

**Environment and Natural Resources Trust Fund
2019 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 117-BH

Reducing Nitrogen Inputs and Loss in Minnesota Lawns

Category: H. Proposals seeking \$200,000 or less in funding

Sub-Category: B. Water Resources

Total Project Budget: \$ 197,376

Proposed Project Time Period for the Funding Requested: June 30, 2022 (3 yrs)

Summary:

The purpose of this project is to quantify the amount of fertilizer applied to Minnesota lawns and to create appropriate fertilizer recommendations to ultimately reduce the amount of fertilizer applied.

Name: Jon Trappe

Sponsoring Organization: U of MN

Title: Postdoctoral Research Associate

Department: College of Food, Agriculture and Natural Resource Sciences

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St. Paul MN 55108

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Web Address

Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

The visual portrays images related to lawn fertilization as well as an public outreach event to educate homeowners and turf professionals. Text describes the goal of the project (to reduce the amount of nitrogen fertilizer applied to lawns), as well as the two proposed activities - quantification of amount of fertilizer applied to lawns and an outreach event to educate homeowners on proper fertilization practices.

<input type="checkbox"/>	Funding Priorities	<input type="checkbox"/>	Multiple Benefits	<input type="checkbox"/>	Outcomes	<input type="checkbox"/>	Knowledge Base
<input type="checkbox"/>	Extent of Impact	<input type="checkbox"/>	Innovation	<input type="checkbox"/>	Scientific/Tech Basis	<input type="checkbox"/>	Urgency
<input type="checkbox"/>	Capacity	<input type="checkbox"/>	Readiness	<input type="checkbox"/>	Leverage	<input type="checkbox"/>	TOTAL <input type="checkbox"/> %
<input type="checkbox"/>	If under \$200,000, waive presentation?						



**Environment and Natural Resources Trust Fund (ENRTF)
2019 Main Proposal**

Project Title: Reducing nitrogen inputs and loss in Twin City metro area urban landscapes

PROJECT TITLE: Reducing nitrogen inputs and loss in Minnesota lawns

I. PROJECT STATEMENT

Why: A recent research report published by researchers at the University of Minnesota estimated that nitrate losses from fertilizer applications are a significant contaminant of Twin City watersheds. The report highlights two inherent problems associated with lawn fertilization – (1) fertilizer rate recommendations made by turfgrass scientists have not accounted for local conditions or homeowner preferences, and (2) we know very little about the amount and types of fertilizer applied to home lawns in Minnesota.

In agricultural production, yield and price of fertilizer determine optimum fertilization rates. Conversely, turfgrass areas are not maintained towards an optimum yield making it difficult for turf managers and homeowners to determine optimum fertilization rates in turfgrass areas. As a result, turfgrass scientists conduct research (most often in experimental settings) to determine fertilization rates that result in high turfgrass quality. These fertilizer recommendations do not account for several factors such as stand quality preferences of the manager, age of turf stand, turf species or cultivar planted, presence of shade, mowing management, irrigation practices, or soil conditions that would each affect optimum fertilization rates. Furthermore, it is unclear to what extent homeowners or other turfgrass managers follow turf scientist recommendations. As a result, little is known how much fertilizer is actually being applied to turf areas. This is important because public officials are left without data needed to make wise decisions about local and state-wide fertilizer policy.

Every previous attempt at quantifying fertilizer applied to home lawns on a national or local level (including the above mentioned research report) has relied on self-reporting of survey responses to estimate homeowner practices. Consequently, we do not know how much fertilizer is being applied to home lawns and our attempts at estimating the impact of lawn fertilization may be inaccurate and potentially missing other sources of nitrogen loss in the urban environment. There is also a need to reduce nitrogen inputs through changes in management practices and through the development of turfgrasses that need less nitrogen fertilizer.

Goals: Our main goal is to reduce the amount of nitrogen applied to lawns. Reducing the amount of nitrogen applied to lawns would decrease the amount of nitrogen entering waterways and diminish greenhouse gas emissions associated with their application. We will achieve this goal by quantifying the difference between perceived and actual amount of fertilizer applied by homeowners and lawn care operators. Our secondary goal is to better align fertilizer recommendations with homeowner preferences and then targeting education efforts based on this information.

Outcomes: The primary objective of this research proposal is to determine the amount of fertilizer applied to Twin City metro area home lawns. A secondary objective is to align fertilizer rate recommendations with homeowner preferences. Knowledge of actual homeowner fertilization practices and preferences is necessary for improving education and outreach methods of turfgrass scientists; this information will also be able to guide policy makers.

