Environment and Natural Resources Trust Fund

2021 Request for Proposal

General Information

Proposal ID: 2021-188

Proposal Title: Building Knowledge and Capacity for AIS Solutions

Project Manager Information

Name: Nicholas Phelps

Organization: U of MN - MAISRC

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Project Basic Information

Project Summary: MAISRC will launch 16-20 high-priority projects aimed at solving Minnesota's AIS problems using a rigorous and collaborative process. The science will be delivered to end-users through strategic communication and outreach.

Funds Requested: $5,000,000

Proposed Project Completion: 2025-06-30

LCCMR Funding Category: Aquatic and Terrestrial Invasive Species (D)

Project Location

What is the best scale for describing where your work will take place?

Statewide

What is the best scale to describe the area impacted by your work?

Statewide

When will the work impact occur?

During the Project and In the Future

Narrative

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Aquatic invasive species (AIS) are a real and growing threat to Minnesota's lakes, rivers, and wetlands. From our docks to state budgets, damaging AIS, such as zebra mussels, common carp, Eurasian watermilfoil, and many others have degraded the State's ecosystem, economy and way of life. For example, we recently found that young-of-the-year walleye are significantly smaller in our large lakes infested with zebra mussels, exacerbating already strained fisheries and local communities. In response to AIS impacts, Minnesotans invest millions of dollars each year to prevent and control infestations. These necessary investments have no doubt resulted in positive outcomes, but fall short of solving the long-term problem.

Minnesota became a national leader with the creation of the Minnesota Aquatic Invasive Species Research Center (MAISRC) in 2012. Meaningful progress is being made – already providing new tools for managers, research-based answers available for real-world decisions, and partners at all levels, locally and around the world, working in the same direction. Solutions to Minnesota's AIS problems are within reach. It is imperative that we remain committed to a long-term vision for AIS control in Minnesota, one that is informed by ground-breaking science that supports proven and efficient management action.

What is your proposed solution to the problem or opportunity discussed above? i.e. What are you seeking funding to do? You will be asked to expand on this in Activities and Milestones.

MAISRC was established with a game-changing investment from the ENRTF, creating a one-of-a-kind program focused on solutions-oriented research and outreach. We are driven to solve problems through innovative, rigorous and collaborative science. We have brought together 23 different project managers (UMN, UMD/NRRI, MN DNR, USGS, etc.) and their experienced teams to pursue 29 ENRTF-funded research projects (some multi-phase) on a range of high-priority species and strategies for AIS prevention, control, and management. Notable highlights are included in the infographic and much more is available here: www.maisrc.umn.edu. We are perfectly positioned to build on past success and continue to make advancements.

We propose to continue forward momentum by launching additional projects through our competitive RFP process, informed by our extensive research needs assessment and stakeholder engagement. All research will be vetted by internal and external peer-reviewers to ensure both scientific rigor and practical application. We will continue to prioritize communication and outreach to ensure results are effectively delivered to managers, practitioners, and the public to build our State's response capacity. Led by a 10-year strategic plan, we will continue to consult our external Advisory Board, Technical Advisory Board, and our Fellows Group to keep us mission-oriented.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

We will continue to advance scientific understanding and build capacity aimed at solving Minnesota's AIS problems. Through workshops and direct communication, we will translate our science and deliver tools directly to local, state and federal AIS managers. We will share research findings with diverse audiences and formats, including media interviews, local presentations, webinars, published manuscripts and much more. Through hands-on experience, this work will train the next generation of AIS professionals. Ultimately, we will be empowering more educated and active stakeholders, who are an essential part of the State's solution to improve and protect Minnesota's natural resources.

Activities and Milestones

Activity 1: Solving Minnesota's AIS problems by supporting innovative solutions-oriented research

Activity Budget: $3,916,491

Activity Description:
We will offer a competitive RFP in years one and two of this project, launching 16-20 new and continuation subprojects (approximately $200k-250k each, with two-year durations) addressing Minnesota's highest priority research needs on emerging and existing AIS threats. New lines of research will be focused on needs identified by our comprehensive research needs assessment. These new subprojects will provide a pipeline of innovation and collaboration. Concurrently, existing projects with high potential will be evaluated through the competitive peer-review process and continued. By providing a long-term strategy to build upon promising research, we are better positioned to realize the value of previous research investments. We have demonstrated the rigor and success of this process by launching both new and continuation subprojects in previous RFP cycles (2017-2020; new projects only 2015-2016).

