



Environment and Natural Resources Trust Fund

2025 Request for Proposal

General Information

Proposal ID: 2025-196

Proposal Title: Optimizing Non-Native Cattail Treatment Effectiveness in Prairie Wetlands

Project Manager Information

Name: Megan Fitzpatrick

Organization: MN DNR - Fish and Wildlife Division

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Project Basic Information

Project Summary: We propose research to compare effectiveness of several invasive cattail treatment methods. Outcomes will include practical recommendations for managers to maximize benefits of conservation dollars for native plants and wildlife.

ENRTF Funds Requested: \$1,006,000

Proposed Project Completion: June 30, 2030

LCCMR Funding Category: Aquatic and Terrestrial Invasive Species (D)

Project Location

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

Region(s): NW, SW, Central,

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

Region(s): SW, Central, NW,

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.

Invasive cattail species (*Typha angustifolia*, *T. x glauca*) have dramatically proliferated in Minnesota since the mid-twentieth century. Unlike native cattail (*T. latifolia*), invasive cattail forms single-species stands, impacting native plant diversity and displacing wildlife food plants. In Minnesota's prairies, tens of thousands of seasonal wetlands (wet in spring, dry by late summer) that provide crucial shallow water wildlife habitat are degraded by invasive cattail. Dense stands eliminate open water patches necessary to ducks and marsh birds for spring foraging and breeding, and creates movement barriers for ducklings, amphibians, and other wildlife. Invasive cattail exacerbates other threats to prairie wetlands. Many of Minnesota's prairie wetlands have been drained, with remaining wetlands threatened by sedimentation, run-off, and other threats.

Minnesota's public land managers spend millions of dollars annually to combat invasive cattail. However, limited scientific information is available to guide management decisions. Potential treatments include herbicides and physical disturbances (like burning, grazing, mowing, disking, cutting, crushing, or scraping). Successful cattail control is often short-lived, because cattail's rhizome system helps it recover from damage, and wind-dispersed seeds regenerate from the seed bank and surrounding private lands and roadsides. Consequently, wetland managers need information on initial success and long-term persistence of cattail treatment options.

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.

We propose research to compare the effectiveness of several cattail treatments for seasonal prairie wetlands. Importantly, we are incorporating unstudied treatments with potentially longer-lasting impacts, which could stretch conservation funds and reduce herbicide application frequency. Further, collaborating wetland managers guided selection of feasible treatments that can be implemented in the immediate future on thousands of impacted prairie wetlands.

We will compare these treatments using the scientifically rigorous before-after/control impact study design:

1. Glyphosate (herbicide) application: This treatment is common, relatively inexpensive, and included for comparison to other treatments.
2. Glyphosate followed by roller-chopping: This unstudied treatment entails a machine crushing cattail after glyphosate application to further damage plants. It is approximately 2x the cost of Treatment #1 per acre, but impacts may last longer, reducing frequency of retreatment.
3. Glyphosate followed by disking: This unstudied treatment involves a machine cutting into the soil after glyphosate application, damaging rhizomes and stratifying native plant seeds. It is about 3x the cost of Treatment #1, but impacts may last much longer.
4. Scraping: This machine treatment removes the soil's top layer, including cattail rhizomes. It is approximately 50x the cost of Treatment #1 but may last longest due to complete rhizome removal.

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?

Our study will produce information (publications, reports, presentations) about the effectiveness and longevity of invasive cattail treatment impacts for wetland vegetation, waterfowl, and marsh birds in Minnesota's seasonal wetlands. Our research group includes USFWS and DNR managers who advised on selection of feasible treatments, such that this work will produce practical information for land managers to balance frequency of needed retreatment versus cost per treatment, maximizing the impact of conservation dollars for enhancing wetland habitat across Minnesota's prairies and benefiting wetland wildlife viewers, waterfowl and rail hunters, and all Minnesotans who benefit from ecosystem services provided by healthy wetlands.

Activities and Milestones

Activity 1: Comparing effectiveness and longevity of invasive cattail treatments for increasing native wetland vegetation

Activity Budget: \$661,751

Activity Description:

Objective 1: Compare vegetative responses and their longevity among cattail treatments, including reduction in cattail abundance and type of cover that replaces cattail (open water, native vegetation, or cattail regrowth).

