

**Environment and Natural Resources Trust Fund
2020 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 227-F

Protected Areas: A New Way to Save Fisheries

Category: F. Methods to Protect, Restore, and Enhance Land, Water, and Habitat

Sub-Category:

Total Project Budget: \$ 499,950

Proposed Project Time Period for the Funding Requested: June 30, 2023 (3 yrs)

Summary:

This project determines whether protecting a few key pieces of lakes in a holistic fashion could save our fisheries and waters, just as similar efforts have saved our wildlife.

Name: Peter Sorensen

Sponsoring Organization: U of MN

Job Title: _____

Department: CFANS

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Location:

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

The entire state of Minnesota is represented with a breif description of the study

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



PROJECT TITLE: Protected areas: A new way to save fisheries

I. PROJECT STATEMENT

Minnesota’s lakes and fisheries are in decline as a direct consequence of many factors including habitat loss, deteriorating water quality, overfishing, warming, and now AIS. Despite enormous efforts to address these issues (ex. habitat preservation/restoration, boat inspection programs, stocking, water quality improvements, etc.), we are still falling short. The reason is simple: these factors are severe and so inter-linked that traditional practices, in which individual agencies focus on only one/few of them, cannot get the job done, especially with increasing fishing pressure and limited budgets. Clearly, the factors that threaten our waters must be addressed collectively and holistically. Over a century ago, Teddy Roosevelt recognized that the nation’s dwindling wildlife were similarly threatened and responded by establishing national wildlife refuges and national parks. These systems have worked extraordinarily well. Similarly, 75 years ago, saltwater fish biologists in Florida faced with dwindling fisheries started protecting key pieces of the ocean from overfishing and related pressures. This once controversial approach has also proven successful, and there are now nearly 15,000 marine protected areas (MPAs) worldwide with plans for more. MPAs identify small, high-quality portions of key habitats and ecosystems and protect them from over-exploitation and misuse while still allowing stakeholder access. Good MPAs develop trophy fisheries locally and allow fish to expand into surrounding waters. Research on MPAs shows that aquatic protected areas do need to be large but do need to be selected based on factors that include ecosystem integrity (habitat), no AIS, good water quality, low fishing pressure, and meaningful enforcement. This concept seems well-suited to lakes but must first be proven scientifically. Then, a next step might be to develop and test some experimental protected areas. We are fortunate: we both have waters that resemble protected areas (ex. state parks, scientific and natural areas, heritage lakes, remote lakes) that can be studied and we know what variables to examine (ex. connections to a quality watershed, habitat quality, water quality, and no AIS). Our proof-of-concept project will study these extant areas and their characteristics to see if their fisheries really are better and why, thereby setting the stage to test and develop the protected area concept further. Access to these protected areas would be open but carefully regulated as justified by their extraordinary value. The final goal might be to protect 5% (several hundred) of Minnesota’s waters, initially using systems we already have. We protect hundreds of terrestrial systems and their wildlife with refuges, sanctuaries, state parks, city parks, nature centers, and scientific areas. It is time we did the same for our waters and fish.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: *Identify 12 lightly-used high quality lakes/ river sections, 12 adjoining areas, and 12 highly-used areas for study to determine if the concept of protected areas makes scientific sense in MN.*

Review existing state fisheries data and travel across Minnesota meeting with MN DNR, TNC biologists, tribal biologists, watershed managers, private citizens, and other stakeholders to identify three types of candidate systems for study: 1) lightly-used systems in great condition (i.e. proxies for protected areas) to see if they might have higher quality and more productive fishes; 2) good quality areas adjoining these lightly protected areas to test spill-over (expansion) effects; and 3) matched areas that are highly-used. Lightly-used areas will have to address all key factors identified by 75 years of study of MPAs and MN fisheries: ecosystem integrity (little development), no AIS, good water quality, low fishing pressure, good enforcement, ecosystem stability. This process will also inventory how many protected sites might be available for the future.

