

Environment and Natural Resources Trust Fund

2026 Request for Proposal

General Information

Proposal ID: 2026-341

Proposal Title: Road Salt Phytoremediation by Invasive Cattail Harvest

Project Manager Information

Name: John Chapman Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences Office Telephone: (612) 626-4857 Email: chapm155@umn.edu

Project Basic Information

Project Summary: This project investigates the effectiveness of invasive cattails in removing salt from stormwater ponds, aiming to develop sustainable management practices and enhance ecological health through cattail harvesting and community engagement.

ENRTF Funds Requested: \$300,000

Proposed Project Completion: June 30, 2029

LCCMR Funding Category: Small Projects (G) Secondary Category: Water (B)

Project Location

What is the best scale for describing where your work will take place? Statewide

What is the best scale to describe the area impacted by your work? Statewide

When will the work impact occur? During the Project and In the Future

Narrative

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

This proposal addresses two pressing environmental issues in Minnesota's stormwater ponds: salt pollution and the ecological consequences of invasive cattails. The use of road salts during harsh winters leads to high salt concentrations in stormwater runoff, which negatively affects water quality and harms aquatic life. This pollution disrupts local ecosystems, alters hydrology, and degrades habitat quality. Simultaneously, invasive cattails, particularly narrowleaf cattails and their hybrids, dominate many of these ponds, forming dense monocultures that crowd out native plants and further degrade water quality. These cattails also exacerbate nutrient loading and contribute to issues like algal blooms. While cattails offer potential for phytoremediation of salt, their invasive nature creates an additional challenge. Existing management efforts focus on controlling cattail populations but lack economic incentives for removal, as cattails are often viewed as a nuisance rather than a resource. Without a viable economic model or sustainable harvesting practices, the removal of invasive cattails remains limited. This proposal seeks to explore how cattails can be used to reduce salt contamination while addressing their ecological impact. By developing sustainable harvesting methods, we aim to mitigate both salt pollution and the negative ecological effects of invasive cattails, offering a balanced solution for stormwater pond management.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

Our proposed solution is to develop a sustainable cattail harvesting strategy for Minnesota's stormwater ponds that utilizes their salt-removal properties while addressing their ecological impact. We aim to explore the potential of cattails as a tool for phytoremediation, focusing on their ability to uptake and store salt from contaminated pond water. Through greenhouse and field studies, we will assess how different cattail species and environmental conditions influence their salt removal capacity and examine the ecological consequences of their removal.

Invasive cattails (Typha angustifolia) and their hybrids have aggressively spread throughout many stormwater ponds, lakes, and wetlands. Recent research indicates that these cattails can absorb significant amounts of salts into their biomass during growth. However, to ensure effective salt removal and promote cattail biomass utilization, it is essential to study various harvesting methods, including timing and selective cutting. Additionally, providing an economic incentive for harvesting is critical for long-term success.

By combining greenhouse and field research, we aim to develop a sustainable cattail management framework that 1. reduces salt pollution; 2. controls invasive populations; and 3. promotes native biodiversity. This project will produce actionable guidelines for local communities to implement cattail harvesting, improve water quality, restore ecosystems, and foster sustainable management.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

This project will protect and enhance Minnesota's natural resources by developing a sustainable strategy for managing invasive cattails in stormwater ponds. By utilizing cattails for salt removal, we aim to reduce salt pollution in freshwater ecosystems, improving water quality and aquatic habitat. Additionally, the project will control invasive cattail populations, promoting biodiversity and restoring native plant communities. The findings will provide actionable guidelines for local communities and authorities to implement sustainable harvesting practices, fostering long-term conservation of stormwater pond ecosystems and contributing to the overall health and resilience of Minnesota's aquatic resources.