The DNR Wetlands Management Program and U.S. Fish and Wildlife Service will provide cattail treatments on seasonal prairie wetlands on public lands in western Minnesota using separate funding. LCCMR funding will support vegetation surveys before and after treatment, and in 10 untreated “control” wetlands, allowing us to report how treatment groups deviate from untreated wetlands and each other over time (before-after/control-impact experimental design). Large sample size to detect statistical trends is key to outcomes. We will study 50 wetlands: 10 per treatment group (above) and 10 control wetlands. We will survey vegetation in July-August before treatment (2025), treat in 2026, and re-survey for three years after treatment (2027, 2028, 2029). We will survey wetlands in three ways: measuring cattail abundance in quadrats at sample points, collecting high-resolution UAV (“uncrewed aerial vehicle”; drone) imagery to measure aerial coverage of cattail vs. other plants and open water, and collecting species-level coverage data using timed meander surveys for measures of plant community condition (e.g., species diversity, floristic quality).

Activity Milestones:

Description	Approximate Completion Date
Conduct before-treatment surveys of vegetation on study wetlands	September 30, 2025
Conduct invasive cattail treatments on study wetlands	October 31, 2026
Completion of annual after-treatment vegetation surveys on study wetlands (3 years)	September 30, 2029
Final results analysis	May 31, 2030
Start dissemination of final results: PhD dissertation, ≥1 oral presentation to managers, start writing publications	June 30, 2030

Activity 2: Comparing effectiveness and longevity of invasive cattail treatments for waterfowl and secretive marsh birds

Activity Budget: \$344,249

Activity Description:

Objective 2: Assess which cattail treatments provide the greatest and longest-lasting benefits for waterfowl and marsh birds.

Seasonal wetlands provide critical habitat for breeding waterfowl and secretive marsh birds (bitterns, rails, grebes). We will survey birds using our before-after/control-impact framework. We will survey the 50 study wetlands in May-June, before treatment (2025) and three years after 2026’s cattail treatments (2027, 2028, 2029).

Accurately counting waterfowl in varying cattail conditions is challenging but necessary to understand when treatment benefits peak and decline. We will count waterfowl pairs using a UAV with thermal and red-green-blue cameras, allowing observers to see around obstructing vegetation. We successfully tested this method in DNR-funded pilot work. Secretive marsh birds are understudied due to their elusive behavior. We will deploy passive acoustic recording units (ARUs), a growing technology for wildlife surveys, to detect marsh bird occupancy in study wetlands via calls. Susan Ellis-Felege’s lab has extensive experience with UAV and ARU-based surveys.

Activity 2 will show which treatments support the most waterfowl pairs and secretive marsh birds per wetland, in the

context of Activity 1 vegetation trends. We will provide Minnesota and regional managers recommendations to maximize benefits of conservation dollars for wetland enhancement and wildlife.

Activity Milestones:

Description	Approximate Completion Date
Conduct before-treatment surveys of waterfowl and marsh birds on study wetlands	September 30, 2025
Conduct invasive cattail treatments on study wetlands	October 31, 2026
Completion of annual after-treatment waterfowl and marsh bird surveys on study wetlands (3 years)	September 30, 2029
Final results analysis	May 31, 2030
Start dissemination of final results: PhD dissertation, ≥1 oral presentation to managers, start writing publications	June 30, 2030

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
John Maile	MN Department of Natural Resources (MN DNR)	-lead implementation of invasive cattail treatments on study wetlands on state Wildlife Management Areas -partner on project design and dissemination of findings, with particular expertise in wetland ecology, restoration/enhancement, and wetland wildlife	No
Ed Zlonis	MN Department of Natural Resources (MN DNR)	-partner on project design, implementation, data analysis, and dissemination, with particular expertise in waterfowl and wetlands	No
Sara Vacek	U.S. Fish and Wildlife Service (USFWS)	-co-lead implementation of invasive cattail treatments on study wetlands on federal Waterfowl Production Areas -coordinate with local USFWS staff regarding project needs and WPA access -partner on project design and dissemination of findings, with particular expertise in wetland ecology, restoration/enhancement, and wetland wildlife	No
Stacy Salvevold	U.S. Fish and Wildlife Service (USFWS)	-co-lead implementation of invasive cattail treatments on federal Waterfowl Production Areas -coordinate with local USFWS staff regarding project needs and WPA access -partner on project design and dissemination of findings, with particular expertise in wetland ecology, restoration/enhancement, and wetland wildlife	No
Dr. Susan Ellis-Felege	University of North Dakota	-advise PhD student -lead UAV purchase and pilot (student) training -partner on project design, data collection, data analysis, and dissemination of findings, especially with regard to: UAV and ARU expertise, wetland vegetation and invasive cattails, and avian biology	Yes
Dr. Todd Arnold	University of Minnesota	-partner on project design, data analysis, and dissemination of findings, especially with regard to avian biology and detection probability in avian surveys	Yes
Dr. Dan Larkin	University of Minnesota	-partner on project design, data analysis, and dissemination of findings, especially with regard to wetland plant communities and invasive cattails	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?

