

**Environment and Natural Resources Trust Fund
2017 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 106-D

Using Science to Solve Minnesota's AIS problems - Phase II

Category: D. Aquatic and Terrestrial Invasive Species

Total Project Budget: \$ 6,100,000

Proposed Project Time Period for the Funding Requested: 4 Years, July 2017 - June 2021

Summary:

10-14 competitive research projects or rapid assessments will be launched to find solutions to Minnesota's top AIS problems through control, prevention, and early detection of existing and emerging AIS threats.

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Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

MAISRC Research Prioritization and Project Selection Process

_____ 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)

2017 Main Proposal

Project Title: Using Science to Solve Minnesota’s AIS problems: Minnesota Aquatic Invasive Species Research Center -Phase II

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I. PROJECT STATEMENT

With 2017 ENRTF funding and guided by MAISRC’s annual systematic research needs assessments that includes input from AIS managers, lakeshore associations, and researchers from around the state, MAISRC will:

- launch 6-8 scientifically rigorous research efforts for effective control response to existing AIS threats
- launch 4-6 projects on assessing and preventing new and emerging threats
- Additionally, MAISRC will be able to ensure the necessary core organizational functions are in place to accomplish this work

The threats posed by aquatic invasive species (AIS) to Minnesota’s lakes, rivers, and wetlands are real and growing and the science needed to address these vexing problems in Minnesota has only just begun. In order to more effectively respond to AIS, Minnesota must be equipped with better information, have more useful tools, and be able to mobilize more people who care about the quality of the state’s waters. Appropriations from ENRTF (2012, 2013, 2014) provided crucial initial support for solutions-oriented research at the Minnesota Aquatic Invasive Species Research Center on common and bigheaded carps, VHS, Eurasian water milfoil, and zebra mussels. It also created the operational capacity needed to prioritize, coordinate, and spur research as well as the outreach capacity to start translating science into management action. Many of these initial projects are funded through 2019, yet other critical research needs exist. For example, more lines of research to address prevention and control of key species such as zebra mussels and curly leaf pondweed are needed, as is new research on emerging species such as starry stonewort and killer shrimp. Systems-level research is also needed on topics such as the economic impacts of AIS, rapid response techniques, and effectiveness of prevention in order to ensure our state’s limited time and resources are being targeted most effectively.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Research for response to existing high priority AIS threats **Budget: \$ 3.8M**

We will launch 6-8 new projects (approximately \$350k- \$425k each) addressing the state’s highest priority research needs on existing threats. This will be accomplished through a competitive process prioritizing level of research need, likelihood the project will contribute to effective, actionable solutions, and scientific rigor. As an example, MAISRC’s 2015 Research Needs Assessment identified 14 high-priority topics: 6 relate to control & management of priority species, 4 focus on preventing establishment & spread, and 4 relate to risk assessment & early detection. These priorities include research on species not currently receiving significant attention by MAISRC, including starry stonewort, spiny water fleas, hybrid milfoil, common reed, faucet snails, and quagga mussels. In a few cases, notably zebra mussels, there is a great need to significantly expand the scope of MAISRC’s research. Several needs address systems (vs. species), such as multi-species surveillance approaches, evaluations of pathways that are vectors for multiple species, food-web impacts, and best practices for rapid response. This activity also includes continuation of projects funded by MAISRC with 2012 or 2013 ENRTF funds that have promising results and high likelihood of leading to an effective control strategy. This activity also includes two years of continued funding for the state’s only full-time zebra mussel research position.

Outcome	Completion Date
1. 6-8 prioritized control, prevention, and early detection research projects launched on existing threats (e.g. starry stonewort, spiny water fleas, hybrid milfoil, quagga mussels, etc.)	July 1, 2018
2. Specific research results, solutions identified	July 1, 2021

Activity 2: Research for response to emerging high priority AIS threats. **Budget: \$ 1.5M**



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We will launch 4-6 research projects (approximately \$200k- \$250k each) that address newly emerging threats, notably newly arriving AIS that have high impacts elsewhere and AIS that had been localized in MN but are beginning to spread. As an example, MAISRC’s 2015 Research Needs Assessment determined there are at least seven species whose arrival is considered imminent and 11 others that are localized, not spreading in MN, but highly invasive elsewhere. We anticipate that some of these projects will be launched in “rapid response” mode and others as part of the main competitive selection process, depending on the nature of research need, how the threat emerges, and the range of expertise on current MAISRC teams.