Activities and Milestones

Activity 1: Greenhouse Study on Salt Remediation Potential of Invasive Cattail (Typha angustifolia)

Activity Budget: \$97,916

Activity Description:

The first activity involves conducting a controlled greenhouse study to assess the salt-removal potential of different cattail species under varying environmental conditions. We will grow cattails in hydroponic systems with different water salinity levels, temperatures, and light conditions. This study will help determine how these variables affect cattail growth and salt uptake. Over the course of the study, we will regularly measure the biomass of the cattails and analyze the salt content in the plant tissues (roots, stems, and leaves). By understanding how cattails mobilize and store salt, we will identify the optimal conditions for using cattails in phytoremediation. This activity will also explore the longevity of salt storage in cattail biomass and evaluate how seasonal changes might affect their efficacy. The data collected will be crucial for developing targeted, sustainable harvesting strategies, such as determining the best time for harvesting cattails to maximize salt removal without causing harm to the ecosystem. The results of this greenhouse study will provide foundational knowledge needed for real-world application in stormwater ponds and inform future field studies. We will also extend our research to several other prominent invasive species in Minnesota, like Eurasian watermilfoil, curly-leaf pondweed, starry stonewort, and Phragmites.

Activity Milestones:

Description	Approximate Completion Date
Complete data collection on biomass growth and salt concentration in cattail tissue	December 31, 2026
Analyze and compile results, finalize data on salt uptake and biomass salt storage	June 30, 2027

Activity 2: Field Sampling and Evaluation of Cattail Salt Removal in Stormwater Ponds

Activity Budget: \$99,709

Activity Description:

The second activity focuses on field sampling in five distinct stormwater ponds to evaluate how cattails perform in realworld conditions. Over the course of a full year, we will collect monthly water, soil, and cattail plant samples from these ponds to measure salt concentrations and biomass changes. This will provide insights into how cattails naturally uptake salt from pond water and how their biomass accumulates salts in various seasonal conditions. The field study will also help us understand the variability of salt removal efficiency across different hydrological environments and seasonal changes. Additionally, we will monitor the surrounding ecosystems to determine the broader ecological effects of cattail growth, including changes in native plant diversity and aquatic habitat quality. By comparing this data with the greenhouse study, we will refine our understanding of how invasive cattails manage salt in real conditions and establish best practices for their removal. The information gathered will be used to assess the feasibility of using cattail harvesting as a strategy to improve water quality and mitigate salt pollution in Minnesota's stormwater ponds.

Activity Milestones:

Description	Approximate Completion Date
Identify pond study candidates	August 31, 2026
Analyze first round of seasonal salt concentration data from field samples	December 31, 2027
Assess the optimal methodology	June 30, 2028

Activity 3: Ecological Assessment and Harvesting Protocol Development

Activity Budget: \$102,375

Activity Description:

The third activity will involve assessing the ecological consequences of cattail removal and developing harvesting protocols based on findings from the greenhouse and field studies. In this activity, we will focus on the Hwy280/Energy Dr. Pond and two additional ponds with varying cattail infestations and salt concentrations. The main goal will be to determine how harvesting cattails at different times of the year (e.g., before or after the growing season) and at different depths affects salt removal, plant regrowth, and the broader ecosystem. We will also investigate the salt content of harvested cattail biomass to ensure it is managed properly (e.g., composted, used for deicing, or as biomass fuel) without reintroducing salts into the environment. Additionally, we will monitor the response of native plant species and aquatic life after cattail removal. This ecological assessment will provide essential data to guide the development of sustainable cattail harvesting practices that not only reduce salt levels but also enhance ecosystem health. The outcome will be a set of best practice guidelines that can be implemented by local authorities and community groups for long-term stormwater pond management.

Activity Milestones:

Description	Approximate Completion Date
Implement experimental cattail harvesting at selected ponds and begin monitoring plant regrowth and salt removal	November 30, 2028
Complete ecological monitoring, noting native plant regrowth and effects on water quality and aquatic species	November 30, 2028
Develop and share cattail harvesting best practices and sustainable management guidelines	June 30, 2029

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Bo Hu	University of Minnesota	Co-PI	Yes
Amy Schrank	University of Minnesota	Co-PI	Yes

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?

Stormwater ponds are currently required to be maintained and inspected on a regular basis, and this work will provide guidance and adjustment of existing activities that maintenance crews may already perform. The schedule or technique found to be optimal by this research could result in different work timing, hours, and equipment which may result in additional minor costs for stormwater pond owners, but could be highly cost effective for salt removal. Education of municipal staff can be done using existing sustainable training platforms. Future work may be funded through partnerships with local agencies, water resource management organizations, and state grants.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Phytoremediation for Extracting Deicing Salt	M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 08g	\$451,000

Project Manager and Organization Qualifications

Project Manager Name: John Chapman

Job Title: Associate Research Professor

Provide description of the project manager's qualifications to manage the proposed project.