Our RFP is open to all Minnesota-based researchers and we encourage collaboration and creation of multi-disciplinary teams. As a result, we have brought together new teams and agency partnerships from across the state and world, adding much-needed expertise and leveraging significant non-ENRTF funds. This coordinated process has also avoided duplication of research efforts and identified gaps where we have successfully recruited new research expertise to complement our current capacity.

Activity Milestones:

Description	Completion Date
Issue competitive RFP and support 8-10 projects on high-priority research needs	2022-01-31
Issue competitive RFP and support 8-10 projects on high-priority research needs	2023-01-31
Research complete, solutions or next steps identified, recommendations shared	2025-06-30

Activity 2: Leadership to facilitate AIS research, collaboration and outreach

Activity Budget: $1,083,509

Activity Description:
The value of a Center-based approach to AIS research is invaluable and reaches far beyond what a fragmented effort could accomplish. MAISRC provides leadership for AIS research that establishes priorities, facilitates coordination, evaluates research progress in real-time, and is a go-to resource for countless individuals, groups, and advisory committees. We also provide physical infrastructure, shared equipment, and lab support to ensure resources are not duplicated across projects and are available when needed. Two core researchers are included in this funding, focused on zebra mussels (1.0FTE) and common carp (0.5 FTE) - arguably Minnesota's most problematic AIS.

The successful translation of our science into public and management action has demonstrated the value of MAISRC. For example, since 2016: we have been featured in ~325 media stories, published 68 manuscripts, trained 300 citizen scientists, and presented our work many times to end-users. In early 2020, we hired our first research-outreach specialist (non-ENRTF funds) who will better support the needs of local and state managers.

With 2021 ENRTF funding, these essential functions will be extended for two more years (July 2023 - June 2025) and will be leveraged by UMN contributions of $3.0+M to base salaries and foregone ICR.

Activity Milestones:

Description	Completion Date
Research needs annually prioritized, RFPs issued, peer-review conducted, result dissemination and outreach performed, activities coordinated	2025-06-30

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this be funded?

MAISRC has a demonstrated track record of not only conducting high-quality research, but also providing the public and managers with research tools and science-based information in understandable formats. This ENRTF funding would ensure that these activities will continue until 2025. We have, and will continue to, leverage the ENRTF investment with significant UMN support (faculty positions, foregone ICR, etc.) and external grant support from 'Partnership Projects'. However, to ensure MAISRC remains focused on Minnesota's priorities and solutions-oriented research, additional ENRTF support is crucial.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Aquatic Invasive Species Research Center - Phase II	M.L. 2017, Chp. 96, Sec. 2, Subd. 06a	$2,700,000
Building Knowledge and Capacity to Solve AIS Problems	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 06a	$4,000,000

Project Manager and Organization Qualifications

Project Manager Name: Nicholas Phelps

Job Title: Director

Provide description of the project manager's qualifications to manage the proposed project.

Dr. Nick Phelps has been the Director of the Minnesota Aquatic Invasive Species Research Center (MAISRC) since 2016 and was an original MAISRC faculty member when the Center was created in 2012. In addition, Dr. Phelps is an Assistant Professor in the Department of Fisheries, Wildlife and Conservation Biology at the University of Minnesota. His research focuses on emerging threats to the health and sustainability of aquatic ecosystems, which lie at the intersection of animals, humans and the environment. Dr. Phelps has managed over $22M in competitive grant funding, led large international collaborations, held numerous outreach and public engagement events, and published more than 40 peer-reviewed manuscripts and book chapters. Under his leadership, MAISRC has become a national leader in solutions-oriented research on AIS and a go-to source for science-based information for AIS managers, practitioners, and the public.

