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

Project Title: **ENRTF ID: 072-B**

St. Croix Harmful Algae Prediction and Alert System

Category: B. Water Resources

Total Project Budget: $ 312,280

Proposed Project Time Period for the Funding Requested: 3 years, July 2016 to June 2019

Summary:

Partnerships will develop a harmful algae bloom prediction and public alert system to better protect human health and the water quality of the St. Croix River.

Name: Deb Ryun

Sponsoring Organization: St. Croix River Association

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St. Croix Falls WI 54024

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Location

Region: NE

County Name: Carlton, Chisago, Kanabec, Pine, Washington

City / Township:

Alternate Text for Visual:

Algae monitoring locations will be along the portions of the St. Croix River that border Minnesota. Impacted communities are all within the Minnesota side of the St. Croix River Watershed.

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

PROJECT TITLE:
St. Croix Harmful Algae Prediction and Alert System

I. PROJECT STATEMENT
Partnering with the U.S. Geological Survey (USGS), the National Park Service (NPS), and the Science Museum of Minnesota St. Croix Watershed Research Station (SCRS), the St. Croix River Association (SCRA) will develop the tools and metrics necessary to predict and assess the occurrence of algae blooms, develop a harmful algae bloom response plan and warning system, and perform public outreach to better protect human health and the water quality of the St. Croix River.

In the past five years, reports of large blue-green algae blooms have increased in frequency along the St. Croix River. Resource managers are concerned that these algae, also known as Cyanobacteria, have the capacity to threaten public health and significantly impact recreational opportunities through the formation of toxic algal blooms. Several strains of Cyanobacteria already found in the St. Croix River and Lake St. Croix are linked to the production of toxins. Contact with these bacteria can result in contact dermatitis, flu-like symptoms and even neurotoxicity in people, pets and livestock.

The overall goals for this project are to provide the scientific framework to understand how and under which conditions harmful algae blooms develop in the St. Croix River, how resource managers can respond to harmful algae blooms, and to develop a public alert system to warn the public of harmful water quality conditions. In addition, the project will determine if bloom occurrence and toxin production are significantly linked to water quality conditions, and whether nutrient-dependent algal growth rates and associated physiological indicators can predict toxin production.

We will achieve these goals and outcomes through:
1) Using in-river water quality data collection along a series of transects to characterize bloom development and downstream movement in response to water quality
2) Collecting algae and water quality data near prominent recreation sites to analyze how cyanobacterial biomass, toxin production, and physiological indicators from nutrient physiology bioassays can be used to predict the development of health risks at these locations
3) Developing a volunteer network, called AlgaeNet, to gather the algae samples and furthermore act as "Bloom Chasers" to quickly respond to algae bloom events
4) Developing a detailed response plan and alert system for resource managers to warn the public in the event of a toxic algae bloom

Activity 1: Water quality and algae monitoring and analysis to determine toxin production, growth rates, and algal movement downstream **Budget: $40,860**

Using a boat mounted, flow-through, continuous monitoring system, water quality conditions will be monitored for chlorophyll-a, phycocyanin, depth, temperature, pH, conductivity, and dissolved oxygen on pre-determined transects. Corresponding algae samples will be collected on a downstream transect and analyzed for Cyanobacteria biomass downstream transport, toxin production and algae growth rates.

Outcome	Completion Date
1. Water condition monitoring on 6 transects once a year for two years	Fall 2018
2. Forty-eight downstream transect samples collected and analyzed for biomass and toxins	Fall 2018
3. Six algae samples analyzed for nutrient dependent physiology, growth rates, and toxins	Fall 2018

Activity 2: Routine algae and water quality condition monitoring, sampling and analysis to determine links between water quality conditions and toxin production **Budget: $181,420**

Algae samples and in-river water quality conditions will be collected on a regular basis at strategically placed monitoring locations along the main stem of the St. Croix. Algae samples will be analyzed for biomass and toxin production. Statistical and trend analyses will be calculated to determine specific links between bloom occurrence, toxin production and water quality conditions. Sampling will occur for two seasons.

Outcome	Completion Date
1. Monthly algae and water quality monitoring at six locations from July – Oct. annually	Fall 2018
2. Bi-monthly algal bloom biomass and toxin sampling twice a month July – Oct. annually	Fall 2018
3. Report detailing bloom, toxin and water quality trends and predictive relationships	Spring 2019

Activity 3: Volunteer sampling capacity building and AlgaeNet development **Budget: $30,000**

A volunteer network, called AlgaeNet will be developed and coordinated to support the algae monitoring and sampling for this project, and act as a building block to engage local communities. Two categories of volunteers will be active in the project: one group to gather algae samples on a regular basis at the determined monitoring locations, and one group to act as "Bloom Chasers" to be on alert and watching for blooms.

Outcome	Completion Date
1. Eight to 12 volunteers committed to sample at six to ten monitoring locations annually	Fall 2018
2. Five volunteers committed to being "Bloom Chasers" annually	Fall 2018
3.Two volunteer training workshops for training annually	Spring 2016-2018

Activity 4: Harmful algae response plan and alert system development and implementation **Budget: $60,000**

We will gather natural resource and algae experts to develop a detailed response plan and system for resource managers to warn the public in the event of a toxic algae bloom. The plan will detail bloom discovery protocols, communication strategies and information dispersal methods.

