

**Environment and Natural Resources Trust Fund
2018 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 152-D

Evaluate Control Methods for Invasive Hybrid Cattails

Category: D. Aquatic and Terrestrial Invasive Species

Total Project Budget: \$ 131920

Proposed Project Time Period for the Funding Requested: 3 years, July 2018 to June 2021

Summary:

This project will evaluate the effectiveness of two methods to remove exotic hybrid cattail to restore fish and wildlife habitat in Minnesota wetlands.

Name: Steve Windels

Sponsoring Organization: Voyageurs National Park

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Web Address _____

Location

Region: Northeast

County Name: Koochiching, St. Louis

City / Township:

Alternate Text for Visual:

Figure 1 Mechanical harvester removing cattails. Figure 2 Muskrats removing cattails.

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



PROJECT TITLE: Evaluate Control Methods for Invasive Hybrid Cattails

I. PROJECT STATEMENT

An invasive hybrid cattail species is rapidly expanding and negatively affecting native species in wetlands across Minnesota. Voyageurs National Park (VNP) has already secured \$1,175,000 in grants (\$790,000 state and \$385,000 federal) to begin critical on-the-ground wetland restoration efforts in Rainy and Kabetogama Lakes to deal with this growing problem. VNP will start work on this project in June 2017 that will affect >500 acres of sensitive wetlands over the next 10 years. However, resources from these grants are restricted from scientific monitoring efforts, and the true effectiveness of our work cannot be known without additional support.

Chemical herbicide treatments are prohibited in these waters by state law. As an alternative, we are using mechanical harvesting machines (Fig. 1) to remove large floating mats of hybrid cattail. We are also stocking muskrats, native herbivores that have the ability to control and reduce cattails and other wetland vegetation, as a native control of hybrid cattails (Fig. 2). To better inform future restoration and management of cattail invaded wetlands in MN, we need a clearer understanding of the effectiveness of various control methods.

Goal 1: Evaluate how mechanical control of hybrid cattails impacts native wildlife and plants in wetlands.

Because hybrid cattail grows in dense stands that crowd out other species, expanding cattail populations negatively affect wildlife and plant communities in MN. Mechanical removal techniques reduce cattail density but we don't know how this translates to improved habitat for native wildlife and plants. Using funding already secured from state and federal sources, mechanical treatment methods will begin in July 2017 and continue through 2019. Some pre-treatment data has been collected for wetlands in 2016 and 2017. We propose to use LCCMR funds to monitor the response of native wildlife and plants 1-3 years after completion of mechanical treatments of hybrid cattail (Fig.1).

Goal 2: Evaluate the effectiveness of muskrats as a natural control of hybrid cattails in wetlands.

While chemical and mechanical treatments are generally effective, they are expensive, disruptive, and require periodic retreatment. Muskrats are a native species in MN that feed on hybrid cattail and other wetland plants. Muskrat populations have the documented ability to reduce and control densities of wetland vegetation, and may be a viable management alternative for expanding hybrid cattails. The usefulness of muskrats as a natural control technique has not yet been evaluated. Our project will experimentally assess the effectiveness of reintroducing and enhancing muskrat populations to serve as a natural control for expanding hybrid cattails in MN (Fig.2).

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Evaluate how mechanical control of hybrid cattails impacts native wildlife and plants in wetlands **Budget: \$55,860**

Selected wetlands in Rainy Lake (VNP) will be mechanically treated to remove/reduce hybrid cattail abundance in 2017 and 2018 (using non-LCCMR funds)(Fig.1). Wildlife and plant surveys will be conducted 1 and 2 years after treatment to evaluate the effects on native wildlife and plant species of interest. Species or groups of species selected to survey are good general indicators of the effects of treatments of native species and are expected to show short-term effects within the 2018-2021 LCCMR project timeframe.

