



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2016 Work Plan

Date of Report: May 29, 2016

Date of Next Status Update Report: November 30, 2016

Date of Work Plan Approval: June 7, 2016

Project Completion Date: June 30, 2020

Does this submission include an amendment request? N

PROJECT TITLE: Evaluate Prescribed Burning Techniques to Improve Habitat Management for Brushland Species

Project Manager: Dr. Rebecca Montgomery

Organization: University of Minnesota

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Location: Aitkin, Carlton, St. Louis, and Pine Counties

Total ENRTF Project Budget:

ENRTF Appropriation: \$267,000

Amount Spent: \$0

Balance: \$267,000

Legal Citation: M.L. 2016, Chp. 186, Sec. 2, Subd. 08d

Appropriation Language:

\$267,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to compare the effects on brushland habitat of conducting prescribed burning in spring, summer, and fall to provide improved management guidelines for wildlife habitat. This appropriation is available until June 30, 2020, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: Evaluate Prescribed Burning Techniques to Improve Habitat Management for Brushland Species

II. 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. The brushland habitats that these wildlife use are intermediate between grasslands and forests, and require periodic disturbance to maintain them as brushlands.

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 the 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 greater plant and animal species diversity.

Prescribed burning has become an important wildlife management tool to incorporate fire disturbance in a controlled way on the modern landscape. Currently, most brushland prescribed burns executed by the Department of Natural Resources are conducted in the spring. However, historically, wildfires occurred throughout the year, including both the summer growing season and spring and fall dormant seasons. 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. The scientific literature indicates that summer burns are more effective at maintaining fire-dependent grassland and oak forest habitats than dormant-season spring burns. However, no such studies exist for brushlands.

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 the northeast region of 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

III. OVERALL PROJECT STATUS UPDATES:

Project Status as of November 30, 2016:

Project Status as of April 15, 2017:

Project Status as of November 30, 2017:

Project Status as of April 15, 2018:

Project Status as of November 15, 2018:

Project Status as of April 15, 2019:

Project Status as of November 15, 2019:

Project Status as of April 15, 2020:

Overall Project Outcomes and Results:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Document current conditions on 2000 acres of brushland habitat in NE Minnesota

Description: In summer 2016, MN DNR partners will identify potential study sites in NE Minnesota, with the intention of treating three sites with prescribed fire. Since burns are dependent on weather and site-specific fuel conditions we will do site preparations on five sites with the goal of burning three of them. Each site will be at least 400 acres and divided into four equally sized sections with similar vegetative composition. DNR staff will create firebreaks to separate the four sections for prescribed fire treatment. To document initial conditions of brushland habitats, we will measure vegetation metrics such as duff layer depth, grass biomass, shrub density, invasive species presence, and plant species composition in the summer prior to burning in 80 plots per site that will also be permanently marked for post-fire sampling. In addition, wildlife surveys (e.g. bird point counts) will be conducted across study sites. These baseline conditions are important to fully evaluate the impacts of prescribed fire.

Summary Budget Information for Activity 1:

ENRTF Budget: \$ 54,117

Amount Spent: \$ 0

Balance: \$ 54,117

Outcome	Completion Date
1. Up to 2000 acres (400 acres/site * 5 sites) surveyed for baseline conditions	October 2016
2. Up to 400 permanent monitoring plots established	October 2016
3. Dataset of plant communities at up to five sites compiled and analyzed	April 2017

Project Status as of November 30, 2016:

Project Status as of April 15, 2017:

Project Status as of November 30, 2017:

Project Status as of April 15, 2018:

Project Status as of November 15, 2018:

Project Status as of April 15, 2019:

Project Status as of November 15, 2019:

Project Status as of April 15, 2020:

Final Report Summary:

ACTIVITY 2: Conduct prescribed burning and monitor vegetation response on 900 acres of brushland habitat in NE Minnesota

Description: MN DNR partners will develop and seek approval for burn plans and conduct prescribed burns at three sites in each of three seasons: spring, summer and fall (nine burns total). Fires will be led and executed by MN DNR staff with fire training. To determine the initial impacts of the burns, we will measure duff layer depth, grass biomass, and shrub top-kill in assess fire intensity and coverage using permanent monitoring plots set up in Activity 1. This sampling will occur 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. In addition, wildlife surveys (e.g. bird point counts) will be conducted several times during the growing season in the study sites. Permanent plots will be censused after the period of this request by university partners and MNDNR.

