

**Environment and Natural Resources Trust Fund
2017 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 102-C

Restoring Resilient Long-Lived Conifer Stands through Experiential Learning

Category: C. Environmental Education

Total Project Budget: \$ 126,840

Proposed Project Time Period for the Funding Requested: 3 years, July 2017 - June 2020

Summary:

We propose the development of an experiential learning case study which will enhance the existing curriculum in silviculture at the University of Minnesota and Itasca Community College.

Name: Marcella Windmuller-Campione

Sponsoring Organization: U of MN

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Location

Region: Metro, Northeast

County Name: Itasca, Ramsey

City / Township:

Alternate Text for Visual:

Experiential learning shifts learning from the classroom to the forest. Students engaging with their environment

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



Environment and Natural Resources Trust Fund (ENRTF)

2017 Main Proposal

Project Title: Restoring resilient long-lived conifer stands through experiential learning

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I. PROJECT STATEMENT

To better prepare graduates from the University of Minnesota (U of MN) and Itasca Community College (ICC) for careers in forestry and natural resources, we propose the development of an experiential learning case study to enhance understanding of techniques which will restore multi-cohort long-lived conifers. The experiential learning case study utilizes the already developed curriculum in silviculture at the University of Minnesota (U of MN) and Itasca Community College (ICC). Experiential learning shifts learning from passive to active and has many benefits.

Passive Learning vs. Experiential Learning	
5 – 10% retention of lecture and reading material	75% retention when “doing”
Instructor provides information to students, limited interactions	Students develop questions and use critical thinking skills to solve them
Limited ability to practice “real world” scenarios	Prepare for future scenarios as a professional

The experiential learning case study will be located in a financially mature red pine plantation on University of Minnesota owned lands at North Central Research & Outreach Center (NC ROC). Red pine is traditionally managed in plantations using a clearcut harvest systems, resulting in high financial yields but limited ecological diversity and resilience to climate change. Our case study would utilize a two-aged harvest system with subsequent planting to transition the red pine plantation towards a more ecological complex forest. This system would explore the impacts of several barriers of implementation including fungal pathogens, insects, and deer herbivory. This case study would allow the feasibility of these methods to be explored as a management option and serve as an important learning opportunity for students.

By utilizing a real management question in an experiential learning case study, this proposal will meet 2 important objectives:

1. Annually provide approximately 55 forestry students from U of MN and ICC valuable hands-on training in sustainable forest management
2. Develop a demonstration area for other land managers that will help explore and refine alternative silvicultural treatments to increase species and structural diversity in red pine.

This project represents a common management issue faced by numerous agencies and one, which our students will be facing when they enter the workforce. By not only exposing students to these issues but actively engaging them in the planning, implementation, and monitoring, students will be better prepared to tackle future uncertainty when developing management recommendation. Additionally, this demonstration area will provide awareness of an alternative silviculture technique which may increase species and structural diversity with limited financial impacts.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Implement patch harvest with retention to develop a two-aged red pine forest **Budget: \$ 100,850** for increased species and structural diversity

One of the red pine plantations at the NC ROC is scheduled to be harvested using this two-aged silvicultural system during the summer of 2016 with 2 additional sites harvested in 2017. Sites will then be burned and



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planted at 750 trees per acre. Trees to be planted include red pine, white pine, Jack pine, white spruce and oak. Monitoring will occur for three growing seasons with subsequent analysis.

Outcome	Completion Date
1. 3 red pine plantations harvested, burned, and planted totaling ~ 12 acres	Summer 2018
2. Monitoring of 6000 seedlings for survival, growth, and forest health issues	Fall 2019
3. Analysis and assessment of short-term results	Spring 2020

Activity 2: Quantification of increased education value of experiential learning

Budget: \$ 25,990

Every year approximately 20 U of MN and 25 ICC students take silviculture. Students will be involved with the decision making at all phases of the project. To assess the value experiential learning adds, students will complete surveys at the end of their respective silvicultural class. Data will be summarized using both quantitative and qualitative metrics. This will be summarized in a report and peer-reviewed literature to serve as one model for building experiential learning in natural resource course work.