Project results and associated recommendations for invasive cattail management methods in seasonal prairie wetlands will be communicated to agency wetland managers, scientists, and the public via ≥ 3 presentations following final analyses. The project manager and university professors will work with the graduate student following dissertation completion to format dissertation chapters for submission to scientific journals, preferably with an open access publication option. The MN DNR (Fitzpatrick), UND (Dr. Ellis-Felege), and UMN (Dr. Arnold, Dr. Larkin) will support analysis and writing. MN DNR will support oral presentations (Fitzpatrick's time, travel) at 1-2 conferences and regional manager meetings, and publication costs.

Project Manager and Organization Qualifications

Project Manager Name: Megan Fitzpatrick

Job Title: Research Scientist II, Minnesota Department of Natural Resources

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

Dr. Megan Fitzpatrick is a Research Scientist at the Minnesota Department of Natural Resources with a PhD in Zoology

(University of Wisconsin-Madison). Fitzpatrick has three years prior experience managing a collaborative ENTRF-funded research project focused on wetland wildlife and wetland management techniques. Specifically, Fitzpatrick joined MN DNR in 2019 to assist with the ENTRF-funded project M.L. 2018, Chp. 214, Art. 4, Sec. 02, Subd. 08g as extended by M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 18 (Restoring Wetland Invertebrates to Revive Wildlife Habitat), originally managed by Dr. Danelle Larson. After Dr. Larson advanced to a new position outside of Minnesota, Dr. Fitzpatrick took the project manager role for the final three years of the project. This role entailed training and supervising young-career undergraduate technicians (over 20) and graduate students (2) conducting field work, and collaborating closely with project partners at two Minnesota universities and the U.S. Geological Survey to complete the project and disseminate findings. Fitzpatrick has published 9 papers (4 as first author). The previous ENTRF project has produced two scientific publications with two more currently in review and a third in development, along with 10 oral presentations to scientific audiences, wetland managers, and the public. Outcomes included management recommendations to increase populations of amphipods, an important invertebrate food resource for Lesser Scaup ducks, in Minnesota wetlands. Fitzpatrick has additional experiences in collaborative research focused on wetland species, including her dissertation work on Whooping Cranes (collaborating with the non-profit International Crane Foundation and USFWS) and post-doctoral research on wood frogs (collaborating with 3 principal investigators).

Organization: MN DNR - Fish and Wildlife Division

Organization Description:

The mission of the Minnesota Department of Natural Resources (DNR) is to work with Minnesotans to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life. The project manager (Fitzpatrick) is a Research Scientist in the Wildlife Research Unit, a unit of approximately 30 research scientists, biologists, biometricians, and support staff whose mission is to ensure that good science informs DNR wildlife management decisions. Fitzpatrick is part of the Wetlands Wildlife Population and Research Group, which focuses on wetland species and their habitats. DNR collaborators include John Maile in the Wetlands Management Program, which restores and enhances small (<50 acre) wetlands in priority complexes within the prairie region of Minnesota.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
2 DNR Field Technicians for each season of waterfowl/marsh bird surveys		Assist with waterfowl and marsh bird surveys for each of 3 years after wetland treatments. (DNR will cover salaries for pre-treatment surveys in spring 2025.)			25%	1.38		\$86,400
							Sub Total	\$86,400
Contracts and Services								
University of North Dakota	Sub award	The University of North Dakota (project collaborator Dr. Susan Ellis-Felege) will provide and mentor a PhD student (assistance with field work, data analysis, and dissemination), provide a UAV (drone) and pilot (PhD student or student technician) for waterfowl surveys, and provide expertise using UAVs and passive acoustic recording units (ARUs)		X		2.25		\$258,710
University of Minnesota	Sub award	Dr. Todd Arnold and Dr. Daniel Larkin will provide assistance with project design, data analysis, and writing. Dr. Arnold has particular expertise with modeling detection probability in avian surveys. Dr. Larkin is an applied plant ecologist with expertise in plant survey methods, plant community metrics, and invasive cattail in particular.				0.4		\$91,389
TBD	Professional or Technical Service Contract	Contractors with wetland plant identification expertise at the species level will conduct timed meander surveys on study wetlands in the year before cattail treatment and three years after treatment to estimate percent coverage of individual wetland species, allowing us to compute plant community condition metrics.				1.16		\$450,000
Minnesota Department of Agriculture	Professional or Technical Service Contract	Minnesota Dept. of Agriculture will analyze annual water samples from our treatment wetlands for nitrogen and phosphorus, two nutrients that				0.04		\$8,800