Outcome	Completion Date
1. Establish sampling sites in mechanically-treated and control wetlands.	9/31/2018
2. Conduct surveys of native wildlife (crayfish, frogs/toads, muskrats, waterfowl, and marshbirds) in wetlands for 1-2 yrs after treatment.	9/31/2020
3. Conduct surveys of native plants (wild rice, bulrushes, pond lilies) in wetlands for 1-2 yrs after treatment.	9/31/2020
4. Provide wetland management recommendations to MN land managers based on effectiveness of mechanical cattail removal to improve wildlife and plant species.	6/30/2021



Activity 2: Determine the effectiveness of muskrats as a native biocontrol for cattails **Budget: \$76,060**

We will identify selected wetlands in VNP in which to stock muskrats (trapped elsewhere in MN) at various densities (Fig.2). This approach will let us test how many muskrats are required to sufficiently reduce hybrid cattail abundance or, alternatively, create open water spaces that muskrats and other wildlife species need. We will also study survival and movements of stocked muskrats to understand how sustainable such stocking methods are. We will also conduct feeding trials with wild muskrats to understand how they prefer hybrid cattail relative other native plants such as wild rice, bulrush, and pond lilies. Stocking and radio implantation efforts will begin in 2018 and continue in 2019, allowing 1-2 yrs of study of short-term effects of muskrat stocking on hybrid cattails.

Outcome	Completion Date
1. Identify wetland sites within VNP that are heavily invaded with hybrid cattail.	7/31/2018
2. Stock muskrats into selected wetlands at 1, 2, and 3x of natural densities and monitor effects to hybrid cattail and other native plants.	9/31/2020
3. Fit 60 muskrats with implanted radio-transmitters to monitor survival and movements after stocking.	9/31/2020
4. Investigate food preferences of native muskrats on invasive hybrid cattail vs. other native plant species.	9/31/2020
5. Report summarizing the effectiveness of muskrats as natural control of hybrid cattail	6/30/2021

III. PROJECT STRATEGY

A. Project Team/Partners

Voyageurs National Park is uniquely situated to pursue this project at this time, as it coincides with a large-scale wetland restoration project in Rainy Lake where hybrid cattail removal is a key component. Results from the ongoing VNP restoration work are providing a model that is being followed in other lakes and wetlands in Minnesota. External funds (see Intro) have been secured for on-the-ground restoration work, including mechanical removal of cattails and translocation of muskrats, but evaluation of the restoration components in a scientific framework (such as described in this LCCMR proposal) is currently not funded by any of the secured funding sources.

- Dr. Steve Windels is a wetland and wildlife ecology expert, and Wildlife Biologist with the National Park Service at VNP. Dr. Windels will oversee the project and contribute to Activities 1 and 2.
- Dr. Adam Ahlers is a wetland and wildlife ecology expert at Kansas State University and will contribute to Activities 1 and 2. Dr. Ahlers worked on muskrats ecology for both his MS and PhD and is considered one of the leading experts on muskrat ecology in North America. His role in this project is critical for its success, as there is no comparable expertise at a Minnesota institution at present. Dr. Ahlers is also currently supervising an MS student working on wetland ecology in VNP/Rainy Lake. Dr. Ahlers will mentor one graduate student at Kansas State that we select from a pool of Minnesota residents.
- Dr. John Erb, a furbearer specialist with the Minnesota Department of Natural Resources, will provide advice on all aspects of the project, particularly on aspects related to research, translocation, and monitoring of muskrats.

B. Project Impact and Long-Term Strategy

Our study will evaluate the cost-effectiveness of two control methods of invasive hybrid cattails expansions. Land managers from VNP, MN Department of Natural Resources, and other agencies will use this information to move forward with immediate removal of invasive hybrid cattails and subsequent long-term restoration efforts.

C. Timeline Requirements

Our project will be completed in 3 yrs (01 July 2018 – 30 June 2021). We will begin site selection and data collection in July 2018. Most field work will conclude in Oct 2020, allowing enough time to complete final reporting.