BUDGET: \$75,000

Outcome	Completion Date
1. <i>Identify lakes and rivers that have can serve as test sites</i>	February 2021



**Environment and Natural Resources Trust Fund (ENRTF)
2020 Main Proposal Template**

Activity 2: *Sample and evaluate fisheries and ecological factors in the three sets of study lakes and rivers.*

Description: Systematically and intensively sample fish populations (diversity, biomass and size) and ecosystem variables (water clarity and quality, shoreline development, AIS, fishing pressure, etc.) in the 12 lightly used/high quality systems, 12 matched good-quality areas adjoining them (a test of spill-over), and 12 highly used /typical lakes/rivers during each of two open-water seasons. We will use a variety of gear including electrofishing, gill nets, trap-nets angling at each site while assessing water quality and aquatic plants. Fish will be tagged, released and recaptured to assess population size and movement. During the off-season, the age and size structure of fish populations as well as their abundance will be carefully evaluated as will the age at maturity, condition factors, and fecundity. Both game and nongame species will be examined and diversity will be considered, as well as the presence of important native species. We will pay special attention to the presence of large female fish as they carry many more and much higher quality eggs and represent the possible basis of high quality trophy fisheries. The study will coordinate with the DNR fisheries managers but be conducted in greater depth than they typically can manage. Whole ecosystem health and all relevant variables will be evaluated.

BUDGET: \$325,000

Outcome	Completion Date
<i>1. Sample 6 lightly-used, 6 adjoining and 6 heavily used sites, analyze age and size of fish as well as ecosystem integrity in the off-season</i>	<i>February 2022</i>
<i>2. Sample another 3 sets of 6 sites, analyze data in off season</i>	<i>February 2023</i>

Activity 3: *Analyze data, publish and report*

Description: Statistically analyze data, make reports and publish. Present findings to public groups.

BUDGET: \$99,950

Outcome	Completion Date
<i>1. Analyze, publish and make oral and written reports.</i>	<i>July 2023</i>

III. PROJECT PARTNERS AND COLLABORATORS:

We will coordinate with individual DNR, watershed district, and tribal biologists to identify sites and analyze them properly. We will also work as a collaborator with the TNC, which is interested in preserving sentinel lakes.

IV. LONG-TERM IMPLEMENTATION AND FUNDING:

This project has the potential to protect and enhance significant portions of Minnesota’s waterways and fisheries for many decades. Our long-term strategy will be to use information from this proof-of-concept study to inform a second phase to develop implementation, possibly funded by the LSOHC. Tentatively, we envisage two or more types of protected areas encompassing 5% (200-400) of our waters: 1) Refuges that carefully protect and save fish for future generations (and hatcheries) and that allow catch-release via a few protected access points; 2) Conservation zones that allow some fishing and utilize the spill-over (expansion) concept to generate high-quality trophy fisheries. Other types of areas that address issues such as enjoying aquatic life at local sites could be easily developed in the future. There is still time to save many of our state’s highest quality waters and fisheries.