		influence cattail growth and will help us understand treatment results.						
							Sub Total	\$808,899
Equipment, Tools, and Supplies								
	Tools and Supplies	Miscellaneous supplies (technician waders, Rite in the Rain paper for datasheets, AA batteries for ARUs, supplies for nitrogen and phosphorous analysis)	Annual supply needs tor field surveys of vegetation and waterfowl					\$27,543
							Sub Total	\$27,543
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	For each of 3 years: 6 weeks of travel for field work at 1456 miles per week, plus housing (hotels or dorms) and meals for 4 people for the 6 weeks	Travel to conduct waterfowl and marsh bird surveys after wetland treatments in spring seasons of 2027, 2028, and 2029. (MN DNR will fund travel for the before-treatment waterfowl and marsh bird surveys in 2025, and travel associated with vegetation surveys.)					\$61,678
							Sub Total	\$61,678
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								

		Minnesota DNR Direct and Necessary Costs	DNR's direct and necessary costs pay for activities that are directly related to and necessary for accomplishing appropriated projects: People Support (~\$3,323), Safety Support (~\$467), Financial Support (~\$6,057), Communication Support (~\$1,528), IT Support (~\$8,974), and Planning Support (~\$1,137)					\$21,480
							Sub Total	\$21,480
							Grand Total	\$1,006,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Contracts and Services - University of North Dakota	Sub award	The University of North Dakota (project collaborator Dr. Susan Ellis-Felege) will provide and mentor a PhD student (assistance with field work, data analysis, and dissemination), provide a UAV (drone) and pilot (PhD student or student technician) for waterfowl surveys, and provide expertise using UAVs and passive acoustic recording units (ARUs)	We are requesting this sub award to an out-of-state university due to Dr. Susan Ellis-Felege's expertise in using UAVs (uncrewed aerial vehicles, or "drones") to survey waterfowl. Use of UAVs to survey waterfowl is key to project outcomes due to the need to accurately count waterfowl in wetlands with varying cattail conditions. (Cattail is tall and visually obstructs traditional ground-based counts in the flat prairie landscape.) We could not find any scientists/professors in Minnesota with expertise in using UAVs to survey birds. Given the need to search out of state, we are partnering with UND due to Dr. Ellis-Felege's demonstrated expertise with UAVs to survey waterfowl (prior publications and positive references), and UND's location on the Minnesota border. Minimal out-of-state travel costs will be incurred in travel to field sites. (Distance from UND campus to Minnesota border is less than 5 miles.) This sub award includes \$43,118 indirect costs requested by UND. Indirect costs are necessary for the university facilities and administrative support that underlie professor and student availability. If ENRTF funds cannot be used for indirect costs, we request that LCCMR consider funding the remainder of the contract (\$215,592), and we will explore other resources to support this necessary cost. This sub award includes \$2,300 to purchase a laptop for the graduate student to conduct study-related work: programming UAV and ARUs, data analysis, writing, and preparing presentations. Again, if ENTRF funds cannot support this equipment, we request that LCCMR consider funding the remainder of the contract, and we will explore other resources to support this necessary cost. Thank you for considering this request for generally ineligible expenses.