2018 Detailed Project Budget

Project Title: Assess control methods for invasive hybrid cattails

IV. TOTAL ENRTF REQUEST BUDGET 3 years

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel:	
1 NPS Wildlife Technician (93% salary, 7% benefits); 50% FTE for 2 years; field assistant for data collection, muskrat telemetry, etc.	\$ 39,000
Professional/Technical/Service Contracts:	
Kansas State University: Grad Research Asst for data collection, analysis, writing; 50% fte, 94.5% salary/5.5% fringe (\$46,460); Grad Research Asst tuition and fees for 2 years (\$11,480); local mileage for field work, summer lodging for grad student for 2 years (\$6,000); misc. field supplies (\$1,000); 2 handheld GPS (\$600); publication fees, 4 publications @ ~\$500/ea (\$2,000)	\$ 67,720
Equipment/Tools/Supplies:	
60 VHF transmitters @\$200 ea	\$ 12,000
60 surgical transmitter implant kits/drugs @\$120 ea	\$ 7,200
Travel:	
Vehicle rental for local travel, lodging for technician	\$ 6,000
Additional Budget Items:	
Flight time for fall aerial muskrat and vegetation surveys, monthly flights to track radio transmitters (\$100/hr for 80 hours; aircraft + fuel cost)	\$ 8,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 131,920

V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
Other Non-State \$ To Be Applied To Project During Project Period:		
Grant from National Park Service for Wetland Restoration Project during July 1, 2018-June 30, 2019 to mechanically remove cattails and restore muskrats to treated wetlands: Admin support (\$6,900), Temp. technicians (\$34,500), Mechanical harvester contract (\$100,000), other expenses (\$43,600).	\$ 185,000	<i>Secured</i>
Other State \$ To Be Applied To Project During Project Period:		
Grant from Initiative Foundation for Wetland Restoration Project during July 1, 2018-June 30, 2019 to mechanically remove cattails and restore muskrats to treated wetlands: Project Mgr (\$79,700), Restoration Specialist (\$59,600), Admin support (\$6,900), Temp. technicians (\$34,500), Mechanical harvester contract (\$100,000), local travel (\$3,600), supplies (\$2,000), other expenses (\$43,700).	\$ 330,000	<i>Secured</i>
In-kind Services To Be Applied To Project During Project Period:		
Voyageurs National Park: 10%FTE salary/benefits for 3 years for Project Lead S. Windels (\$36,000); capture equipment and supplies (\$8,000); telemetry equipment and supplies (\$13,000); 2.5%FTE salary/benefits for VNP Pilot for flight needs (\$8,400); use of boats, motors, gas (est. \$10,000)	\$ 64,400	<i>Secured</i>
Kansas State University will provide 1 semester support/tuition for grad student	\$ 7,780	<i>Secured</i>
Kansas State University will provide indirect costs (50%) as in-kind match	\$ 32,365	<i>In Progress</i>
Minnesota Department of Natural Resources: 80 hours in-kind support of John Erb salary/benefits	\$ 4,500	<i>Secured</i>
Past and Current ENRTF Appropriation:	NA	
Other Funding History:		
VNP: Inventory of known stands of invasive hybrid cattail, wild rice, and muskrat abundance in 2015 (\$15,000); VNP study of muskrat abundance and survival in 2004-2005 (\$40,000); USGS/NPS project to characterize genetics of invasive hybrid cattail stands 2005-2006 (\$70,000); restoration project to test new mechanical methods of cattail removal and wetland revegetation in 2015-2018 (\$460,000); Kansas State University: semi-aquatic mammal distribution research in relation to invasive hybrid cattails in Minnesota 2016-2017 (1 GRA, 2 research technicians; \$56,420).	\$ 891,420	<i>Secured</i>



