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

Project Title: **ENRTF ID: 019-A**

Prescribed Burning to Improve Management for Brushland Species

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: $ 267,623

Proposed Project Time Period for the Funding Requested: 4 years, July 2016 to June 2020

Summary:

Brushlands provide critical habitat for >250 wildlife species. We compare effects of spring, summer and fall burns on brushland vegetation, providing much needed management guidelines for this key wildlife habitat.

Name: Rebecca Montgomery

Sponsoring Organization: U of MN

Address: 1530 Cleveland Ave N

St. Paul MN 55108

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Web Address

Location

Region: NE

County Name: Aitkin, Carlton, Cook, St. Louis

City / Township:

Alternate Text for Visual:

Images of brushland and prescribed burn; project goals, activities and outcomes; map of open lands and study area.

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

PROJECT TITLE: Prescribed burning to improve management for brushland-dependent species

I. PROJECT STATEMENT

We propose to compare the response of brushland vegetation to prescribed burns conducted in the spring, summer, and fall to understand how the season of burning influences the ability to effectively maintain open, brushland conditions. Brushlands cover approximately ~8.5 million acres (20% land surface) in Minnesota and provide critical habitat for over 250 wildlife species, including >80 species on the Minnesota Department of Natural Resources (DNR) list of Species of Greatest Conservation Need (SGCN) including 38 birds, 17 mammals, 12 reptiles, 2 amphibians, and 12 insects. Numerous game species also use brushland habitats including Sharp-tailed grouse, American Woodcock, white-tailed deer, and furbearers.

Prior to European settlement, Minnesota's brushlands were maintained by frequent wildfires. These burns happened most frequently in summer and fall when vegetation was dry enough to carry fire. We know very little about effects of burning in different seasons on brushland vegetation. We know that in forest and grasslands, summer and fall fires increase habitat value by creating patchiness in the vegetation due to variation in where the fire burned hotter and cooler. This patchiness supports more species.

Currently, brushlands are maintained by prescribed burns conducted in the spring. Because springs tend to be moist, fires are less hot and are easy to control. However, cooler fires may be less effective in achieving habitat goals of maintaining open conditions by preventing the conversion of brushland to forest.

Why don't managers burn in summer and fall? Lack of science-based guidelines hinders change in practice. Managers require data showing benefits before changing existing management, especially when so many significant wildlife species are involved. Data on benefits to achieving habitat goals using summer and fall burns will motivate adoption of more diverse prescribed fire regimes on brushlands, ultimately benefiting wildlife.

We will compare the effects of spring, summer and fall prescribed burns on brushland vegetation in 900 acres of brushland in central and NE Minnesota. Our project will:

- provide data on the habitat benefits of spring, summer and fall burns
- develop best management practices for maintaining healthy brushland habitat
- improve brushland habitat to meet the needs of diverse wildlife and native plant species

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Document current conditions on 900 acres of brushland habitat in central/NE Minnesota **Budget: $54,353**

To document initial conditions of brushland habitats, we will measure duff layer depth, grass biomass, shrub density, invasive species presence, and plant species composition in the summer prior to burning. These baseline conditions are important to fully evaluate the impacts of prescribed fire.

Outcome	Completion Date
1. Nine hundred acres (300 acres/site * 3 sites) surveyed for baseline conditions	*October 2016*
2. Ninety permanent monitoring plots established	*October 2016*
3. Dataset of plant communities at three sites compiled and analyzed	*April 2017*

Activity 2: Conduct prescribed burning and monitor vegetation response on 900 acres of brushland habitat in central/NE Minnesota **Budget: $196,334**

Our MN DNR partners will conduct burns at three sites in each of three seasons: spring, summer and fall (9 burns total). To determine the initial impacts of the burns, we will measure duff layer depth, grass biomass, and shrub top-kill and will assess fire intensity and coverage immediately following each burn. To determine the vegetation response to the burns, we will examine plant species composition including invasive species, and vegetation density and cover for the initial two years following treatment using ENTRF funds. Permanent plots will be censused after the period of this request by university partners and MNDNR.

Outcome	Completion Date
1. Three hundred acres burned in spring, 300 in summer and 300 in fall	*November 2017*
2. Nine hundred acres surveyed for post-burn conditions	*November 2017*
3. Nine hundred acres surveyed for vegetation response to burning	*December 2019*
4. Dataset of fire effects and vegetation response compiled and analyzed	*December 2019*

Activity 3: Develop a manager's guide for brushland habitat **Budget: $16,936**

To ensure that the findings of this study are incorporated into management, we plan to conduct outreach efforts with stakeholders including a webinar and workshop to develop a best management practices guide for restoring and maintaining diverse brushland habitat for non-game and game wildlife species.