Outcome	Completion Date
1. A planning team of at least 15 resource professionals to meet regularly during response plan development	Fall 2016
2. A detailed response plan outlining actions during bloom conditions, and the top 10 communication strategies	Fall 2017
3. At least four training sessions to learn about the alert system, how to report blooms and conduct follow-up actions	Fall 2018
4. Implementation of at least five communication strategies and awareness activities	Fall 2018

III. PROJECT STRATEGY

A. Project Team/Partners

Partners receiving funding: St. Croix River Association and the U.S. Geological Survey
Partners not receiving funding: National Park Service, Science Museum of Minnesota's St. Croix Watershed Research Station, and the St. Croix Basin Team. Additional partnerships will be sought with local county Soil and Water Conservation Districts (Washington, Chisago, and Kanabec), local towns and communities along the riverway (Stillwater, Taylors Falls, Afton, and others), the Minnesota Pollution Control Agency, Minnesota Department of Natural Resources and more.

B. Project Impact and Long-Term Strategy

Resource managers are in need of tools to help determine the links between Cyanobacteria bloom occurrence, toxin production and water quality in the St. Croix River basin. The proposed project will determine how and when algal blooms become toxic, and suggest potential management action designed to minimize the conditional health risks associated with the severity of blooms.

C. Timeline Requirements

This is a three year project.

2016 Detailed Project Budget

Project Title: St. Croix Harmful Algae Prediction and Alert System

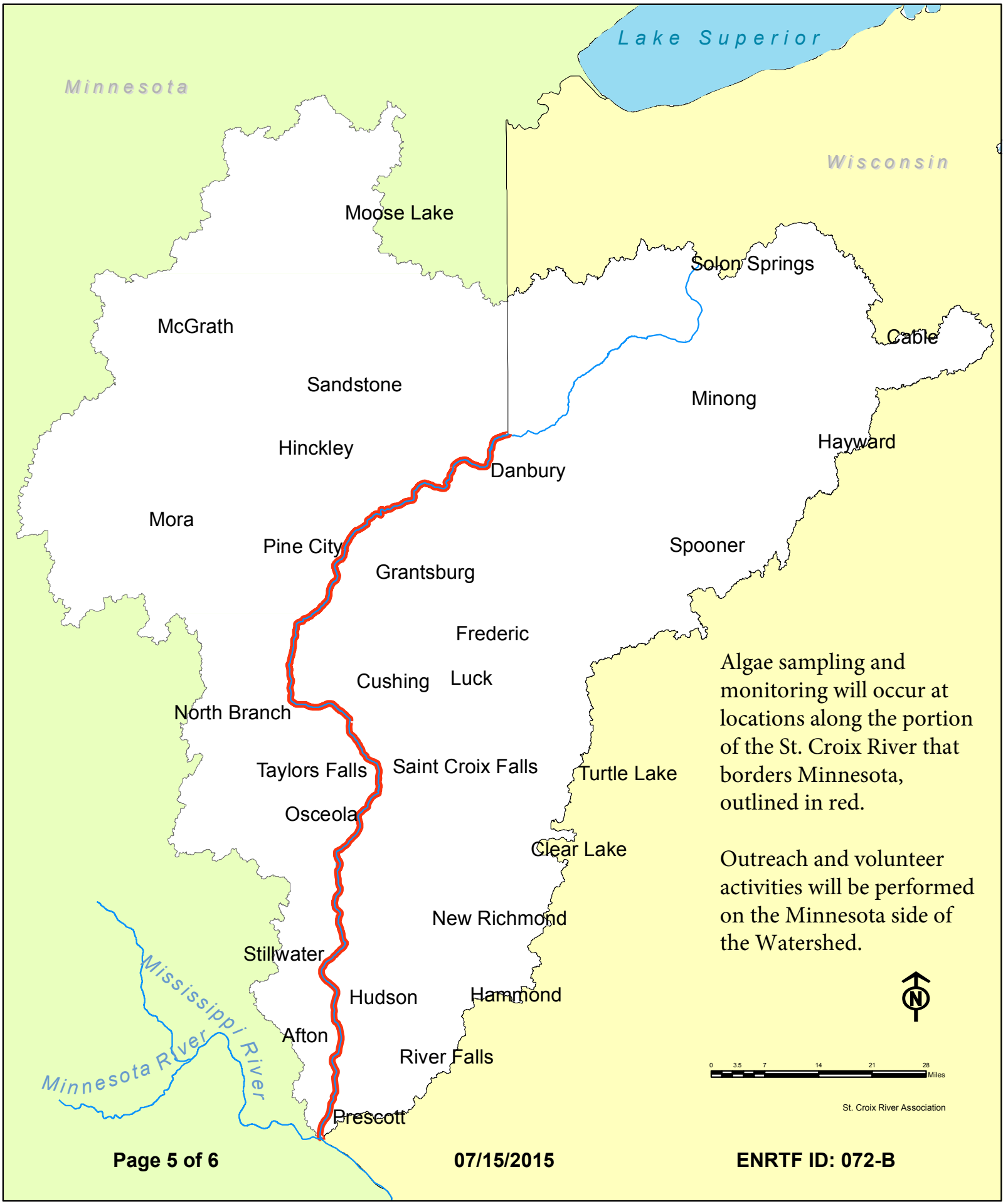
IV. TOTAL ENRTF REQUEST BUDGET *$312,280 over three years*

