

**Environment and Natural Resources Trust Fund  
2018 Request for Proposals (RFP)**

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**Project Title:**

**ENRTF ID: 006-A**

Maximizing Wildlife, Water, and Productivity in Peatland Forests

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**Category:** A. Foundational Natural Resource Data and Information

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**Total Project Budget:** \$ 698,000

**Proposed Project Time Period for the Funding Requested:** 4 years, July 2018 to June 2022

**Summary:**

There are 3 million acres of peatland forests in Minnesota. This proposal will identify management actions that maximize ecosystem benefits of peatland forests, including wildlife, water, timber, and native plants.

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**Name:** Marcella Windmuller-Campione

**Sponsoring Organization:** U of MN

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**Location**

**Region:** Central, Northwest, Northeast

**County Name:** Aitkin, Becker, Beltrami, Carlton, Cass, Clearwater, Cook, Crow Wing, Hubbard, Itasca, Koochiching, Lake, Lake of the Woods, Marshall, Pennington, Pine, Red Lake, Roseau, St. Louis

**City / Township:**

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**Alternate Text for Visual:**

Map of peatland forests across Minnesota developed by DNR. Peatland forest provide valuable habitat for birds, contribute to filtering of pollutants in water, and are important source of forest products. How can our management maximize these benefits? Attached letter of support from DNR Division Leaders.

|                          |                         |                             |                      |
|--------------------------|-------------------------|-----------------------------|----------------------|
| _____ 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)**

**2018 Main Proposal**

**Project Title:** Maximizing wildlife, water, and productivity in peatland forests

**PROJECT TITLE:** Maximizing wildlife, water, and productivity in peatland forests

**I. PROJECT STATEMENT**

Our project will identify management actions that maximize ecosystem benefits of peatland forests, including wildlife, water, timber, and native plants. In Minnesota, peatland forests comprise **20% (3 million acres) of all forest lands** and **30% (1.7 million acres)** of state-administered forest lands, mostly as school trust lands.

Peatland forests are ecologically and economically important, providing:

- **Wildlife:** habitat for over **100 bird species** including **Species of Greatest Conservation Need** such as Connecticut Warbler, Boreal Chickadee, Spruce Grouse, and Boreal Owl, offering fantastic recreation opportunities (**1.4 million** bird watchers annually and bird hunters).
- **Water:** important **regulation of hydrology** and **filtering of pollutants** before entering one of three major waterways: Mississippi River, Great Lakes, and Lake Winnipeg
- **Timber:** approximately **250,000 cords (~4.5 million dollars)** of black spruce timber is harvested on all peatland ownerships annually and **300,000 decorative tops (~ 70 thousand dollars)** harvested on state lands. Both contribute significantly to rural economies across northern MN.
- **Native plants:** habitat for rare plants including bog adder’s mouth (endangered), ram’s head lady’s slipper (threatened), hair-like beak-rush (threatened), and numerous unique moss species.

Peatland forests in Minnesota are highly vulnerable because they occur at the southern edge of their range, contain low tree diversity, and are sensitive to slight changes in hydrology. Since European settlement, millions of acres of peatland forests in Minnesota have shifted to non-forested conditions due to changes in hydrology (e.g., ditching). Peatland forests are vastly understudied because of their remote and poorly accessible locations. Most of these forests are actively managed despite relatively high uncertainty about how timber harvest affects vegetation dynamics, hydrology, and wildlife use over time. Two recent MN DNR reports highlight the need for more comprehensive investigation of the effects of timber harvest in different peatland forest communities (Lowland Conifer Status Report (2016) and Tamarack Assessment Project (2015)). This uncertainty threatens our ability to **maximize benefits** from these extensive ecosystems and is a **management priority** for MN DNR (see **attached letter of support from Directors of three divisions within DNR**)

Our project will provide foundational data for the management of peatland forests. Our objectives are to:

- 1) Quantify how timber harvest practices influence wildlife use, hydrological functions, native plant composition, tree regeneration, and forest productivity over time in Minnesota’s peatland forests.
- 2) Collaboratively develop multiple-use management strategies for peatland forests with MN DNR and other forest resource stakeholders.