Outcome	Completion Date
1. Webinar for brushland managers and landowners on vegetation response to prescribed fire in different seasons (spring, summer and fall)	*January 2020*
2. Workshop with DNR staff and stakeholders to develop best management practices for using prescribed fire for brushland habitat management	*March 2020*
3. Management guide for using prescribed fire to maintain brushland habitat	*June 2020*

III. PROJECT STRATEGY

A. Project Team/Partners

Dr. Rebecca Montgomery (UMN-TC, Department of Forest Resources), overall management responsibility for project team and co-advise graduate student; Dr. Lee Frelich (UMN-TC, Department of Forest Resources), coordinate day-to-day activities and co-advise graduate student; Charlotte Roy (MN DNR) and Lindsey Shartell (MNDNR), provide expertise on habitat characteristics for wildlife, coordinate prescribed burning with MNDNR field staff. All team members will collaborate on Activity 3, translating research to action.

B. Project Impact and Long-Term Strategy

The project will have practical utility by providing data and guidelines that will support management actions that keep brushland habitat healthy by mimicking historical patterns of fire. Permanent monitoring plots established will allow university partners and MNDNR to conduct vegetation surveys to track responses to treatment into the future (e.g. 5-10 yr response).

C. Timeline Requirements

Due to timing of the burn seasons, this project requires four years for completion. July-August 2016 – conduct baseline vegetation assessment; April/July/October 2017 – conduct spring/summer/fall burns and assess immediate post-fire effects; July 2018 – 1 year post-fire assessment of vegetation; July 2019 – 2 year post-fire assessment; January/March 2020 – webinar and workshops with stakeholders; June 2020 Management Guide completed.

2016 Detailed Project Budget

Project Title:Prescribed burning to improve management for brushland-dependent species

IV. TOTAL ENRTF REQUEST BUDGET *4* **years**

BUDGET ITEM	AMOUNT
Personnel:	
Project manager (2% time), 66% salary 34% benefits, 4 yrs, Dr. Rebecca Montgomery	$ 12,286
Field coordinator (8% time), 66% salary 34% benefits, 4 yrs, Dr. Lee Frelich	$ 34,295
Graduate student (Year 1&2 25% time, Years 3&4 50% time; 57% salary, 43% benefits)	$ 126,723
Undergraduate students (40h/wk *12 wk @ $12/h, 100% salary, 4 yr, 1 persons	$ 23,731
Professional/Technical/Service Contracts:	
Contract with MN DNR to conduct burning. $65/acre * 900 acres in central and NE MN	$ 58,500
Equipment/Tools/Supplies:	
Notebooks for field data collection, flags and rebar for plot marking, GPS for plot locations	$ 1,000
Travel:	
Travel for natural resource manager workshops: 1 year * 1 workshops * 5 persons * 1 d * (mileage [250 mi/workshop*0.575 cents/mile] + per diem [$82 lodging + $56 M&I])	$ 1,409
Travel for field work: 9 trips * 300 mi/trip * 0.575/mi = 1552$; 63d * $46 M&IE = 2898$; 63d * $83 lodging = 5229	$ 9,679
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 267,623

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: *Additional DNR staff time for conducting prescribed burns ($13,500). Dr. Charlotte Roy's time (5% time) and Dr. Lindsey Shartell's time (5%), 66% salary 34% benefit, 4 years*	$ 34,159	*Secured*
Unrecovered indirect costs @ 52% of modified total direct cost base of $182800	$ 95,056	*Secured*
Funding History:	N/A	
Remaining $ From Current ENRTF Appropriation:	N/A	

Management goal: Maintain open conditions that support >250 wildlife species including >80 species of greatest conservation need

Problem 1: Fire suppression leads to overgrown brushlands and loss of open conditions
Solution: Use prescribed burning to mimic historical patterns of wildfire

Overgrown Brushland

Prescribed fire in spring

Problem 2: Historically, wildfires occurred in all seasons: spring, summer and fall. Prescribed burns occur in spring. Cooler spring fires due to moist condition may hinder effective achievement of management goals.

Solution: Provide data on the impacts of summer and fall burns to support science-based guidelines for maintaining healthy brushland habitat.