Organization: U of MN - MAISRC

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 AIS in Minnesota by preventing spread, controlling populations, and managing ecosystems; and to advance knowledge of AIS to inspire action by others. MAISRC was created in 2012 with funding by the Minnesota Legislature from the Environment and Natural Resources Trust Fund.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Project Manager		Lead MAISRC research activities and coordinate with local, state, and national agencies and AIS professionals.			36.5%	1		$201,780
Co-Project Manager		Coordinate MAISRC research program, outreach to stakeholders, and dissemination of research findings.			36.5%	2		$219,924
Communications Specialist		Maintain MAISRC communications platforms to effectively disseminate research findings and connect MAISRC research with the public.			31.8%	2		$187,228
Laboratory Manager		Maintain MAISRC Containment Lab to ensure efficiency and accessibility for MAISRC projects.			31.8%	0.1		$8,612
Contract Faculty		Perform dedicated research on control and management of common carp in Minnesota.			36.5%	1		$128,251
Research Associate		Perform dedicated research on the control and management of zebra mussels in Minnesota.			36.5%	2		$218,400
Co-PIs		16 Co-PIs to perform research on the prevention, control and management on AIS in Minnesota. Position will be funded through research projects that are funded by MAISRC RFPs.			36.5%	1.28		$200,000
Post-doctoral Associates		10 Post-docs to perform research on the prevention, control and management on AIS in Minnesota. Position will be funded through research projects that are funded by MAISRC RFPs.			25.4%	20		$1,630,200
Graduate Students		10 Graduate students to perform research on the prevention, control and management on AIS in Minnesota. Position will be funded through research projects that are funded by MAISRC RFPs. Fringe rate includes cost of tuition.			87.9%	10		$1,052,240
Undergraduate Students		12 Undergraduate students to perform research on the prevention, control and management on AIS in Minnesota. Position will be funded through research projects that are funded by MAISRC RFPs.			0%	6		$150,000
							Sub Total	**$3,996,635**

Contracts and Services								
Private Contractors	Professional or Technical Service Contract	Equipment repairs, mailing, communications services, etc. More detail provided as specific research projects are proposed.				0		$125,000
Co-PIs	Sub award	Subawards to Co-PIs outside of the UMN (e.g. USGS, other colleges/universities). More detail provided as specific research projects are proposed.				0		$100,000
University of Minnesota	Internal services or fees (uncommon)	UMN contract research services (e.g. genetic analysis, supercomputing). More detail provided as specific research projects are proposed.				0		$125,000
							Sub Total	**$350,000**
Equipment, Tools, and Supplies								
	Tools and Supplies	Field/Lab Supplies	Supplies for research in the field and lab (e.g. Piping, fish food, gas for boats, tanks, reagents, sampling supplies, and other consumables). More detail provided as specific research projects are proposed.					$225,185
	Equipment	Field/Lab Equipment	Equipment for research in the field and lab (e.g. storage containers, software, nets, and other equipment). More detail provided as specific research projects are proposed.					$225,180
	Tools and Supplies	General Operating Supplies	Supplies for research coordination (e.g. paper, office supplies, ink/toner).	X				$8,000
							Sub Total	**$458,365**
Capital Expenditures								
							Sub Total	**-**

Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	Travel for MAISRC staff and researchers. More detail provided as specific research projects are proposed.	Conduct research, AIS coordination meetings, and dissemination of research results.					$80,000
	Conference Registration Miles/ Meals/ Lodging	Project Manager travel to one conference per year. Co-PIs travel to one in-state conference per project. More detail provided as specific research projects are proposed.	Presentation of research findings.					$40,000
							Sub Total	**$120,000**
Travel Outside Minnesota								
	Miles/ Meals/ Lodging	Project Manager travel to four regional AIS meetings.	Coordination of AIS research with regional managers and researchers.	X				$8,000
	Conference Registration Miles/ Meals/ Lodging	Co-PIs travel to national conferences, with prior approval.	Presentation of research findings to strategic audiences and expanding AIS research for Minnesota.	X				$42,000
							Sub Total	**$50,000**
Printing and Publication								
	Printing	Research support materials, mailed surveys, research reports, etc. More detail provided as specific research projects are proposed.	Dissemination of research findings and support for research activities.					$25,000
							Sub Total	**$25,000**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$5,000,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Equipment, Tools, and Supplies		General Operating Supplies	MAISRC's core work is to prioritize and facilitate AIS research that advances AIS solutions for Minnesota. In order to do this work effectively, MAISRC staff need office supplies like paper, pens, ink/toner, file folders, etc. Office materials like these are not provided by the UMN.
Travel Outside Minnesota	Miles/Meals/Lodging	Project Manager travel to four regional AIS meetings.	Working with regional AIS managers and researchers is essential to advancing AIS solutions for Minnesota by sharing knowledge and coordinating control/management efforts that are rooted in the latest science. Participating in regional meetings allows MAISRC to engage in AIS prevention and management efforts that will have direct impacts on Minnesota waters.
Travel Outside Minnesota	Conference Registration Miles/Meals/Lodging	Co-PIs travel to national conferences, with prior approval.	Sharing research findings at regional and national conferences allows MAISRC researchers to connect with others in the field and advance knowledge and AIS solutions. Shared research findings directly impact Minnesota by bringing new ideas and information into the state that can further AIS prevention, control, and management efforts.