**II. PROJECT ACTIVITIES AND OUTCOMES**

**Activity 1: Establish a network of 60 research sites and quantify ecosystem function**      **Budget: \$205,647**

With the aid of MN DNR, we will identify 60 research sites across northern Minnesota. All sites will have been actively managed; time since harvest will be grouped into 4 age classes (0-100 years) and an unharvested control. The sites will be split among 3 dominant peatland forest native plant community types. We will use standard vegetation inventory techniques to quantify vegetation: trees, shrubs, herbaceous plants, mosses, and down dead wood and determine the effects of management on vegetation communities and forest succession. Data will be related to site and timber productivity, forest health, and ecosystem function, including rare plants.

| <b>Outcome</b>  | <b>Completion Date</b> |
|---|------------------------|
| 1. Identify and sample 60 sites in 3 peatland forest community types across 4 age classes | September 2021         |
| 2. Evaluation of management effects on plant communities and productivity                 | January 2022           |



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**Activity 2: Assess relationships between water and management**

**Budget: \$ 210,000**

Site hydrology will be assessed by continuously measuring water table fluctuations in groundwater monitoring wells, measuring precipitation inputs, and evaluating soil water dynamics on collected peat cores at 36 of the sites, with periodic measurements at the remaining sites. Water budgets will be developed for each age class to assess effects of management at the stand and landscape scale, and a classification scheme will be developed to identify site types susceptible to alteration of hydrology.

| Outcome  | Completion Date |
|--|-----------------|
| 1. Site hydrology and water budget assessments completed for the 60 research sites | September 2021  |
| 2. Classification scheme for hydrologic alteration completed                       | January 2022    |

**Activity 3: Assess relationships between wildlife and management**

**Budget: \$224,000**

Due to the overall abundance, logistical considerations, and DNR input, wildlife monitoring will focus on characterizing amphibian and avian communities in the spring and summer across the 60 research sites using digital audio recorders and field observer point counts. These taxa are an abundant and conspicuous component of vertebrate wildlife in peatland forests. A subset of sites will be targeted to gather additional data on two Species of Greatest Conservation Need, Connecticut Warbler and Boreal Chickadee. Birds will be fitted with radio transmitters and tracked throughout the breeding season to assess nest locations, nest success, and obtain details of their habitat requirements.

| Outcome  | Completion Date |
|--|-----------------|
| 1. Amphibian and bird community composition and diversity measured for 60 research sites. Connecticut Warbler and Boreal Chickadee habitat data collected at selected sites. | August 2021     |
| 2. Evaluation of management effects on amphibian and bird communities  | September 2021  |

**Activity 4: Develop forest management strategies to maximize peatland forest benefits**

**Budget: \$58,353**

Findings from Activities 1-3 will be integrated, and management strategies will be developed that account for the interrelationships among vegetation, water, and wildlife. Alternative strategies to maximize ecological and economic resources will also be developed. Guidelines for black spruce were last developed in 1977.

| Outcome   | Completion Date |
|---|-----------------|
| 1. Compilation and integration of vegetation, hydrology, and wildlife assessments | January 2022    |
| 2. Management strategies to maximize benefits for peatland forests completed      | June 2022       |

**III. PROJECT STRATEGY**

**A. Project Team/Partners**

The project team includes Dr. Marcella Windmuller-Campione from UMN (receive summer salary), Dr. Alexis Grinde from Natural Resources Research Institute (receive salary), and Dr. Rob Slesak from the MN Forest Resources Council (providing in-kind support). The project team will work closely with the Divisions of Forestry, Ecological and Water Resources, and Fish and Wildlife in MN DNR.

**B. Project Impact and Long-Term Strategy**

The project will provide data to assess current forest management practices and develop much needed **multiple-use management strategies** for peatland forests on DNR lands. Project partners will collaborate with ongoing efforts within the DNR including the Wetland Hydrology Monitoring Proposal to leverage data to maximize inference and use for management. Strategies to maximize ecosystem benefits will be developed through a collaborative process that accounts for the complex interactions between vegetation dynamics, hydrological function, and wildlife use.

**C. Timeline Requirements**

Three full field seasons are required with an additional year of data analysis for a total of four years.