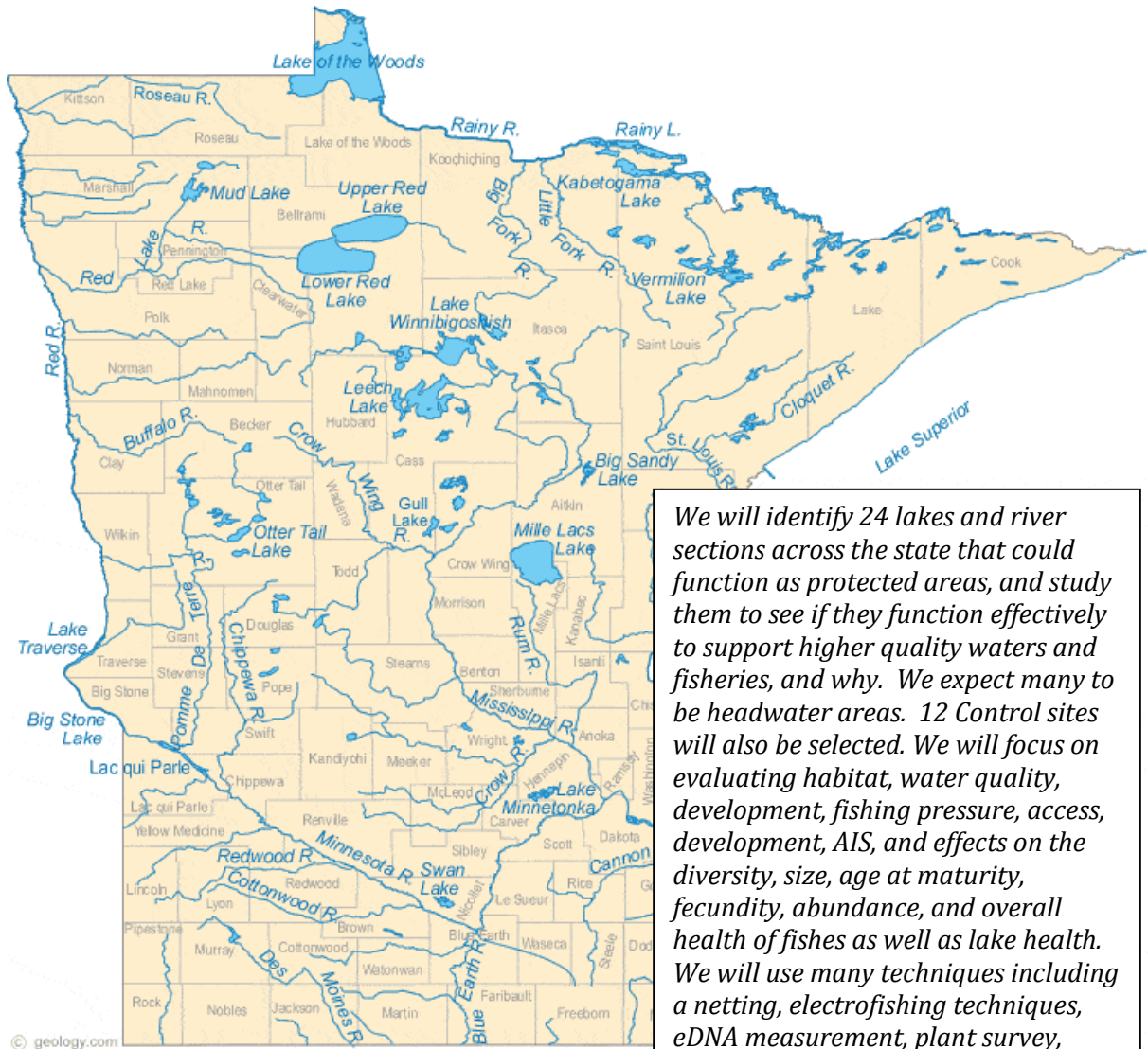
Attachment A: Project Budget Spreadsheet
 Environment and Natural Resources Trust Fund
 M.L. 2020 Budget Spreadsheet



Legal Citation:
 Project Manager: Peter Sorensen
 Project Title: Protected areas: A new way to save fisheries
 Organization: University of Minnesota
 Project Budget: \$499,950
 Project Length and Completion Date: 3 years, June 30, 2023
 Today's Date: April 9 2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET		Budget	Amount Spent	Balance
BUDGET ITEM				
Personnel (Wages and Benefits)		\$ 330,000	\$ -	\$ 330,000
<i>P.I. Sorensen, 4 weeks of summer salary for 3 years (\$65K [0.74 salary: 0.26 benefits] 8% FTE x 3 = .24FTEs</i>				
<i>TBD, Postdoctoral researcher, fulltime 3y (\$240K [0.80 salary:0.20 benefits]), 100% FTE x 3= 3FTEs</i>				
<i>Undergrad assistant, 2 summers (\$25K, 1.0 salary, 0.0 benefits) 25% x 2 =0.59 FTEs</i>				
Professional/Technical/Service Contracts				
<i>Carbon dating for otoliths(fish ear bones)- aging is big part of the study</i>		\$ 20,000	\$ -	\$ 20,000
<i>Rebuild the floor and electrical system of our 40 year electrofishing boat to make it safe and efficient so we can sample fish across the state</i>		\$ 27,000	\$ -	\$ 27,000
Equipment/Tools/Supplies				
<i>Field & Lab supplies: Sampling nets (gill, trammel) tags, buckets, anesthetics, gasoline, etc. for 2 years & histology and ageing supplies</i>		\$ 50,000	\$ -	\$ 50,000
<i>Non-capital equip: computer and printer for field data collection</i>		\$ 5,000		\$ 5,000
Capital Expenditures Over \$5,000				
<i>Boat trailer for electrofishing boat to take it field sites (present one rusted out)</i>		\$ 7,200		\$ 7,200
Fee Title Acquisition				
		\$ -	\$ -	\$ -
Easement Acquisition				
		\$ -	\$ -	\$ -
Professional Services for Acquisition				
		\$ -	\$ -	\$ -
Printing				
<i>Publishing in open-access journal, at least 2 peer-reviewed publications planned</i>		\$ 5,000	\$ -	\$ 5,000
Travel expenses in Minnesota - in accordance with UMN Travel Policy				
<i>Travel to field sites with overnight stays (24 trips per year; 400 miles per trip at \$0.58/mile =\$232/trip; 3 overnight stays with food per trip =\$500/trip) = \$17,500/yrx 2= \$35K</i>		\$ 35,000	\$ -	\$ 35,000
<i>Workshops and conferences to disseminate and share information with DNR, USFW, TBC, universities</i>		\$ 10,000	\$ -	\$ 10,000
Other				
<i>Truck, Boat, net and trailer repair</i>		\$ 10,000		\$ 10,000
<i>Boat storage fee in winter</i>		\$ 750	\$ -	\$ 750
COLUMN TOTAL		\$ 499,950	\$ -	\$ 499,950
SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT				
	Status (secured or pending)	Budget	Spent	Balance
Non-State:		\$ -	\$ -	\$ -
State:		\$ -	\$ -	\$ -
In kind: University IDC waived (54% MTDC)		Pending	\$ 265,680	\$ -
				\$ 279,972
Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS				
	Amount legally obligated but not yet spent	Budget	Spent	Balance
M.L. 2014, Chp. 226, Sec. 2, Subd. 04a		0	\$854,000	\$854,000
M.L. 2018, Chp. 214, Art.4, Sec. 2., Subd. 06E		\$ 902,046	\$ 998,000	\$ 95,954
				\$ 902,046