Activity 1. Assess current conditions on 900 acres of brushland

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Activity 2. Conduct prescribed burns in spring, summer or fall and monitor vegetation response

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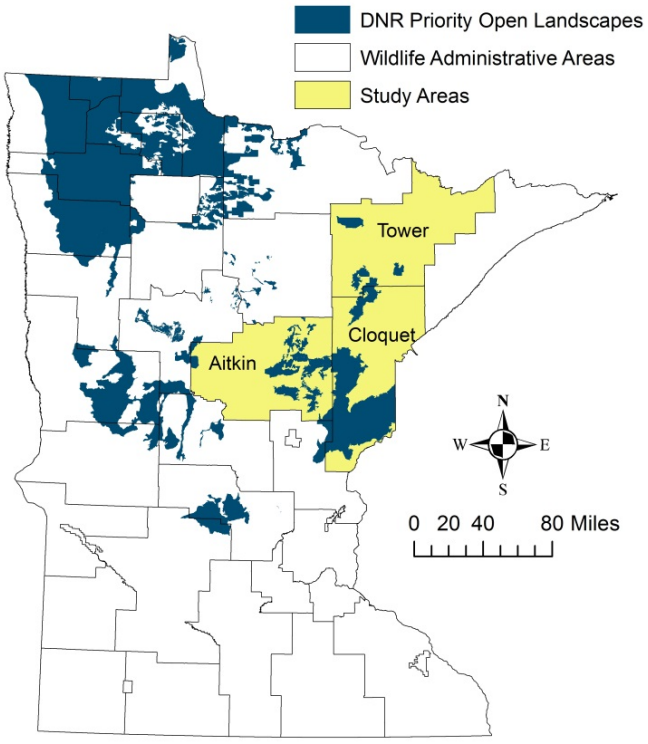
Activity 3. : Develop a manager's guide for brushland habitat



Specfic study sites will be dependent on vegetation and fire conditions, but will be located within priority open landscapes in Aitkin, Cloquet, and Tower Wildlife Work Areas.

Project Manager Qualifications and Organization Description

Project Manager: Rebecca A. Montgomery
Associate Professor, Dept. of Forest Resources, University of Minnesota, St. Paul, MN 55108.

Professional Appointments and Preparation
Associate Professor, Forest Resources, University of Minnesota, 2011-present
Assistant Professor, Forest Resources, University of Minnesota, 2004-2011
Research Associate, Forest Resources, University of Minnesota, 2003-2004
Instructor, Forest Resources, University of Minnesota, 2003-2004
Ph.D., Ecology and Evolutionary Biology, University Connecticut, 1999.
B.A., Biology, *magna cu laude*, Occidental College, 1994.

Honors, Professional Recognition and Service (Selected)
Invited speaker at regional, national and international symposia, seminars, and workshops, e.g. MN Sustainable Forest Education Cooperative, Michigan State, UW-Madison, University of Toronto, US-Japan Workshop on Photosynthetic Plasticity and Global Change. Received Richard C. Newman Art of Teaching award (2010) and College of Food, Agricultural and Natural Resources Sciences Distinguished Teaching Award (2010). I serve as chair of the Physiology Working Group of the Society of American Foresters and subject editor of *Forest Science*. I serve on the Science Team for the Minnesota Climate Change Vulnerability Assessment and on the Falcon Heights Environment Commission.

Areas of Expertise
Plant ecophysiology, forest ecology, forest regeneration and dynamics, shrub ecology, herbivory, competition, invasive species, rare and endangered species biology. Research spans temperate and tropical forests, managed and unmanaged ecosystems.

Project Management Experience and Responsibilities for this Project
More than ten years of research experience in prairies, oak savanna, deciduous and boreal forest of Minnesota. Principal investigator or co-principal investigator on >15 research grants from National Science Foundation, Minnesota Department of Natural Resources, US Department of Energy, US National Park Service and USDA Forest Service projects. Montgomery will provide scientific leadership, supervise funded staff, mentor the graduate student and both oversee and participate in all project activities.

Peer-reviewed publications
Thirty-seven publications, including articles, book chapters, and reports. Thirty-one publications in the peer-reviewed literature.

Organization Description
The University of Minnesota has a strong tradition of education and public service through it role as both the state land-grant university, and the state's primary research university. The Department of Forest Resources is the leading research and educational institution on forest related issues in Minnesota. For over 100 years the department has played a key role in discovering and fostering sustainable forest resource management activities in Minnesota.