Outcome	Completion Date
1. 4-6 prioritized competitive projects or rapid assessments launched on new threats (e.g. snakehead, hydrilla, killer shrimp, red swamp crayfish, etc.)	July 1, 2018
2. Specific research results, solutions identified	July 1, 2021

Activity 3: Core Center functions to support AIS research

Budget: \$800k

The Center is an effective and efficient way to support research on AIS for many reasons. For example, it provides:

- Physical infrastructure and shared equipment and lab staffing needs to enable the research
- Leadership and direction, critical for establishing priorities and coordinating effective response
- Communication of research progress and implementation of science- based outreach programs to ensure results are translated into management action
- Opportunities for cross disciplined research collaborations, including from visiting experts

MAISRC core operations are supported through June of 2019 from 2013 ENRTF. No other funding exists to support the Center beyond this time. With 2017 ENRTF funding, these critical Center functions will be extended for two more years (July 2019 - June 2021) and will be leveraged by University of Minnesota contributions to base salaries for tenure track faculty, space & utilities, HR functions, payroll etc. valued at approximately \$3.2m.

Outcome	Completion Date
1. Annual research needs assessments completed; RFPs issued; peer reviews conducted; research results shared; research, trainings, and outreach performed; shared equipment procured and maintained; etc .	July 1, 2021

III. PROJECT STRATEGY

A. Project Team/Partners

MAISRC Director (Dr. Susan Galatowitsch) and Associate Director (Becca Nash) will provide leadership and coordination for all aspects of this project. The Center Advisory Board (primarily external membership) and Center Faculty group (UM AIS researchers) provide guidance and input to the Director and Associate Director. MAISRC scientists and leadership coordinate with DNR in multiple ways as formalized in a memorandum of understanding (signed in 2013). As part of their research, center scientists collaborate with managers and scientists of USGS, USFWS, NPS, DNR and local government units (e.g., Minnehaha Creek Watershed District), and specific lakeshore associations. No partners are slated to receive funds from this request, although some may respond to the calls for proposals.

B. Project Impact and Long-Term Strategy

MAISRC was established to build long-term research capacity (including new faculty positions and facilities) although all initial funding sources were short-term (the main appropriation ends in 2019). We have been able to leverage the initial financial support, most notably through a university commitment to make permanent two center positions (one faculty, one outreach staff). However, to ensure MAISRC continues to focus on the state’s priorities and solutions-oriented research, additional ENRTF support is crucial.

C. Timeline Requirements The proposed timeline for this project is 4 years (July 1, 2017-June 30, 2021).

2017 Detailed Project Budget

Project Title: Using Science to Solve Minnesota's AIS problems: Minnesota Aquatic Invasive Species
Research Center -Phase II

IV. TOTAL ENRTF REQUEST BUDGET 4 years

BUDGET ITEM	AMOUNT
Personnel:	
10-14 Post Docs: (20.75% fringe rate) 100% FTE x 2-3 years each	\$ 2,200,000
10-14 Grad Students: (37% tuition, 9% fringe) 50% FTE x 2-3 years each	\$ 1,300,000
10-14 Undergraduate Students: (0% fringe rate) 25% FTE x 2-3 years each	\$ 80,000
10-14 Co-PI/ Scientists: (33.7% fringe rate) 4% FTE x 2-3 years each; 2 non tenured principle investigators 80% FTE x 2 years	\$ 700,000
PI/Project Manager: (33.7% fringe rate) 30% FTE x 2 years	\$ 165,000
Co-Project Manager: (33.7% fringe rate) 100% FTE x 2 years	\$ 230,000
Comm. & Admin Assistant: (27.4% fringe rate) 100% FTE x 2 years	\$ 115,000
2 Aquatic laboratory techs: (27.4% fringe rate) 1- 50% FTE x 2 years; 1 x 25% FTE x 2	\$ 110,000
Professional/Technical/Service Contracts	
Fees or honoraria for guest lecturer and speakers, equipment repairs, maintenance and repairs for MAISRC holding facilities, webinar and event A/V services- approx \$30k/ year for MAISRC core operations; contracts for statistics, DNA analysis, supercomputing institute - approx \$45k/ project for existing threats, \$15k/ project for new threats (more detail to be provided as 10- 14 specific research projects are proposed)	\$ 515,000
Equipment/Tools:	
Surgical equipment, pipettors, incubators, computer, software, trap nets, seine nets, dip nets, pumps, timers, heliospectral lights for experiments (approximately \$20k/year for core functions; \$25k/project for existing threats; \$4k/project for new threats; more detail to be provided as 10- 14 specific research projects are proposed)	\$ 275,000
Supplies:	
Anesthesia, fish, fish food, gas for boats, printing/duplication, mailing, folders, paper, piping, glue, replacement helio & LED bulbs for experiments (approximately \$16k/year for core functions; \$25k/project for existing threats; \$6k/project for new threats; more detail to be provided as 10- 14 specific research projects are proposed)	\$ 265,000
MN Travel:	
Mileage, lodging, meals and for investigator travel to 1 conference a year to present findings; travel for research needs assessment participants; travel for consulting researchers (more detail to be provided as 10- 14 specific research projects are proposed)	\$ 145,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 6,100,000