Outcome	Completion Date
1. 200 students participating in “hands-on” forest management including burning, planting, tending, monitoring & assessment Adding 20 additional hours of field experience for U of MN students	Fall 2019
2. Assessment of 55 students each year for value added	Winter 2019
3. Development of report and peer-reviewed literature	Spring 2020

III. PROJECT STRATEGY

A. Project Team/Partners

The project team includes Dr. Marcella Windmuller-Campione, from the University of Minnesota Twin Cities, Brad Jones from Itasca Community College, Dr. Howard Hoganson University of Minnesota North Central Research and Outreach Center. Marcella and Brad are the silvicultural instructors at their respective institutes.

B. Project Impact and Long-Term Strategy

The U of MN is the only 4-year accredited forestry school in the state. Many students begin their forestry and natural resource education at ICC, graduating with an accredited 2-year Associate of Applied Science Degree. Instead of transferring to the U of MN to finish their degrees, many students turn to other programs out-of-state. This experiential learning case study will establish an important network with the goal of increasing long-term transfer student enrollment from ICC to U on MN. Additionally, the demonstration area will be available for field trips for the Itasca Area School Collaborative, specifically Deer River and Grand Rapids, to provide high school students with exposure to the decision making process that forest manager’s face. This may result in increased enrollment in forestry and natural resource degree programs at ICC and U of MN. Since forests are long lived, this project will continue to serve students in the respective classes long after the 3 year timeline proposed in this study.

This project would also be developed as a demonstration site to evaluate treatments and establish protocols for a larger replicated study on state, county, and private lands. The location of the demonstration site is along the North Country National Hiking trail; the development and installation of informational signs can aid the interested public in understanding the role of sustainable forest management in developing more resilient forests.

C. Timeline Requirements

Funding is requested for three years.

2017 Detailed Project Budget

Project Title: *Restoring resilient long-lived conifer stands through experiential learning*

IV. TOTAL ENRTF REQUEST BUDGET 3 years

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel:	
Dr. Marcella Windmuller-Campione, University of Minnesota: 6% FTE for 3 yrs (\$19,587) plus 33.7% fringe (\$6,601)	\$ 26,187
UofM Undergraduate student employee to assist with monitoring, protection and competition control, and data processing. Salary 14 weeks @ \$12/hr (\$20566) plus 7.4% fringe (\$1,625) for 3 years.	\$ 22,191
NC ROC Forest Staff Manager: 4% FTE for 3 yrs (\$6,145) plus 22.4% fringe (\$1,377) supervision and coordination of day to day activities on the forest lands at the ROC	\$ 7,522
Professional/Technical/Service Contracts:	
Brad Jones, Itasca Community College: 4 release credits over 2 years (\$12,000 fringe included)	\$ 12,000
ICC work study students to collect data, install deer protection, complete competition control activities and track costs. Salary spring and fall semester, 2 students @ \$12/hr, 30 weeks for first year, 1 student in years 2 and 3. (Fringe included)	\$ 28,800
Equipment/Tools/Supplies:	
Forestry Equipment: brush saws (4 @ \$625), calipers (6 @ \$175), loggers tapes (6 @ \$80)	\$ 3,970
Seedlings: total of 6000 seedlings of white pine, red pine, Jack pine, white spruce, and oak will be purchased. Stock will include bareroot, containerized, improved, and non-improved.	\$ 4,560
Deer protection: Plantskydd Animal Repellent (\$720/yr * 3 yrs); bud caps (\$150); individual tree protection (\$5000)	\$ 7,310
Educational sign: 2 wooden signs @ \$750 to explain the forestry techniques used and the goals of this project	\$ 1,500
Travel:	
Due to the distance travel costs for U of MN students factor in transportation, lodging, and dinner and breakfast at the CFC. U of MN students will spend 2 days at the site, overnighing at the Cloquet Forestry Center, Cloquet MN. Transportation: 2 10-passagener van rental rate: \$220 + \$560 mileage = \$780/trip * 3 years = \$2340 Housing: \$20/night * 20 students * 3 yrs = \$1200 Food: breakfast (\$8.50) + dinner (\$12.50) = \$21 * 20 students * 3 yrs = \$1260	\$ 4,800
Additional Budget Items:	
Field trip for high school students (transpiration, material, subs): \$2,000 * 2 high schools	\$ 4,000
Day workshop for forestry professionals (materials, classroom rental)	\$ 4,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 126,840