The project could benefit most waterways in Minnesota and their fisheries



We will identify 24 lakes and river sections across the state that could function as protected areas, and study them to see if they function effectively to support higher quality waters and fisheries, and why. We expect many to be headwater areas. 12 Control sites will also be selected. We will focus on evaluating habitat, water quality, development, fishing pressure, access, development, AIS, and effects on the diversity, size, age at maturity, fecundity, abundance, and overall health of fishes as well as lake health. We will use many techniques including a netting, electrofishing techniques, eDNA measurement, plant survey, water quality assessment. A meta-analysis will determine if the protected area concept is viable in MN.

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PETER W. SORENSEN, PROJECT MANAGER - QUALIFICATIONS

Professor Peter Sorensen (Dept. Fisheries, Wildlife and Conservation Biology, U of MN) assumes responsibility for this project. He is uniquely qualified to direct this project. Peter is currently directing two LCCMR projects on invasive carp, one of which ends June 2019 and another which performs proof-of-concept tests of a sound deterrent for carp in the Mississippi River. He also co-leads a similar project in KY for the USFWS. Peter will have time available for the proposed work as his first LCCMR project is ending in 2019.

Interests and expertise:

Peter is broadly interested in fisheries conservation and aquatic invasive species as well as the physiological basis of fish behavior and its ramifications for improving fisheries. Sensory cues including sound are of special interest as are pheromones. He has been studying invasive fish since 1989. His goal is stop the invasion of bigheaded carps and prevent similar species from ever entering key waters while restoring our fisheries and waterways to what they were at the turn of last century. Peter seeks holistic commonsense solutions to natural resource problems such as AIS and declining fisheries.

Professional preparation:

Bates College (Maine), Biology, B.A. 1976

University of Rhode Island, Biological Oceanography, Ph.D., 1984

University of Alberta, Zoology/Medical Science, Postdoctoral Fellow, 1984-1988.

Recent experience:

Assistant professor, 1988- 1993

Associate professor, 1993-1997

Professor, 1997-

Grant management: Dr. Sorensen has received over 83 competitive grants while at the University of Minnesota worth over 25 million dollars.

Publications: 153 peer-reviewed publications, 26 book chapters, 1 patent (sea lamprey pheromone identification and its use in control), 1 book, 30+ non-peer reviewed publications

Graduate students: 25 total, 22 postdocs

Teaching: Fish Physiology & Behavior, Marine Biology

Other Scholarship and Activities: Peter is on the editorial boards of three international journals on fish biology and invasive species as well as two national AIS committees that guide invasive carp work. Dr. Sorensen founded the Minnesota Aquatic Invasive Species Research Center (MAISRC) and was its director until 2014.

PROJECT ORGANIZATION

Dr. Sorensen will serve as the manager for this project and will oversee the activities of the research fellow who will run the field project. Peter will coordinate activities. He and the research fellow (who will direct the technician and summer undergraduate) will meet weekly and the entire group will meet every month.

April 9 2019