Personnel:	**AMOUNT**
Personnel: SCRA Project Coordinator (TBD) (75% salary, 25% benefits) (30% FTE for three years). Project management, coordination, volunteer capacity development, plan and alert system development.	90,000
Personnel: John Bumgarner, USGS Studies Program Manager (72 % salary, 28 % benefits) (2.5 % FTE for three years). Project supervision, staff scheduling, quality control and technical support	9,250
Personnel: Project Chief (TBD) (71% salary, 29 % benefits) 11 % FTE for three years. Manages, conducts and supervises project. Quality control.	46,100
Personnel: USGS Hydrologic Technician (TBD) (74 % salary, 26 % benefits) 23 % FTE for three years. Conducts data collection and field activities. Quality control.	61,440
Personnel: USGS Administrative Assistant (69 % salary, 31 % benefits) 2.5 % FTE for three years. Provide administrative support for funding agreements, cost accounting and billing.	6,400
Personnel: USGS Groundwater and Water Quality Technical Specialists (79 % salary, 21 % benefits). 3% FTE for three years. Provides quality control, technical advice, report review and proposal reveries to ensure USGS technical standards.	12,250
Personnel: USGS Database and IT support (73 %salary, 27 benefits). Two individuals each at 1% FTE for three years. Provides database and Information Technology support to meet USGS standards and requirements	7,400
Professional/Technical/Service Contracts:	
Professional/Technical/Service Contracts: USGS National Water Quality Lab Analytical Services contract	57,940
Professional/Technical/Service Contracts: USGS contract fee for USGS report preparation, editing and production (Science Publishing Network . This includes electronic publishing and distribution of report products.	10,000
Equipment/Tools/ Supplies:	
Equipment/Tools/Supplies: Miscellaneous field equipment and supplies for data collection, including pumps, pressure transducers, electronic recording devices, well packers, well casing and well shelters, None of these individually exceeds $5,00 each.	3,500
Travel:	
Travel: USGS truck and boat travel to field sites and to local meetings. Includes local conference fee, boats, vehicles, lodging and meals.	3,500
Additional Budget Items	
Shipping: Expenses for shipping samples to MGS and USGS laboratories	4,500
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	312,280

V. OTHER FUNDS

SOURCE OF FUNDS	**AMOUNT**	**Status**
Other Non-State $ To Be Applied To Project During Project Period:	$ 14,300	*pending*
Other State $ To Be Applied To Project During Project Period:		
In-kind Services To Be Applied To Project During Project Period:		
Funding History:		
Remaining $ From Current ENRTF Appropriation:		

St. Croix River Watershed



St. Croix Harmful Algae Prediction and Alert System

Project Manager Qualifications

Deb Ryun, Executive Director of the St. Croix River Association (SCRA) since October 2009, will provide project management. In this role she will provide oversight of the project as a whole and manage the project coordinator. Extensive past experience and her work to date at SCRA have provided Ryun with key skills needed for this project, including: management and coordination of multi-stakeholder initiatives; watershed-level planning; and implementation of on-the-ground projects to protect land and water. Prior to joining SCRA, Ryun served as Executive Director for Conservation Districts of Iowa (CDI), a non-profit organization working to conserve and enhance soil and water resources on private working lands.

Organization Description

The mission of the SCRA is to protect, restore and celebrate the St. Croix River and its watershed. Founded in 1911, SCRA began a significant transformation in 2008, moving from a volunteer organization to a more active leader with the appropriate vision, governance and resources. This transformation was stimulated by a widely-acknowledged need for an organization focused specifically on protecting and improving the St. Croix River and its basin.

SCRA works closely with the National Park Service, nonprofits and state and local governments. We also support and collaborate with existing partnerships, including the St. Croix Conservation Collaborative, a working group initiated by SCRA in 2005 to increase collaboration among groups working on land protection in the basin; and the St. Croix Basin Water Resources Planning team (Basin Team), which was formed in 1993 by the agencies overseeing the St. Croix National Scenic Riverway and has led water quality research and established a basin-wide goal of reducing phosphorous pollution to the river by 20 percent. SCRA recently completed a project in partnership with the St. Croix Basin Team in which we leveraged $500,000 in Clean Water, Land and Legacy Amendment funds for water quality testing and implementation work on the St. Croix, to a project total investment of $ $1,035,592. These existing partners will be called upon as appropriate to work on this project through SCRA's coordination.

SCRA is committed to applying the systems developed through this project over the long-term.