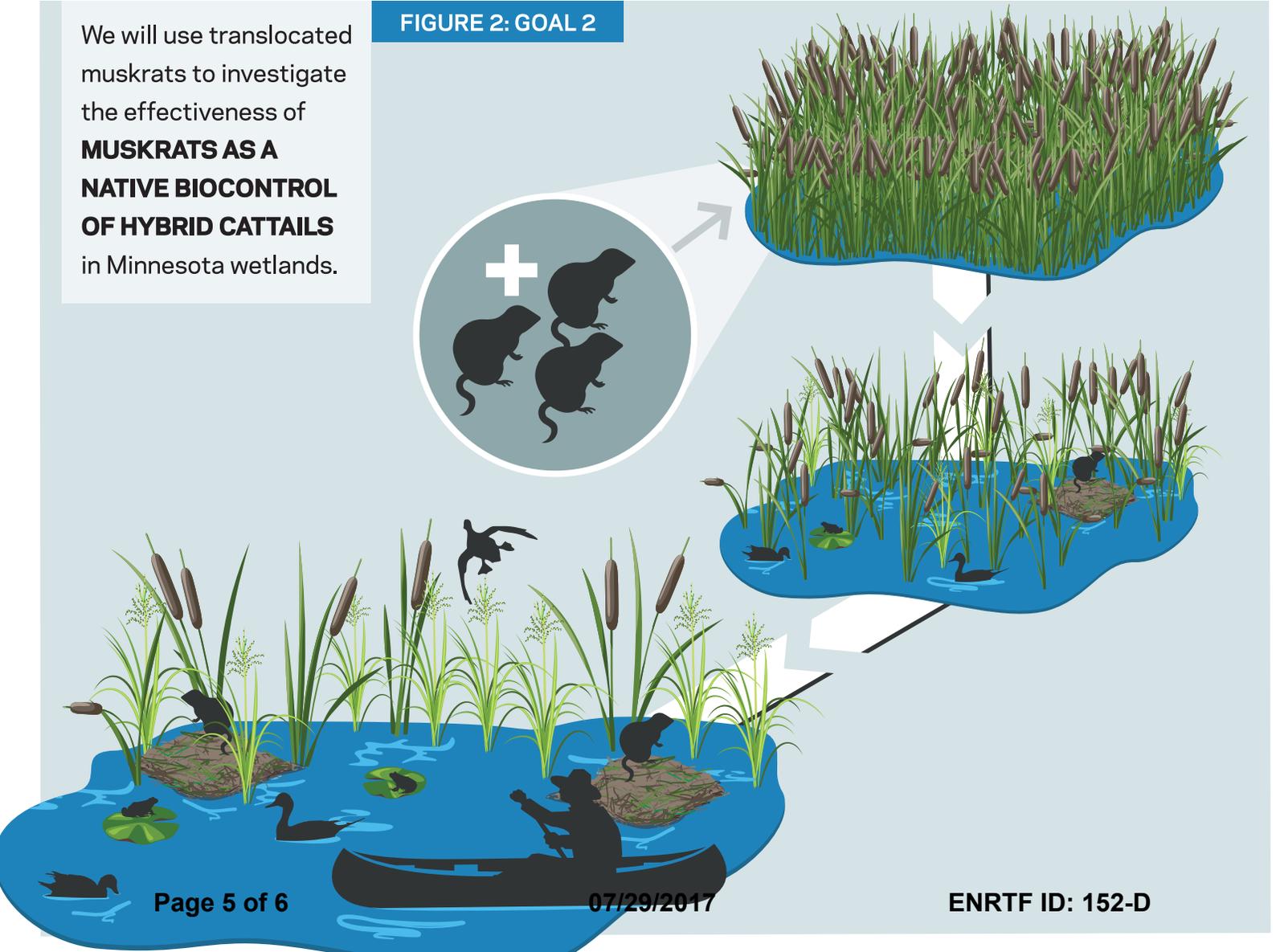
FIGURE 1: GOAL 1

We will evaluate how **MECHANICAL CONTROL OF HYBRID CATTAILS** impacts native wildlife and plants in Minnesota wetlands.



We will use translocated muskrats to investigate the effectiveness of **MUSKRATS AS A NATIVE BIOCONTROL OF HYBRID CATTAILS** in Minnesota wetlands.