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
In-Kind	TBD. There are numerous potential sources. More specific funding sources will be determined following the MN DNR budget meeting in May 2024.	DNR Funding to initiate the project in spring 2025: Includes cost of travel and technician salaries before-treatment waterfowl and marsh bird surveys in study wetlands in spring 2025, along with initial equipment purchases and university contracts for spring 2025.	Pending	\$166,297
In-Kind	TBD. There are numerous potential sources. More specific funding sources will be determined following the MN DNR budget meeting in May 2024.	DNR funding for vegetation surveys throughout the project. Includes cost of travel and technician salaries to conduct vegetation surveys of cattail abundance on study wetlands in July-August 2025 (before cattail treatments) and in the three years following treatment (2027, 2028, 2029)	Pending	\$509,021
In-Kind	Game and Fish Fund: MS 97A.055	DNR Staff Time (Megan Fitzpatrick: 75% FTE over 5 years = 3.75 FTEs and NR Spec Ed Zlonis to assist with project planning, field work, analysis, and dissemination at 0.1 FTE for 5 years)	Secured	\$216,772
In-Kind	Game and Fish Funds. More specific information (with specific legal citation) will follow MN DNR budget meeting in May 2024.	MN DNR will provide 2 laptops for project activities (5 years) and trucks for field work (4 trucks per year, 60 truck-months over the duration of the project)	Pending	\$37,200
In-Kind	TBD closer to proposed 2026 treatments. Numerous funding sources are available, including some state and some federal. We are listing state for now, but this may need adjustment later.	Estimated cost for cattail treatments on 20 wetlands on Wildlife Management Areas for the MN DNR Wetlands Management Program (WMP) with average size 2.5 acres. The WMP conducts wetland enhancements in the prairie region every year at a rate of >>20 wetlands per year. We will collect data before and after their treatments on 20 wetlands that fall within the parameters of our study design in 2026. We have designed our study to focus on a type of wetland that WMP commonly treats, ensuring that we will have more than enough potential study wetlands available from WMP's normal enhancement work. We are listing the status as pending only because specific funding sources for specific wetlands are not determined this far in advance of treatments.	Pending	\$228,438
In-Kind	OHF: ML 2021, First Sp. Session, Ch. 1, Art. 1, Sec. 2, subd. 4(f)	MN DNR Wetlands Management Program staff time to plan and manage cattail treatments. The Wetlands Management Program enhances prairie wetlands as part of their regular work. We will collect data on ~20 study wetlands on Wildlife Management Areas that fall within our study parameters. We have designed our study such that the type of wetland WMP commonly treats falls within our study parameters, ensuring that OHF funds will not be used for research.	Secured	\$20,000
			State Sub Total	\$1,177,728
Non-State				

In-Kind	TBD closer to proposed 2026 treatments. Numerous funding sources are available, including some state and some federal. We are listing non-state for now, but this may need adjustment later.	Estimated cost for cattail treatments on 20 wetlands on federal Waterfowl Production Areas for the USFWS, with average wetland size 2.5 acres. The USFWS conducts wetland enhancements in the prairie region every year at a rate of >>20 wetlands per year. We will collect data before and after their treatments on 20 wetlands that fall within the parameters of our study design in 2026. We have designed our study to focus on a type of wetland that USFWS commonly treats, ensuring that we will have more than enough potential study wetlands available from USFWS's normal enhancement work. We are listing the status as pending only because specific funding sources for specific wetlands are not determined this far in advance of treatments.	Pending	\$228,438
In-Kind	University of North Dakota (state funds, but from North Dakota, not Minnesota)	Tuition waiver for PhD student that is supported on the project (\$7470/year for 5 years). The PhD student will conduct a substantial amount of work for the project, including data collection, UAV piloting, data analysis, and dissemination of results.	Secured	\$37,350
In-Kind	University of North Dakota (state funds, but from North Dakota rather than Minnesota)	5% of Dr. Susan Ellis-Felege's 9-month salary with fringe, for 5 years. Dr. Ellis-Felege will advise a PhD student and provide extensive expertise in UAV (drone) surveys of waterfowl, avian biology, wetland vegetation, and ARUs (acoustic recording units) for surveying birds	Pending	\$35,230
In-Kind	U.S. Fish and Wildlife Service (Morris and Fergus Falls Wetland Management Districts)	USFWS biologist time to plan and manage cattail treatments and provide consultation and coordination with PhD student, Universities and MN DNR. USFWS partners with Ducks Unlimited to enhance prairie wetlands as part of their regular work. We will collect data on ~20 study wetlands on Waterfowl Production Areas that fall within our study parameters. 2.5% of 2 biologists' time for 5 years	Secured	\$25,000
			Non State Sub Total	\$326,018
			Funds Total	\$1,503,746

Total Project Cost: \$2,509,746

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [c71397cc-ef8.pdf](#)

Alternate Text for Visual Component

This infographic is titled "Optimizing Invasive Cattail Treatment Effectiveness in Prairie Pothole Wetlands". It asks, "What's the most efficient way to get from this...", over two images of cattail-filled prairie wetlands, "...to this?" (over two pictures of prairie wetlands with a mix of diverse native vegetation and open water)....

Administrative Use

Does your project include restoration or acquisition of land rights?

No

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?

No

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:

Megan Fitzpatrick submitted the proposal through the LCCMR online system. Additional contributors to the text and budget preparation were: Sara Vacek, Stacy Salvevold, John Maile, Todd Arnold, Susan Ellis-Felege, Daniel Larkin, and Ed Zlonis. Please refer to Project Collaborators for their affiliations. Additionally, DNR Fish and Wildlife Division Director Dave Olfelt reviewed and approved the proposal for submission.