How: We are proposing a holistic approach to this problem. First, we need to better understand how and when homeowners apply nitrogen to lawns, which will help us better educate the public about proper fertilization practices and also help social scientists understand the motivations that lead to over and under fertilization. This project will accomplish these goals by first implementing pre- and post-assessment surveys (Activity 1) throughout the growing season of approximately 150 home lawns in the Twin City metropolitan area. In-person observations will be used to determine the difference between the homeowner’s perceived and actual fertilization practices. In Activity 2, we will use information from in-person observations to inform the creation of new outreach efforts such as new Extension publications and videos along with an educational field day for homeowner lawncare.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Pre- and Post-assessment lawn fertilization surveys and estimation of average amount of N applied. Budget: \$191,876

In-person observations conducted twice in the growing season for the approximately 150 lawns will determine actual fertilization practices, including application timing, amount applied, and method of application. Because fertilizer applications are often weather dependent, we will conduct a second survey and in-person assessments using a different group of homeowners in year 2 of the experiment. Data will allow researchers to better understand the impact of lawn fertilizations on MN waterways and the global environment.



Environment and Natural Resources Trust Fund (ENRTF)

2019 Main Proposal

Project Title: Reducing nitrogen inputs and loss in Twin City metro area urban landscapes

Outcome	Completion Date
1. Six neighborhoods of representative socioeconomic backgrounds will be selected and surveyed within the Twin City area.	November 2019
2. Selected survey respondents will be visited by project team members in order to determine actual fertilizer amount and method applied during fertilization events.	March 2020- November 2021
3. Submission of manuscripts for publication in peer-reviewed journal	June 2022

Activity 2: Educate homeowners of responsible fertilization practices.

Budget: \$5,500

Results from Activity 1 will inform extension and outreach programing for homeowners and lawn care operators regarding best management practices and ways to reduce environmental impact of lawn fertilization.

Outcome	Completion Date
1. A field day specifically for homeowners concerning best management practices	June 2021
2. Extension publications detailing best management practices for lawn fertilization will be published and made free to public	June 2022

III. PROJECT PARTNERS

A. Project Team/Partners

Eric Watkins (Co-PI, paid), Professor in Turfgrass Science and Breeding (Dept. of Horticultural Science, Univ. of Minnesota) will be the principal coordinator for Activity 1. **Brian Horgan** (Co-PI, unpaid), Professor and Extension Turfgrass Specialist (Dept, of Horticultural Science, Univ of Minnesota) will coordinate the extension activities outlined in Activity 2. **Kristen Nelson** (Co-PI, paid), Professor of Natural Resources (Dept of Forest Resources, Univ. of Minnesota) will write and distribute the pre- and post-assessment surveys outlined in Activity 1. **Jon Trappe** (PI, paid), Postdoctoral Research Associate (Dept. of Horticultural Science, Univ. of Minnesota) will conduct the in person observations and data analysis outlined in Activity 1.

IV. LONG-TERM IMPLEMENTATION AND FUNDING

This research will be the first study of its kind in the U.S. to quantify and further estimate the amount of fertilizer applied to home lawns. This research builds on previous research aimed at identifying sources of nitrogen pollution and may identify the need for further research to investigate other sources of nitrogen and phosphorus pollution in urban water bodies. Ultimately, this project will benefit numerous stakeholders in the green industry including homeowners, public land managers, professional turf and landscape managers (hundreds in the Twin Cities alone), sod farmers (approximately 50 statewide), grass seed producers (over 100 farmers in northern Minnesota), seed companies (numerous), state agencies such as MDA and MnDOT, and the broader scientific community. The methodology used in this research may also be used as a pilot study by other turfgrass scientists in other parts of the U.S. that have different turf species requiring different fertilization management than those in Minnesota. This research will enable us to better understand the extent of home lawn care practices and allow scientists to make recommendations towards efficiently maintaining acceptable levels of turfgrass quality, while providing policy makers better information when attempting to protect Minnesota’s natural resources. Finally, results from this research will reduce nitrogen inputs to turfgrass areas, resulting in reduced nitrogen contaminates in Minnesota waterways.

V. TIME LINE REQUIREMENTS

Because funding of approved projects will not commence until July 1, 2019 (after homeowners have begun maintaining their lawns in 2019), the remainder of the 2019 growing season (July-December) will be used to locate and contact potential participants. Once an appropriate and representative number of participants have agreed to be a part of the experiment, in-person observations will begin prior to the initiation of homeowner planned lawn care activities in spring 2020 and 2021 for the first and second runs, respectively, of the Activity 1. Once the project has been initiated (for activities 1 and 2), no anticipated specific timing constraints before or during this research implementation are expected.

