

**Environment and Natural Resources Trust Fund
2016 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 086-B

Emerging Chemical Detection in Animals and the Environment

Category: B. Water Resources

Total Project Budget: \$ 834,878

Proposed Project Time Period for the Funding Requested: 2.5 years, July 2016 to May 2019

Summary:

This project aims to determine levels of emerging and unregulated pollutants, termed micropollutants, in subsistence species and the environment in and around the Grand Portage Indian Reservation, Cook County, Minnesota.

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Sponsoring Organization: Grand Portage Band of Lake Superior Chippewa

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Location

Region: NE

County Name: Cook

City / Township: Grand Portage

Alternate Text for Visual:

The visual illustrates a map of the project area and the major benefits of the proposed work to determine emerging and unregulated chemicals in animals and the environment on the Grand Portage Reservation.

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



Environment and Natural Resources Trust Fund (ENRTF)

2016 Main Proposal

Project Title: *Evaluation of anthropogenic micropollutants in subsistence species used by the Grand Portage Band of Lake Superior Chippewa*

I. PROJECT STATEMENT: Goal: Gather baseline surveillance data for anthropogenic organic micropollutants, focusing on potentially endocrine-active compounds including pharmaceuticals, within the tissues of subsistence species and the surrounding environment in the Grand Portage Indian Reservation to guide land and chemical management practices and to promote a sustainable ecosystem.

We propose to evaluate levels of unregulated and emerging contaminants within key subsistence species on Grand Portage Indian Reservation (GPIR). Through a unique, new collaboration between the Grand Portage Indian Reservation, UMN College of Veterinary Medicine's Ecosystem Health Division (EHSD) and School of Public Health, and Minnesota Pollution Control Agency (MPCA) we will assess threats by chemical pollutants to the sustainable use of tribal natural resources, and thus the very culture of the tribe. Specifically, we will assess the threat of low concentration but potentially toxic "micropollutants" within key subsistence species and the environment as part of a long-term ecosystem health program. This project emerged as high priority during an expert solicitation workshop conducted in December 2014 in conjunction with UMN's Institute on the Environment. Further, the proposed project will be the first of its kind to evaluate micropollutant levels in animals and the environment simultaneously, providing new methodologies for natural resource managers, while adding to MPCA's state-wide risk assessment. This project directly addresses the second priority item in the Water Resources section of the LCCMR 2015 RFP to determine the environmental fate and ecological effects of emerging and unregulated contaminants.

The Grand Portage Band of Chippewa rely on subsistence species through hunting, fishing, and gathering on reservation lands and within the 1854 Ceded Territory. Previous studies in this area found dangerous concentrations of heavy metals within fish species utilized and consumed by tribal members, resulting in management actions such as consumption advisories in several species. However, further risks due to other hazards such as micropollutants in subsistence species have not yet been evaluated. Previous studies conducted by the Minnesota Pollution Control Agency (MPCA) and the U.S. Geological Survey within Minnesota have demonstrated the presence of numerous micropollutants in remote lakes without an obvious source of contamination. Research has found that aquatic exposures to some estrogen-mimics (e.g., ethinyl estradiol, the chemical in the birth control pill) can render fish sterile and thus threaten the sustainability of those populations. However, little is known about the potential for micropollutants to accumulate in fish and wildlife tissues, thus potentially exposing higher-level organisms and humans. Baseline levels of these contaminants in the GPIR ecosystem have not been determined, thus no long-term chemical management strategies exist. This study would characterize the baseline occurrence of micropollutants on these lands and guide further initiatives to investigate effects on populations and risk to human health. Furthermore, this study, *the first of its kind*, would provide data and new models and tools for risk assessment and surveillance useful for a variety of resource management agencies.

Project outputs: This project is unique in that it will focus on system-wide exposures and responses across a variety of aquatic and related terrestrial species (considering the broader food web) in a watershed. Data collected will be analyzed and communicated visually using spatial mapping software that is not only statistically powerful, but designed to interact with managers and other decision/policy makers to determine long term chemical and biodiversity monitoring locations key for management and cultural sustainability. Specific outputs will include: micropollutant occurrence data within key habitats and species on the GPIR; an analysis of potential sources; identification of at-risk areas and/or populations; land and chemical use guidelines to enhance the sustainability and improve the overall health of the GPIR ecosystem. The information gathered by this project will also be shared with MPCA to add to their knowledge base about micropollutants in Minnesota lakes and biota, thus contributing to a state-wide risk assessment.



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Methods: This project will use similar water, sediment, and biota sampling protocols for aquatic habitats that were performed in the MPCA studies. The GPIR actively manages their resources both through annual population assessments, hunting, and dealing with nuisance animals. This project will sample animal tissues that are collected through routine management and assessment activities (and subsistence harvest) for collection of tissue samples.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Finalize Sampling Protocol

Budget: \$834,878

Using the recommendations from December’s planning workshop and ongoing discussions with MPCA and GPIR community members, we will review wildlife species identified and sampling protocols already in place to finalize the priority areas for this project.

