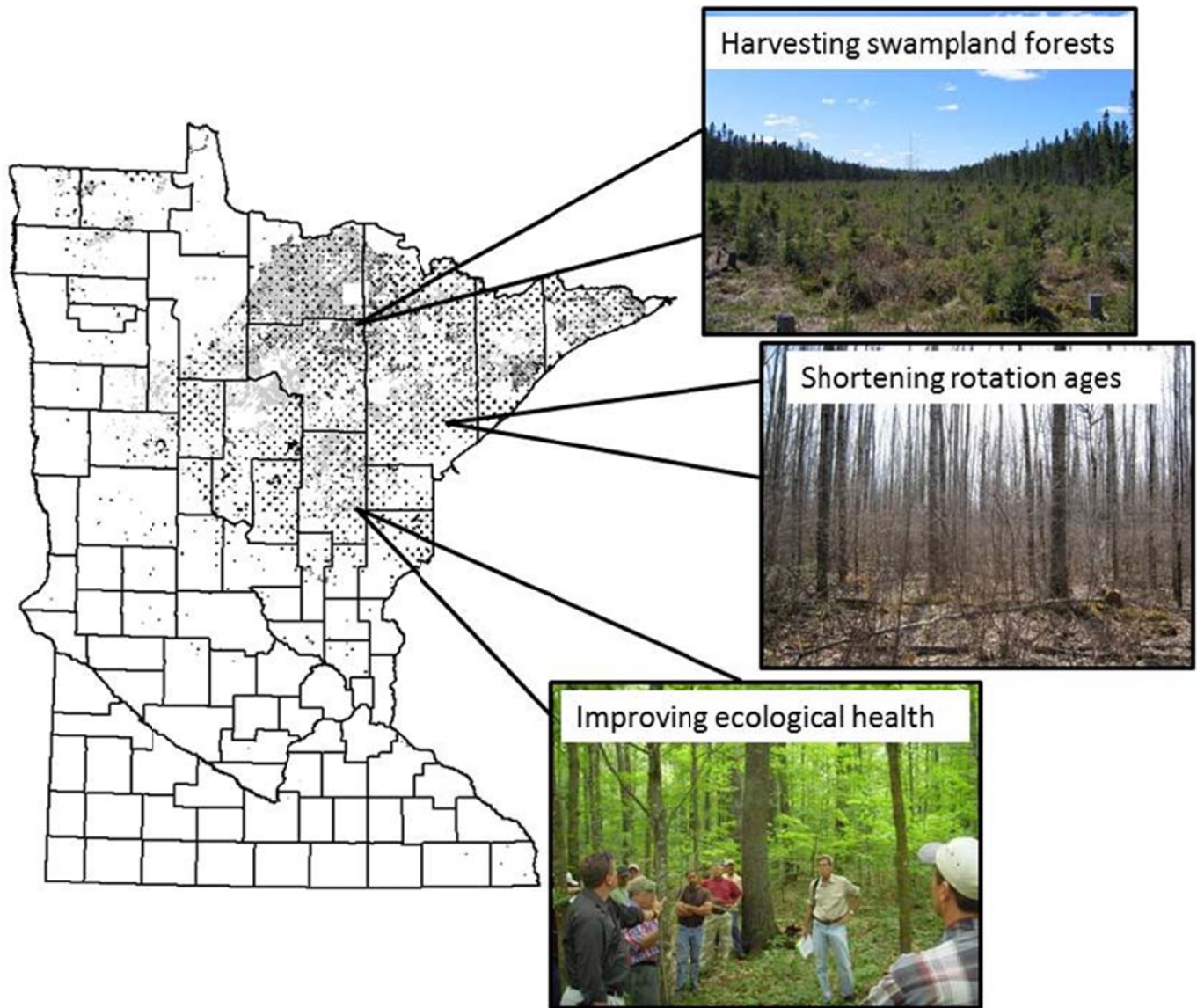


Figure 1. Distribution of School Trust Lands, namely School Lands (black) and Swamp Lands (gray) in Minnesota. Management practices being recommended to increase revenue from these areas include harvesting swampland forests, including black spruce and tamarack bogs, shortening the age at which forests are harvested, and applying practices like thinning and planting to improve ecological health and value of Trust Lands. Despite these recommendations, the impacts of these practices on the carbon storage, ecological health, and productivity of forests covering School Trust and other ownerships is unknown. **We will 1) determine the current ecological health of School Trust Lands and 2) assess the ecological impacts of the widespread application of these management practices to Trust Lands and other forest ownerships in Minnesota.**

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Project Manager Qualifications

Anthony W. D'Amato

Qualifications

Anthony is an Associate Professor of Silviculture and Applied Forest Ecology in the Department of Forest Resources, University of Minnesota. He conducts teaching, research, and participates in outreach/Extension programs. His research primarily focuses on traditional and experimental silvicultural strategies for meeting diverse forest management objectives ranging from the sustainable production of woody biomass for biofuels to increasing the resilience and resistance of forest ecosystems to future climate and disturbance impacts. His primary outreach audiences are natural resource managers.

Anthony has been the principal investigator and project manager on several large-scale projects aimed at evaluating the ecological impacts of different management strategies in upland and lowland forest ecosystems. He has published numerous peer-reviewed and non-technical articles which address the impacts of forest management practices aimed at increases productivity on the health, biodiversity, and habitat found in a diversity of forest systems in Minnesota.

Responsibilities

As Project Manager, Anthony would coordinate and manage the overall project, coordinate the assessments of current ecological conditions of Trust Lands in Activity 1, provide oversight on evaluations of impacts of forest management practices on health, ecological integrity, and productivity of upland and lowland forests on Trust Lands (Activity 2), and provide oversight on the integration of research findings into forest growth and change, forest planning, and wildlife habitat models for projecting future ecological conditions (Activity 3). In the coordination and management role, he would convene meetings of project participants throughout the life of the project to facilitate collaborative efforts, share results, discuss future directions, and identify additional outreach opportunities that could be pursued. His research would focus on evaluating impacts of forest management practices on health, ecological integrity, and productivity of upland and lowland forests on Trust Lands (Activity 2).

Organization Description

The Department of Forest Resources is part of the University of Minnesota.