Summary Budget Information for Activity 2:

ENRTF Budget: \$ 196,140
Amount Spent: \$ 0
Balance: \$ 196,140

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

Project Status as of November 30, 2016:

Project Status as of April 15, 2017:

Project Status as of November 30, 2017:

Project Status as of April 15, 2018:

Project Status as of November 15, 2018:

Project Status as of April 15, 2019:

Project Status as of November 15, 2019:

Project Status as of April 15, 2020:

Final Report Summary:

ACTIVITY 3: Develop a manager’s guide for brushland habitat

Description: To promote incorporation of findings of this study into management, we will present a webinar to brushland managers and landowners to describe the vegetation and wildlife response to prescribed fire in our study, following which we will host a workshop for DNR staff and other stakeholders to design a brushland prescribed fire best management practices (BMP) document and management guide. The goal of these efforts is to develop recommendations for restoring and maintaining diverse brushland habitat for non-game and game wildlife species.

Summary Budget Information for Activity 3:

ENRTF Budget: \$ 16,743
Amount Spent: \$ 0

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

Project Status as of November 30, 2016:

Project Status as of April 15, 2017:

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Project Status as of April 15, 2020:

Final Report Summary:

V. DISSEMINATION:

Description: Results of this study will be presented at local, regional, and national meetings (e.g. Sustainable Forests Education Cooperative Annual Research Round-up, The Wildlife Society). Findings will be published in peer-reviewed journals, in outreach newsletters (e.g., the Lake States Fire Science Consortium), and posted annually on the Minnesota Department of Natural Resources (MN DNR) website in the Summaries of Wildlife Research Findings section found at <http://www.dnr.state.mn.us/publications/wildlife/index.html>. Project description and results will also be available through websites of the University of Minnesota’s Department of Forest Resources (<http://www.forestry.umn.edu/>) and Center for Forest Ecology (<http://cffe.cfans.umn.edu/>).

Research will form the basis of an M.S. thesis that will be publically available through the University of Minnesota.

As described in Activity 3, webinars and workshops aimed at developing BMP and management guidelines also disseminate results. BMP and management guidelines will be made publically available on the MN DNR website (<http://www.dnr.state.mn.us>) and in paper form when requested.

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Project Status as of April 15, 2020:

Final Report Summary:

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget Overview:

Budget Category	\$ Amount	Overview Explanation
Personnel:	\$ 196,453	1 project manager at 2% FTE (\$12,286), 1 field coordinator at 8% FTE (\$34,295) and one undergraduate at 25% FTE (\$23,731) for 4 years; 1 project staff (graduate student, post-doctoral research associate or staff scientist) at 25% FTE years 1&2 and 50% FTE years 3&4 (\$127,723).
Professional/Technical/Service Contracts:	\$ 58,500	Contract with MN DNR to conduct burning.
Equipment/Tools/Supplies:	\$ 958	Notebooks for field data collection, flags and rebar for plot marking, GPS for plot locations
Capital Expenditures over \$5,000:	\$ 0	
Fee Title Acquisition:	\$ 0	
Easement Acquisition:	\$ 0	
Professional Services for Acquisition:	\$ 0	
Printing:	\$ 0	
Travel Expenses in MN:	\$ 11,089	Travel for natural resource manager workshops and fieldwork.
Other:	\$ 0	
TOTAL ENRTF BUDGET:	\$ 267,623	