Outcome	Completion Date
<i>1. Identify environmental sampling priorities (ie specific lakes or areas and organisms)</i>	<i>December 2016</i>
<i>2. Finalize sampling protocols and tests in cooperation with MPCA</i>	<i>December 2016</i>

Activity 2: Conduct Sampling and Perform Data Analysis

Outcome	Completion Date
<i>1. Sample collection from aquatic and terrestrial environments and species</i>	<i>October 2017</i>
<i>2. Analyze data to identify priority areas</i>	<i>January 2018</i>
<i>3. Disseminate findings to MPCA</i>	<i>March 2018</i>
<i>4. Plan future action, initiatives, management strategies</i>	<i>May 2019</i>

III. PROJECT STRATEGY

A. Project Team/Partners

Our team is a partnership of academic, tribal, and state agencies. GPIR is poised to monitor and protect natural resources, with an active research and natural resource management program and highly supportive local community. Project lead, Seth Moore will provide community involvement, logistical support, and data analysis and interpretation. UMN partners Dominic Travis, Tiffany Wolf, Matteo Convertino and Nick Phelps specialize in addressing grand challenges in health at the intersection of animal, human, and environment. In addition, Minnesota Pollution Control Agency (MPCA) will provide relevant expertise in parallel with their efforts. ENRTF funds will be utilized by both GPIR and UMN to conduct field work, lab work, and hire necessary personnel. MPCA personnel Mark Ferrey and Mark Jankowski will provide subject area expertise and analysis and interpretation of testing results. Partners will synthesize data and interpret epidemiological and health/disease risks associated with micropollutant levels in the food web.

B. Project Impact and Long-Term Strategy

This project will improve our ability to monitor and manage health threats to MN wildlife from environmental change to guide consumption recommendations for the local tribe. The baseline data will help to form a long-term monitoring plan for the GPIR and provide a basis for the creation of a research/education site.

C. Timeline Requirements

This will be a 2.5 year project. Year 1: Finalize capture and sampling protocols and approvals; wildlife and environmental sampling. Year 2: Further data collection and initial descriptive and mapping (spatial) analysis. Year 3 (0.5 years): integration of data into modeling tools and formulation of management plans.

2016 Detailed Project Budget

Project Title: Evaluation of anthropogenic micro pollutants in subsistence species used by the Grand Portage Band of Lake Superior Chip

IV. TOTAL ENRTF REQUEST BUDGET 2.5 years

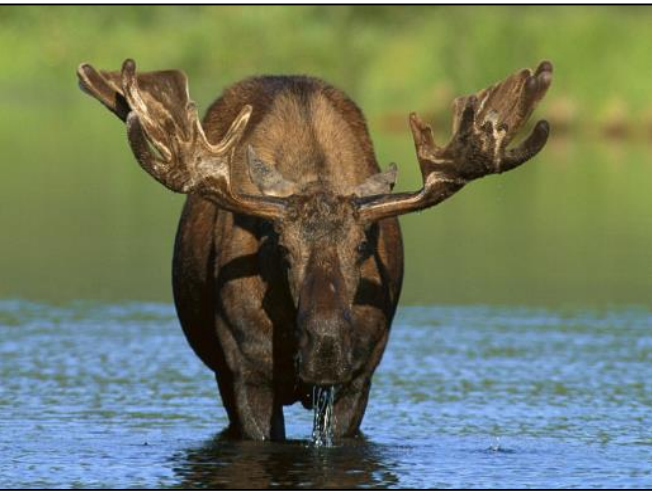
BUDGET ITEM	Sub-total	Amount
Personnel:		\$370,162
Principle Investigator: Seth Moore 15% FTE x 2.5 yrs (11,850 + 38% fringe)	\$40,882	
Project Manager: Tiffany Wolf - 15% FTE x 2.5 yrs (46,638 + 34% fringe)	\$62,355	
Grand Portage Biologist: Yvette Chenaux- 50% FTE x 2.5 yrs (42,000 + 38% fringe)	\$28,980	
Grand Portage Technician: (To be hired) - 100% FTE x 2.5 yrs (25,000 + 38% fringe)	\$35,824	
UMN Ecohealth Lead: Dominic Travis - 5% FTE x 2.5 yrs (20,742 + 34% fringe)	\$27,732	
UMN Spatial Modeler: Mateo Convertino - 4% FTE x 2.5 yrs (12,646K + 34% fringe)	\$16,907	
UMN Grad Student: (To be hired) - 50% FTE x 2.5 yrs (59,705 + 75% fringe)	\$104,961	
UMN Fish Health Specialist: Nicholas Phelps - 4% FTE x 2.5 yrs (12,592 + 34% fringe)	\$16,835	
UMN VPH Resident: (To be hired) - 20% FTE x 2.5 years (19,306 + 85% fringe)	\$35,686	
Travel:		\$21,216
UMN Staff: 1 six-day trip per investigator per year (6)	\$18,216	
Grand Portage Staff: 5 two-day trips for 2 staff	\$3,000	
Additional Budget Items:		\$443,500
Field Work: Logistics and sample collection and transport (\$3,000 per field season)	\$6,000	
Sample Processing: Analysis of contamination with micropollutants (175 samples @ \$2,500 sample)	\$437,500	
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND REQUEST		\$834,878