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
In-Kind	University of Minnesota foregone indirect costs	Administrative support of MAISRC activities including payroll and human resources, finance, facilities, and IT.	Secured	$2,750,000
Cash	Environment and Natural Resources Appropriation M.L. 2019, Art. 1, Sec. 3, Subd. 3(j)	Appropriation language: prioritize, support, and develop research-based solutions that can reduce the effects of aquatic invasive species in Minnesota by preventing spread, controlling populations, and managing ecosystems and to advance knowledge to inspire action by others.	Pending	$1,020,000
			State Sub Total	**$3,770,000**
Non-State				
			Non State Sub Total	**-**
			Funds Total	**$3,770,000**

Attachments

Required Attachments

Visual Component

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Alternate Text for Visual Component

Minnesota Aquatic Invasive Species Research Center: Building knowledge and capacity for AIS solutions.
A three-step process is outlined:
1. Ideas & Needs
a. Inclusive prioritization process to identify most pressing needs
b. Annual RFPs allow for agile response to emerging issues
2. Research
a. Two-year projects take testing from the lab to the lake
b. International collaboration, Minnesota-focused
3. Real World Solutions
a. Proven tactics and recommendations
b. Findings shared with decision makers
c. Support and advise on-the-ground implementation
The MAISRC funding cycle is illustrated by a 2019-2024 timeline. The cycles begin with a one-year RFP followed by two-year projects—resulting in a three-year process. An RFP is issued each year, resulting in overlapping cycles.
MAISRC Research & Accomplishments
- First in the world to map the zebra mussel genome. We then released the data publicly, providing a road map to develop high-precision control methods.
- Mobilized 70+ volunteers and partners to survey and map invasive Phragmites across the entire state of Minnesota. Identified 470+ populations, developed a management plan, and supported local level implementation efforts.
- Moved promising research from the lab to the lake and conducted the largest-ever experimental treatment to suppress established zebra mussel populations.
- Combined field, laboratory, and big data approaches to optimize control methods for curly leaf pondweed, Eurasian watermilfoil, and starry stonewort.
- Common carp research projects were proven effective and inspired the launch of an independent company to successfully manage carp populations.
- Developed an online tool showing the invasion risk of starry stonewort and zebra mussels for all lakes in Minnesota to help counties prioritize watercraft inspectors and surveillance at high-risk sites.
- Created and continue to support the award-winning Aquatic Invasive Species Detectors program and certified ~300 citizen scientists. Participants at an affiliated event found two early infestations of starry stonewort, which allowed for rapid removal in the lake.
- Host an annual showcase that provides concerned citizens, AIS professionals, and local decision makers with the latest research findings and management recommendations.
- Installed the nation's first acoustic deterrent system and made recommendations for gate adjustments to prevent upstream migration of bighead carp.

A map of Minnesota shows MAISRC's research activities across the state indicated by icons. Icons are divided into five different categories: invasive plants (913 icons), invasive invertebrates (175 icons), invasive fish (125 icons), pathogens and harmful microbes (60 icons), and citizen scientists and outreach (262 icons).
More information available at maisrc.umn.edu.

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Does your project have patent, royalties, or revenue potential?

Yes,

- Patent, Copyright, or Royalty Potential

Does your project include research?

Yes

Does the organization have a fiscal agent for this project?

Yes, Sponsored Projects Administration

Minnesota Aquatic Invasive Species Research Center:

Building knowledge and capacity for AIS solutions

MAISRC

1 IDEAS & NEEDS

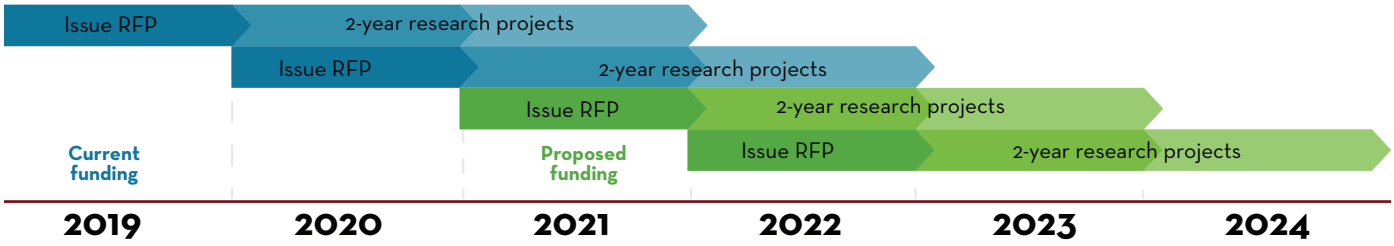
- Inclusive prioritization process to identify most pressing needs
- Annual RFPs allow for agile response to emerging issues

2 RESEARCH

- Two-year projects take testing from the lab to the lake
- International collaboration, Minnesota-focused

3 REAL WORLD SOLUTIONS

- Proven tactics and recommendations
- Findings shared with decision makers
- Support and advise on-the-ground implementation



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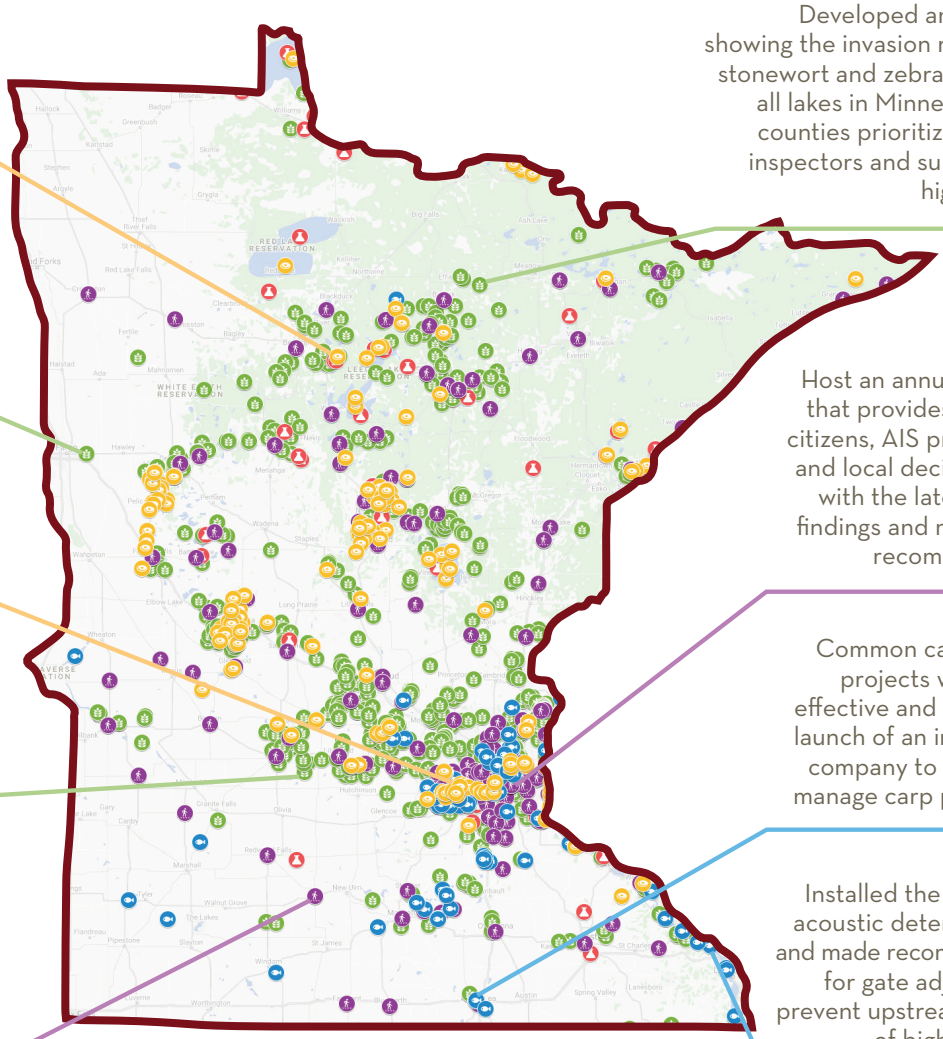

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Invasive plants | Invasive invertebrates | Invasive fish | Pathogens and harmful microbes | Citizen scientists and outreach