John A. Chapman is an Associate Research Professor for the University of Minnesota Department of Bioproducts and Biosystems Engineering and also serves as the Director of the Erosion and Stormwater Management Certification Program. John holds a Ph.D. in Civil Engineering from the University of Minnesota, a M.S. Degree in Civil Engineering and a B.S. Degree in Geological Engineering from the University of Wisconsin – Madison. He is a registered engineer in Minnesota and Colorado. When not researching erosion control and stormwater, he conducts workshops for engineers, contractors and other professionals on stormwater management technology and regulations. John chaired the 2013 International Low Impact Development Conference and the 2019 Stormwater Operations and Maintenance Conference. He has served as the president, as well has holding other leadership positions, of the Minnesota Erosion Control Association. He has served as the President of the Tau Beta Pi Engineering Honor Society Twin Cities Alumni Chapter since 2015. He has provided leadership in the Minnesota Stormwater Steering Committee and from 2014 to 2019 was instrumental in the establishment of the Minnesota Stormwater Research Council.

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Organization Description:

The University of Minnesota is the land grant university for the State of Minnesota.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineli gible	% Bene fits	# FTE	Class ified Staff?	\$ Amount
Personnel								
Lead PI -		Direct, oversee and coordinate entire project			36.6%	0.06		\$13,339
summer salary								
only								
Co-PI -		Direct and manage tasks and student workers			36.6%	0.06		\$14,709
summer salary								
only							ļ'	
Co-PI -		Direct tasks and student workers			36.6%	0.06		\$7,991
Professional								
Researcher -								
summer salary								
only							ļ!	
Researcher 5 -		Provide technical assistance on field and lab			36.6%	0.57		\$61,491
employed by		procedures						
grant funds							ļ!	
Graduate		Provide technical lab and field work, education			83.6%	3		\$179,501
student					00/	0.07		40.570
Undergraduate		experiment set up and take down, conduct			0%	0.27		\$9,579
students		experiments					Cub	¢296.610
							Sub Total	\$286,610
Contracts and								
Services								
							Sub Total	-
Equipment,								
Tools, and								
Supplies								
	Tools and	Greenhouse rental	To work on the greenhouse					\$3,690
	Supplies		experiment for plant growth					
	Tools and	lab and field supplies: chemicals, reagents, sampling	to conduct the research accurately					\$3,700
	Supplies	materials, personnel protection	and safely both in the lab and the field					
							Sub	\$7,390
							Total	
Capital Expenditures								

						Sub	-
					-	Total	
Acquisitions							
and							
Stowardshin							
Stewaruship						Cult	
						Sub	-
						Total	
Travel In							
Minnesota							
	Miles/ Meals/	trips to 5 stormwater ponds	To take samples - site visits mileage,				\$6,000
	Lodging		per diem to collect				
						Sub	\$6,000
					-	Total	<i>\$0,000</i>
Transl Outside						TOLAI	
Travel Outside							
Minnesota							
					9	Sub	-
						Total	
Printing and							
Publication							
						Sub	-
					-	Total	
Other						TUtai	
Other							
Expenses							
					9	Sub	-
						Total	
					(Grand	\$300,000
					-	Total	

Classified Staff or Generally Ineligible Expenses

Category/Name Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub	-
			Total	
Non-State				
			Non State	-
			Sub Total	
			Funds	-
			Total	

Total Project Cost: \$300,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component File: 99795ce8-022.pdf

Alternate Text for Visual Component

This visual component includes: 1. two striking environmental issues facing MN water environment, salt pollution and invasive cattail; 2. the proposed research method, the phytoremediation; 3. research activities; and 4. research outcomes....

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
SPA letter	<u>3efe45c2-e19.pdf</u>
Audit	<u>ee90614c-8b9.pdf</u>

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I understand the UMN Policy on travel applies.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF? N/A

Does your project include original, hypothesis-driven research?

Yes

Does the organization have a fiscal agent for this project?

No

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing \$10,000 or more or large-scale stream or wetland restoration?

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care,

treatment, education, training, instruction, or recreation to children")?

No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Wendy Moylan, Bo Hu, Amy Schrank, University of Minnesota

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

N/A