Explanation of Use of Classified Staff: N/A

Explanation of Capital Expenditures Greater Than \$5,000: N/A

Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: 2.9 FTE

Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: 1 FTE

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
State			

MNDNR: Dr. Charlotte Roy and Dr. Lindsey Shartell (5% time each, 4 years)	\$34,159	\$0	DNR staff time will be used as in-kind support
MNDNR: Additional staff time for burns	\$13,500	\$0	In-kind support
University of Minnesota, in-kind	\$95,056	\$0	Unrecovered indirect costs at 52% of modified direct cost base \$182,800.
TOTAL OTHER FUNDS:	\$142,715	\$0	

VII. PROJECT STRATEGY:

A. Project Partners:

- Dr. Rebecca Montgomery (UMN-TC, Department of Forest Resources), overall management responsibility for project team and co-advise graduate student, staff scientist or technician
- Dr. Lee Frelich (UMN-TC, Department of Forest Resources), coordinate day-to-day activities and mentor research staff
- Charlotte Roy (MNDNR) 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:

Prescribed fire has become an important wildlife management tool to incorporate natural disturbance in a controlled way on the modern landscape. Yet, prescribed burns can be difficult to implement under many conditions (e.g., too wet, windy, dry) and require many people to execute safely. Currently, most prescribed burns executed by the MNDNR are conducted in the spring due to greater staff availability, larger burn windows, longer days, and more favorable fire and smoke conditions. Yet, managers indicate anecdotally that the woody response to burning is better during late summer and early fall, when vegetation is not dormant. Furthermore, spring fire top kills brush only, leaving energy in the roots resulting in suckering. Species resistant to or enhanced by spring fires are inadvertently favored by the current burning regime and species that benefit from fires at other times of year may be neglected. Our project will improve our understanding of how the season of burning influences brushland vegetation response and thus wildlife habitat. If vegetation responses differ among seasons in brushlands as they do in other ecosystem types, then wildlife managers may need to consider incorporating summer and fall burns into their management practices. This study will provide data to support a change in practices, if needed. Many wildlife species, both game and non-game species, rely on brushland habitats. Understanding how the season of management influences the vegetation response will help the DNR be more effective in maintaining these habitats.

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. The management guidelines and BMPs developed from this study will guide future management of brushland habitats across Minnesota. By continuing to make these resources available to land managers the results of this study will have long-term impacts on management practices.

Permanent monitoring plots established at the study sites will allow university partners and MNDNR to conduct vegetation surveys to track responses to treatment into the future (e.g. 5-10 yr response). The treated sites will

continue to be managed as open brushland habitat and future treatments could also be assessed and compared to the study results.

C. Funding History: N/A

VIII. FEE TITLE ACQUISITION/CONSERVATION EASEMENT/RESTORATION REQUIREMENTS:

A. Parcel List: N/A

B. Acquisition/Restoration Information: N/A

IX. VISUAL COMPONENT or MAP(S): see attached

X. RESEARCH ADDENDUM: see attached (to be submitted December 11, 2015)

XI. REPORTING REQUIREMENTS:

Periodic work plan status update reports will be submitted no later than *November 30, 2016; April 15, 2017; November 30, 2017; April 15, 2018; November 15, 2018; April 15, 2019; November 15, 2019; April 15, 2020*. A final report and associated products will be submitted between June 30 and August 15, 2020.