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:		
	NA	
Other State \$ To Be Applied To Project During Project Period:		
Unrecovered indirect costs@ 53% (2017), 54% (2018, 2019) of total direct cost \$125,670	\$ 66,975	<i>Secured</i>
In-kind Services To Be Applied To Project During Project Period:		
Much of the project work will be completed by student labor in conjunction with class activities. Contracts will be developed, trees planted and bud caps for deer protection will all be done by students in associated class-lab assignments.	\$ 4,000	<i>Secured</i>
Funding History:		
White pine reforestation work at the NC ROC, funding from the Rajala Companies over the past 10 years	\$ 10,000	Secured
Remaining \$ From Current ENRTF Appropriation:	NA	



Many reasons why students choose a career in natural resources

- Enjoy outdoor activities: hiking, hunting, fishing, birding
- Wants to influence management and policy

Traditional lecture halls are great for learning about the science and theories that is the backbone of natural resource management



Forests are complex. Students must critically analyze each stand when developing management recommendations

Students chose this major because they like being outside.



Experiential Learning Case Study

- Same content just connecting the theories with real world scenarios
- Engages students
- Demonstration for restoring complex ecosystems



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Project Manager Qualifications and Organization Description

Project Manager: Marcella A. Windmuller-Campione

Assistant Professor, Dept. of Forest Resources, University of Minnesota, St. Paul, MN 55108.

Professional Appointments and Preparation

- Assistant Professor, Forest Resources, University of Minnesota, 2015 – present
- Ph.D., Ecology, Utah State University, 2015
- M.S. Forestry, Michigan Technological University, 2011
- B.S. Forestry minor in Ecology, *magna cum laude*, Michigan Technological University, 2009

Areas of Expertise

Silviculture, adaptive management, forest ecology, plant community dynamics forest regeneration and dynamics, invasive species dynamics. My research spans numerous forest ecosystems in North America and explores how both traditional and alternative silvicultural approaches can be used to increase forest resistance and resilience to current and future threats. Below are a few selected publications.

- Windmuller-Campione, M.A. & Long, J.N. (2015). If Long-Term Resistance to a Spruce Beetle Epidemic is Futile, Can Silvicultural Treatments Increase Resilience in Spruce-Fir Forests in the Central Rocky Mountains? *Forests*, 6, 1157-1178
- Campione, M., Nagel, L. & Webster, C. (2012). Herbaceous-Layer Community Dynamics along a Harvest- Intensity Gradient after 50 Years of Consistent Management. *Open Journal of Forestry*, 2, 97-109

Project Management Experience and Responsibilities for this Project

As a new faculty member at the U of MN, I (Marcella Windmuller-Campione) have experience engaging students through active learning. At the U of MN and in a previous course at Utah State, I utilized a flipped classroom, where students listens to lectures outside of class and participated in activities like group assignments, paper discussions, and presentations. The experiential learning case study will challenge my students to think critically and apply concepts they are learning in class to real forest systems. It will also build connections between two important forestry programs, Itasca Community College and University of Minnesota, within the state of Minnesota. I have experience teaching programs for students and professionals. I am the Co-Director of the first module for the National Advanced Silvicultural Program (NASP) a two week, graduate level course for federal employees to become certified silviculturists. For this project, I will serve as lead contact for this collaborative project, working closely with students as they engage with multi-facet nature of this project.

Organization Description

For over 100 years, the Department of Forest Resource at the University of Minnesota has been the leader in producing high quality teaching and research in natural resource management across the state of Minnesota.