## 2018 Detailed Project Budget

**Project Title: Maximizing wildlife, water, and productivity in peatland forests**

### IV. TOTAL ENRTF REQUEST BUDGET 4 years

| <u>BUDGET ITEM</u>   | <u>AMOUNT</u>     |
|--|-------------------|
| <b>Personnel:</b>  |                   |
| Dr. Marcella Windmuller-Campione, University of Minnesota (66.3% salary, 33.7% benefits); 8% FTE each year for 3 years summer salary   | \$ 35,197         |
| Dr. Alexis Grinde, Natural Resource Research Institute (66.5% salary, 33.5% benefits); 12.0% FTE each year for 3 years (soft money position)   | \$ 39,396         |
| UMN 2 graduate research assistants to collect, analyze, and evaluate data for vegetation and hydrology. Salary and fringe (0.82) for 3 years each (0.5 FTE)  | \$ 252,853        |
| 1 Research Scientist, Natural Resources Research Institute (66.5% salary, 33.5% benefits); 0.75 FTE each year for 3 years. Wildlife technician, data collection and analysis.  | \$ 103,915        |
| Bird bander @ 0.08 FTE for 2 years (92.3% salary, 7.7% benefits)   | \$ 5,938          |
| UMN Research associate coordinating collection of vegetation, wildlife, and hydrology data from lowland conifer forests; Salary and fringe (0.2) for 2 years (0.75 FTE)  | \$ 104,222        |
| 3 UMN undergraduate work study students to assist with summer data collection and processing. Salary and fringe (0.074) for (0.23 FTE) 3 years.  | \$ 59,329         |
| <b>Equipment/Tools/Supplies:</b>   |                   |
| Pressure transducers for continuous water table monitoring - 2 at each of 36 sites (72 @ \$350.00 each)  | \$ 25,200         |
|  | \$ 16,200         |
| Tipping bucket rain gauges to continuously measure precipitation at 36 sites (36 @ \$450.00 each)  | \$ 13,500         |
| 15 Digital Audio Recorders (DARs; \$900.00 each) for longer-term monitoring of amphibian and bird communities at field sites. We will also use 15 DARs purchased for previous LCCMR project.   | \$ 13,500         |
| Transmitters and telemetry equipment to assess breeding season habitat use for focal species. Including telemetry receivers, dataloggers, and antennae (\$7,200) and 30 radio transmitters for SGCN Boreal Chickadee and Connecticut Warbler (30 @ \$260 = \$7,800)  | \$ 15,000         |
| Forest inventory equipment (increment borers 2 @ \$250.00 each, laser hypsometer 1 @ \$1,500 each, calipers 2 @ \$125 each)  | \$ 2,250          |
| <b>Travel:</b> Travel for mileage (75%) and lodging (25%) within Minnesota for researchers, the Research Associate, and Graduate Students to the project sites. A large amount of travel will be required because sites will be located across northern Minnesota and will visited multiple times throughout the year for vegetation, wildlife, and hydrology assessments. Travel reimbursement will follow University of Minnesota protocols. | \$ 25,000         |
| <b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>   | <b>\$ 698,000</b> |