**Environment and Natural Resources Trust Fund
M.L. 2016 Project Budget**



Project Title: Evaluate Prescribed Burning Techniques to Improve Habitat Management for Brushland Species

Legal Citation: M.L. 2016, Chp. 186, Sec. 2, Subd. 08d

Project Manager: Rebecca A. Montgomery

Organization: University of Minnesota

M.L. 2016 ENRTF Appropriation: \$ 267,000

Project Length and Completion Date: 4 Years, June 30, 2020

Date of Report: May 29, 2016

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	Activity 2 Budget	Amount Spent	Activity 2 Balance	Activity 3 Budget	Amount Spent	Activity 3 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	<i>Document current conditions on 2000 acres of brushland habitat in NE Minnesota</i>			<i>Conduct prescribed burning and monitor vegetation response on 900 acres of brushland habitat in NE Minnesota</i>			<i>Develop a manager's guide for brushland habitat</i>				
Personnel (Wages and Benefits)	\$48,319	\$0	\$48,319	\$132,800	\$0	\$132,800	\$15,334	\$0	\$15,334	\$196,453	\$196,453
Rebecca Montgomery, Project manager, \$12,286 (66% salary, 34% fringe), 2 % FTE all years											
Lee Frelich, Field coordinator, \$34,295 (66% salary, 34% fringe), 8 % FTE all years											
1 Research staff member, \$126,723 (57% salary, 43% benefits), 25% FTE Years 1 & 2, 50% FTE Years 3 & 4											
1 undergraduate student or field technician, \$23,731 (100% salary), 25% FTE all years											
Professional/Technical/Service Contracts											
Contract with MN DNR to conduct burning. \$65/acre * 900 acres in central and NE MN				\$58,500	\$0	\$58,500				\$58,500	\$58,500
Equipment/Tools/Supplies											
Notebooks for field data collection, flags and rebar for plot marking, GPS for plot locations	\$958	\$0	\$958							\$958	\$958
Travel expenses in Minnesota											
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	\$0	\$1,409	\$1,409	\$1,409
Travel for field work: up to 60 days/year (100 mi/d) of vehicle rental or personal mileage reimbursement, whichever is least costly \$7100; ~50d/year housing at Cloquet Forestry Center at 17/d = \$2500	\$4,840	\$0	\$4,840	\$4,840	\$0	\$4,840				\$9,680	\$9,680
COLUMN TOTAL	\$54,117	\$0	\$54,117	\$196,140	\$0	\$196,140	\$16,743	\$0	\$16,743	\$267,000	\$267,000

Prescribed burning to improve management for brushland-dependent species

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.

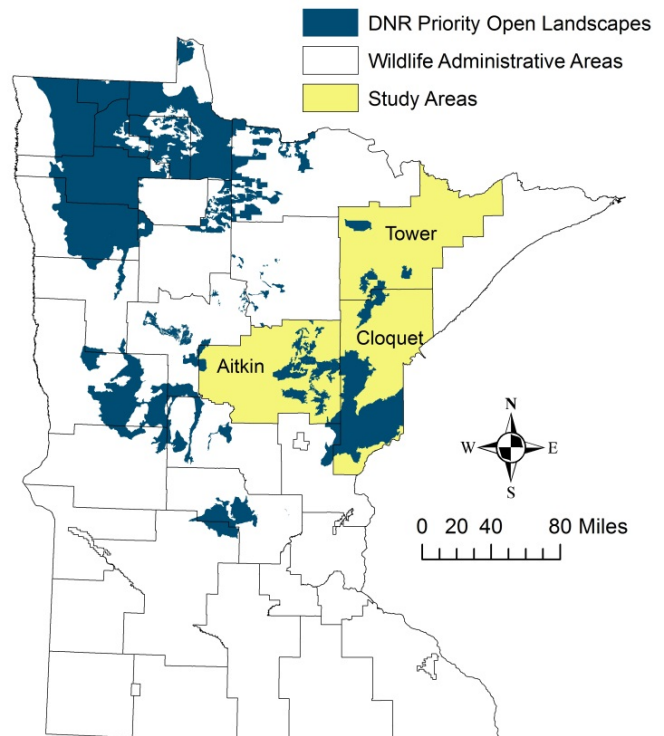
Activity 1. Assess current conditions on 2000 acres of brushland



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



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



Specific 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.