2019 Detailed Project Budget

Project Title: Reducing nitrogen inputs and loss in Minnesota lawns

IV. TOTAL ENRTF REQUEST BUDGET 3 years

BUDGET ITEM	AMOUNT
Personnel:	\$ -
E. Watkins (Co-PI), and K. Nelson (Co-PI), partial summer salary support (Each are on 9 mo. Appointments) + fringe + 3% inflation. Watkins (0.23 FTE/yr), .25 mo: \$8,173 + \$2,738, Nelson (0.23 FTE/yr), 0.25 mo: \$8,959 + \$3,001.	\$ 22,871
Partial salary support for J. Trappe (PI), who is conducting research and extension activities for activity 1: (9.0 FTE yrs 1 & 2) (70%) + fringe + 3% inflation, and activity 3 (3.0 FTE yr 3) (25%) + fringe +3% inflation. 111,157 + 23,788.	\$ 134,945
One part-time summer undergraduate to assist with on-site assessment and soil sampling in Activity 1, (3.7 FTE/yr) \$8,640 (\$12/hr, 30 hrs/wk/, 24 wks - yr 1; 16 wks - yr 2) and one part time summer advanced undergraduate to assist with Qualtrics data in Activity 1, (0.23 FTE/yr) \$360 (\$12/hr, 30/hrs x 1 wks)	\$ 14,760
Equipment/Tools/Supplies:	
Travel:	
Vehicle expenses to visit on-site evaluation locations in Activity 1; help defray costs of UMN leased vehicle mileage and gas = \$3000/ year for years 1 and 2 for Activity 1.	\$ 6,000
Additional Budget Items:	
Educational and Outreach Materials: signs, website work, brochures, handouts, pubs, press releases, tri-fold pamphlet, online updates, etc	\$ 5,500
Soil samples for survey participants (4,500/yr, 2yrs)	\$ 9,000
Survey research \$2,150/ year mailings, data analysis, info materials, for Activity 1	\$ 4,300
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 197,376

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State \$ To Be Applied To Project During Project Period:	N/A	N/A
Other State \$ To Be Applied To Project During Project Period:	N/A	N/A
In-kind Services To Be Applied To Project During Project Period:	N/A	N/A
Funding History:	N/A	N/A
Remaining \$ From Current ENRTF Appropriation:	N/A	N/A



Reducing nitrogen inputs and loss in Minnesota lawns



Our goal is to reduce the amount of fertilizer applied to lawns to diminish the amount of nitrogen entering waterways and decrease greenhouse gas emissions associated with their application.

Activity 1: Implementation of pre- and post-assessment surveys through the growing season of multiple home lawns in the Twin City metro area.



Activity 2: We will use what we learn from Activity 1 to educate homeowners and turfgrass professionals regarding responsible fertilization practices via outreach education, trade journals, a turf blog, and peer review publications.



Environment and Natural Resources Trust Fund (ENRTF) Project Manager Qualifications and Organization Description

Project Title: Reducing nitrogen inputs and loss in Minnesota lawns

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Project Manager Qualifications

Dr. Jon Trappe is currently serving as a Postdoctoral Research Associate at the University of Minnesota. He has 17 years of experience working in the turfgrass industry as either an academic or professional. Dr. Trappe's research and education goals are centered on reducing water and fertilizer inputs to turfgrass systems. Already in his young career as a turfgrass scientist, Dr. Trappe has received various accolades from his peers in the forms of scholarships and awards for his work in turfgrass research and extension.

As a member of the turfgrass science research team at the University of Minnesota, Dr. Trappe is committed to pursuing research efforts that reduce inputs to turfgrass systems. He has conducted numerous research on turfgrass management practices that mitigate greenhouse gases, enhance soil carbon sequestration potential, reduce fertility, irrigation, mowing, and pesticide requirements, and improve establishment.

Dr. Trappe also values the importance of communicating his recent scientific advancements to the stakeholders in the green industry. In his 11 years as an extension educator, Dr. Trappe has presented over 40 extension talks to over 3,500 homeowners and professionals in the green industry. Dr. Trappe has also published numerous extension publications, popular press articles, blog posts, in addition to conducting on-site consultation visits with turfgrass professionals and homeowners alike. This broad extension and outreach experience has allowed him to work closely with turfgrass managers of multiple demographics and provide expert advice that is both relevant and environmentally sound.

Organization Description

The University of Minnesota Turfgrass Science Program is among the world's top research programs pursuing low-input turfgrass science research. The Turfgrass Science Research Lab consists of seven faculty and extension positions, six full-time research staff, and six graduate students. The facilities and team create an environment that is prolific in applied and basic turfgrass research aimed at preserving natural resources while assisting turfgrass professionals and homeowners alike.