FIGURE 2: GOAL 2



2016 LCCMR Project Manager Qualifications and Organization Description

I. QUALIFICATIONS

Dr. Steve K. Windels has been a Research Wildlife Biologist at Voyageurs National Park, MN from 2003-present. He currently oversees research and monitoring projects on beavers, moose, wolves, and other wildlife species. He has worked on projects involving cattails, muskrats, beavers, and other aspects of wetland ecology since 2003. He recently won the prestigious National Park Service Director's Award for Natural Resource Research in 2014. He is also an adjunct faculty/research associate in the Integrated Biological Sciences Program at University of Minnesota-Duluth/Natural Resources Research Institute.

Education/Certification

Ph.D. in Wildlife Ecology, Michigan Technological University
M.S. in Range and Wildlife Management, Texas A&M University – Kingsville
B.S. in Fisheries and Wildlife Management, University of Minnesota
Certified Wildlife Biologist® by The Wildlife Society.

Relevant Publications

Gable, T.D., **S.K. Windels**, J.G. Bruggink, and A.T. Homkes. 2016. Where and how wolves kill beavers. *PLoS One* 11(12).

Windels, S.K., and J.L. Belant. 2016. Performance of tail-mounted transmitters on American beavers *Castor canadensis* in a northern climate. *Wildlife Biology* 22:124-129.

Smith, J.B., **S.K. Windels**, T. Wolf, R. Klaver, and J.L. Belant. 2016. Do transmitters affect fitness indices of American beavers *Castor canadensis*? *Wildlife Biology* 22:117-123.

Johnston, C.L., and **S.K. Windels**. 2015. Using beaver works to estimate colony activity in boreal landscapes. *Journal of Wildlife Management* 79:1072-1080.

Severud, W.J., J.L. Belant, **S.K. Windels**, and J.G. Bruggink. 2013. Seasonal variation in assimilated diets of American beavers. *American Midland Naturalist* 169:30-42.

Severud, W.J., **S.K. Windels**, J.L. Belant, and J.G. Bruggink. 2013. The role of forage availability on diet choice and body condition in American beavers (*Castor canadensis*). *Mammalian Biology* 78: 87-93.

Windels, S.K. 2013. Ear tag loss rates in American beavers. *Wildlife Society Bulletin* 38:122-126.

Travis, S.E., J. Marburger, **S. K. Windels**, and B. Kubátová. 2011. Clonal structure of invasive cattail (*Typhaceae*) in the Western Great Lakes Region of North America. *Wetlands* 31: 221-230.

Snow, A., S. Travis, R. Wildova, T. Fer Charles, P. Sweeney, J. Marburger, **S. K. Windels**, B. Kubatova, and D. Goldberg. 2010. DNA markers for studies of hybridizing cattail populations (*Typha latifolia* x *T. angustifolia*) in North America. *American Journal of Botany* 97:2061-2067.

Travis, S.E., J. Marburger, **S. K. Windels**, and B. Kubátová. 2009. Clonal diversity and hybridization dynamics of invasive cattail (*Typhaceae*) stands in the Great Lakes Region of North America. *Journal of Ecology* 98: 7-16.

II. RESPONSIBILITIES

Dr. Windels will coordinate and manage the overall project. Dr. Windels will also oversee all aspects of study design, analysis, and final reporting in close collaboration with Dr. Ahlers and Dr. Erb.

III. ORGANIZATION DESCRIPTION

The mission of the National Park Service, which celebrated its 100th Anniversary in 2016, is “to preserve unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations.” Voyageurs National Park, Minnesota’s only National Park, was established in 1975 to preserve the history and natural resources of the Border Lakes Region. The National Park Service also has a strong mission to promote the use of National Parks as natural laboratories to better understand the natural world. Information generated by applied research and monitoring in Voyageurs National Park is often used to help address other conservation issues in Minnesota and beyond.