V. OTHER FUNDS

SOURCE OF FUNDS	Amount	Status
Other Non-State \$ To Be Applied To Project During Project Period:		
Partnership Development grant: UMN College of Veterinary Medicine, Population Systems Signature Program	\$20,000	Pending
In-kind Services To Be Applied To Project During Project Period:		
Grand Portage Biologist: Seth Moore - salary contribution	\$25,000	Secured
MPCA Research Ecotoxicologist - Mark Jankowski 4% FTE salary and 34% fringe	\$9,527	Secured
MPCA Environmental Scientist - Mark Ferrey salary and 34% fringe	\$9,527	Secured
Field logistics and personell for sample collection	\$25,000	Secured
Preliminary sample collection and analysis by Grand Portage	\$50,000	Secured
Laboratory resources at UMN College of Veterinary Medicine:		
Lab facilities and equipment	\$25,000	Secured
Veterinary specialist/diagnostician time	\$180,000	Secured
TOTAL OTHER FUNDS		\$344,054
TOTAL PROJECT VALUE		\$1,178,932

Baseline data on emerging and unregulated micropollutants in Minnesota's environment and wildlife is strongly needed. To meet this need, we will develop new monitoring strategies to evaluate risks to wildlife populations and human health!

A Unique Partnership Approach for Protecting Minnesota's Threatened Ecosystems



Provide LONG-TERM ecosystem protection:

- Monitor anthropogenic pollutants within key habitats and subsistence species in the Grand Portage Reservation
- Analyze potential sources of pollutants
- Identify at risk areas and/or populations
- Develop land and chemical use guidelines to enhance ecosystem sustainability and health



Grand Portage Catchment Area
Grand Portage Indian Reservation

We can WORK TOGETHER to protect this ecosystem:

- Partnership of tribal, state, and academic agencies
- Provide new methodologies for natural resource managers
- Focus on system-wide exposures across a diversity of aquatic and terrestrial species



Seth Moore, PhD, has worked for the Grand Portage Band of Lake Superior Chippewa since 2005, he presently manages the Grand Portage Departments of Biology and Environment. Dr. Moore has worked on Lake Superior fisheries and regional environmental issues for over 23 years. He earned his PhD in Water Resources Science from the University of Minnesota (2008), a master's degree in Environmental Biology also from University of Minnesota (1998), and a bachelor's dual degree in Biology and Environmental Studies from Northland College in Ashland, WI (1994). Dr. Moore focuses his research efforts on subsistence species of the Grand Portage Band of Chippewa. His current projects include coaster brook trout restoration and identifying habitats used by moose under a warming climate.

As Director of Biology and Environment he works under limited supervision and has latitude to determine natural resource priorities and focus on projects designed to accomplish natural resources and environmental goals of the Grand Portage Band. Dr. Moore recently received recognition as the 2013 Tribal Biologist of the Year award from the Native American Fish and Wildlife Society.

Dr. Moore has developed a research program to determine the effects of climate change on subsistence species of the Grand Portage Band of Chippewa. Some observed effects of climate change include moose population decline and loss of coldwater-obligate species like brook trout in inland lakes. He also lead the development and implementation of a Climate Change Adaptation Plan to address projected impacts to the reservation lands and waters.

Moore works with both executive and elected leadership and understands the realities of communicating environmental and natural resources issues in a political forum. Working at a high level within his organization, and serving as direct liaison to federal and state agencies at high levels within those organizations, he is poised for a large collaborative project such as this upcoming research on determining levels of emerging pollutants in biota and the environment.

Dr. Moore designed, oversaw construction, and implemented successful operation of the Grand Portage Native Fish Hatchery. He has secured numerous grants (totaling several million dollars) to build both permanent and temporary staff and field capacity including three research vessels and a current staff of 10 permanent FTEs and up to three temporary hires. He assisted the Grand Portage Band in becoming signatory to the Joint Strategic Plan for the Great Lakes and successfully securing a position on the Council of Great Lakes Fisheries Agencies, and becoming members of the Lake Superior Committee and the Lake Superior Technical Committee.

The Grand Portage Trust Lands Agency is a fully functioning tribal natural resources agency with environmental and natural resources management responsibility for the Grand Portage Reservation. The agency is comprised of five departments, Land and Real Estate, Environment, Fisheries and Wildlife Biology, Forestry, and Conservation Enforcement. Each department has a director and staff and has capacity to accomplish the responsibilities within the Grand Portage jurisdiction. The Departments of Environment and Biology will accomplish the proposed research project and has several research vessels suited for aquatic sampling of water and biota in inland and Lake Superior waters. The two departments have a staff of 13 qualified professionals with degrees including bachelors, Master's, and PhD that provide the intellectual capacity to analyze data. The agency has laboratory space and all the necessary infrastructure to accomplish large research projects and assessment work.