### V. OTHER FUNDS

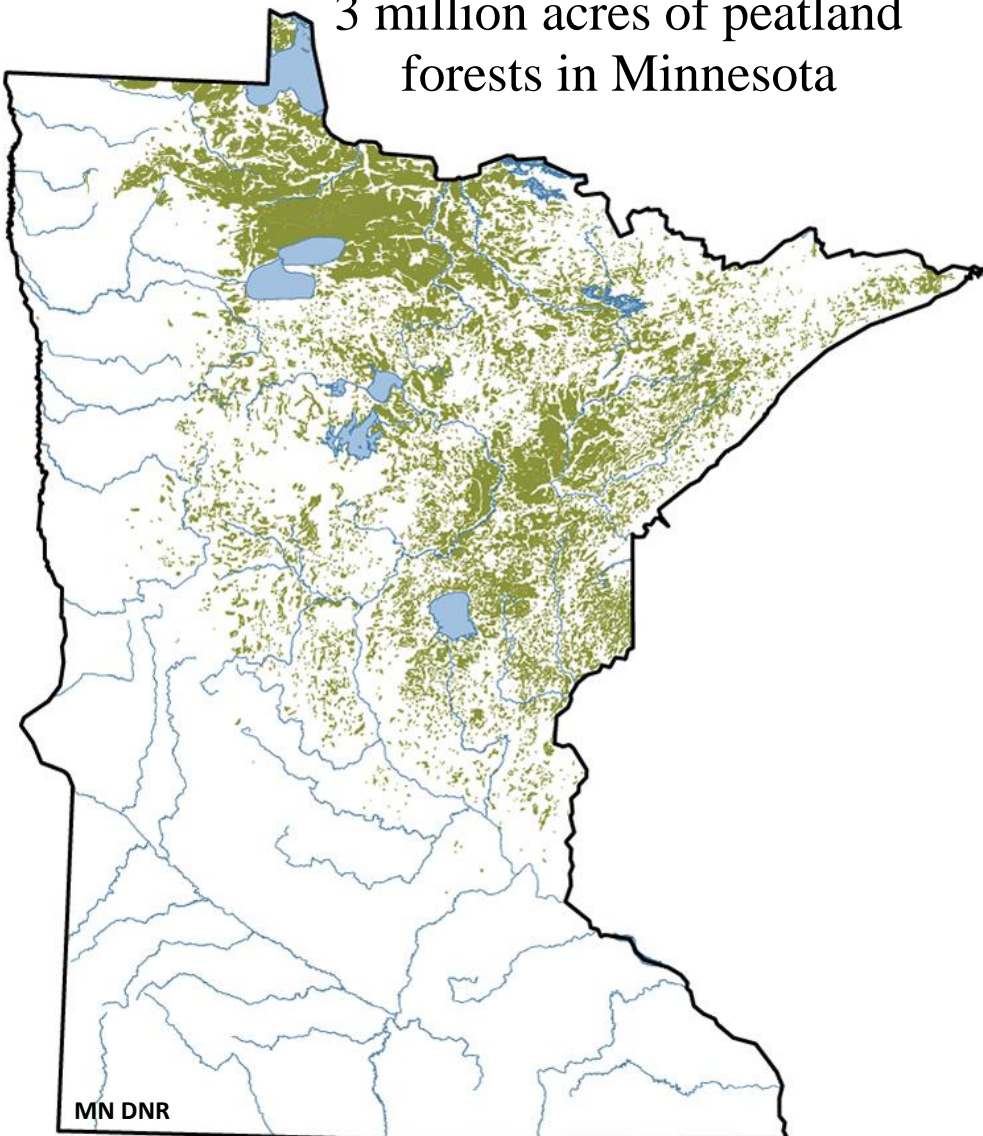
| <u>SOURCE OF FUNDS</u>  | <u>AMOUNT</u> | <u>Status</u>  |
|---|---------------|----------------|
| <b>Other Non-State \$ To Be Applied To Project During Project Period:</b>   |               |                |
| <b>Other State \$ To Be Applied To Project During Project Period:</b>   |               |                |
| <b>In-kind Services To Be Applied To Project During Project Period: (Total amount \$483,874)</b>  |               |                |
| In-kind salary and fringe for Dr. R. Slesak over course of project (0.05 FTE annually for 4 years)  | \$ 24,000     | <i>Secured</i> |
| In-kind support from DNR Division of Ecological and Water Resources Division, 220 hours of staff time including 80 hours of field work with Regional Plant Ecologist and 140 hours of consultation with Dr. Emily Peters, Doug Norris, Erika Rowe, and Nongame Specialist | \$ 17,600     | <i>Secured</i> |
| In-kind support from DNR Division of Forestry, 140 hours for assistance   | \$ 11,200     | <i>Secured</i> |
| In-kind support from DNR Fish and Wildlife, 100 hours for assistance  | \$ 8,000      | <i>Secured</i> |
| In-kind assistance with periodic lodging at Div. Wildlife field station (assume 10 nights per year for 6 people = 180 user nights over 3 years * ~\$100 per room hotel cost)  | \$ 18,000     | <i>Secured</i> |
| Potential use of Argo, truck, and trailer for site assess and transportation (project costs will pay fleet costs; 15 days per year for 3 years)   | \$ 6,000      | <i>Secured</i> |
| Unrecovered indirect costs@ 54% (2018, 2019, 2020) of total direct cost \$698,000   | \$ 376,920    | <i>Secured</i> |
| <b>Funding History:</b>   |               |                |
| <b>Remaining \$ From Current ENRTF Appropriation:</b>   |               |                |





# Maximizing wildlife, water, and productivity in peatland forests

3 million acres of peatland forests in Minnesota



Provide water, wildlife habitat, timber, and habitat for rare and endangered plants

## How can our management maximize these benefits?



## Environment and Natural Resources Trust Fund (ENRTF)

### 2018 Main Proposal

**Project Title:** Maximizing wildlife, water, and productivity in peatland forests

### 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., Page, D. H., & Long, J. N. (2017). Does the Practice of Silviculture Build Resilience to the Spruce Beetle? A Case Study of Treated and Untreated Spruce-Fir Stands in Northern Utah. *Journal of Forestry*.
- 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 a background in using a holistic approach to solving complex forest management approach. I was part of an interdisciplinary team in Utah, exploring how forest managers could increase resistance and resilience of western ecosystems to an uncertain future. My work in Minnesota uses these same approaches to explore adaptive and alternative management strategies for forest communities in Minnesota. For this project, I will provide scientific leadership and serve as lead contact for this collaborative project. I will oversee and participate in all parts of this project to ensure the successful development of the expected outputs.

#### Organization Description

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