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State \$ To Be Applied To Project During Project Period:	\$ -	
Other State \$ To Be Applied To Project During Project Period: ENRTF 2013 funds will support core operations during the first two (of four) years of this 2017 project period.	\$ -	Secured
In-kind Services To Be Applied To Project During Project Period: Foregone indirect costs	\$ 3,172,000	Secured
Funding History:		
2012 ENRTF (Sorensen, invasive carp)	\$ 2,000,000	Obligated
2013 ENRTF (Sadowsky, Sorensen, Bajer, Newman, Venturelli, Phelps, Larkin, McCartney, Galatowitsch)	\$ 8,700,000	Obligated
2014 ENRTF (Sorensen, invasive carp)	\$ 854,000	Obligated
Remaining \$ From Current ENRTF Appropriation:		
2012 ENRTF (Sorensen, invasive carp)	\$ 200,000	Obligated
2013 ENRTF (Sadowsky- biocontrol of quagga & zebra mussel, Eurasian watermilfoil; Sorensen- detection, prevention, control of Asian carps; Bajer- biocontrol of common carp; Newman- Eurasian watermilfoil control with weevils; Venturelli- modeling to understand threats of Heterosporis to game fish; Phelps- invasive carp control with pathogens; McCartney- mechanisms of zebra mussel spread; Galatowitsch- core operations through June 2019)	\$ 7,640,000	Obligated to 8 different projects by 8 PIs, pending peer review
2014 ENRTF (Sorensen, invasive carp)	\$ 366,000	Obligated

Minnesota Aquatic Invasive Species Research Center

Research Priorities and Project Selection

ANNUAL THREAT ASSESSMENT (Technical Committee)

Ensure list of species needing research attention includes emerging threats as well as those already known MN AIS problems



UPDATE RESEARCH PRIORITIES (Broad input)

Determine changes needed to center’s research priorities* based on new threats & research progress on current projects* * (*see lists below)



SUPPORT NEW & CONTINUING PRIORITY RESEARCH (Panels)

Make new research investments through competitive grants process and scientific peer review

*HIGH PRIORITY NEEDS (2016 EXAMPLES)	**CURRENT & PENDING PROJECTS
AIS Fish	AIS Fish
Carp deterrents for use in small waterways	Common carp control; eDNA to assess presence of Asian carp and common carp; ‘Judas fish’ technique for removing carp; Food attractants to control silver carp; Bubble curtains to deter Asian carp; Eradication of invasive carps using viruses; Asian carp risk analysis; Blocking Asian carp with Lock and Dams; Common carp biocontrol and toxins
AIS Invertebrates	AIS Invertebrates
Early stage treatment options for zebra mussels; Genetic controls for zebra mussels; Identifying highest risks for zebra mussel & spiny water flea spread (e.g., bait, boaters, docks, lifts, etc.); Identifying pathways for new threats: killer shrimp, New Zealand mud snail, red swamp crayfish.	Zebra mussel pathways of spread through genetics; early detection tools; survey protocols; Biological control strategies –zebra mussels; Improving zebra mussel biocide efficacy. Spiny water flea impacts on game fish populations.
AIS Plants	AIS Plants
Better controls for hybrid/narrow leaf cattail ; Reducing curly leaf pondweed propagules as a control approach; Minimum dosing of herbicides to control hybrid milfoil; common reed risk assessment	Weevil control of Eurasian watermilfoil ; Eurasian watermilfoil biocontrol; Curly leaf pondweed controls, non-target impacts, and post-control recovery of natives; Starry stonewort risk assessment and control methods
AIS Microbes	AIS Microbes
Development of systematic, science- based surveillance technologies for harmful pathogens	Heterosporis threats to game fish; VHS screening



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Project Manager Qualifications:

Dr. Galatowitsch is a Professor and Department Head of the Department of Fisheries, Wildlife, and Conservation Biology at the University of Minnesota. She has served as the Director for the Minnesota Aquatic Invasive Species Research Center since 2014. Galatowitsch has a PhD in Ecology and Evolutionary Biology from Iowa State University (1993). Galatowitsch leads a research team that for over twenty years has focused on ecosystem restoration; primarily wetlands, riparian corridors, and lakeshores. Her research team has focused on developing invasive control strategies for wetland plants (e.g., reed canary grass, common reed), enhancing post-control ecosystem recovery (e.g., prairie potholes, South Africa headwater streams, Minnesota lakeshores), and assessing the risks of introduced aquatic plants. She has published two books and over 80 scientific papers and book chapters. Galatowitsch is a Fellow of the Society of Wetland Scientists.

Organization Description:

The Minnesota Aquatic Invasive Species Research Center (MAISRC) uses innovative science to identify solutions to Minnesota's AIS problems. Our mission is to develop research-based solutions that can reduce the impacts of aquatic invasive species in Minnesota by preventing spread, controlling populations, and managing ecosystems; and to advance knowledge of AIS to inspire action by others. MAISRC was founded in 2012 with funding by the Minnesota Legislature from the Environment and Natural Resources Trust Fund and the Clean Water Fund.