



2019
research
report

Minnesota Aquatic
Invasive Species
Research Center



Greetings from MAISRC!

Dear friends,

It was another exciting and productive year at the Minnesota Aquatic Invasive Species Research Center! I continue to be inspired by our researchers – from the first semester students to the tenured professors – all working toward a common goal of finding research-based solutions to Minnesota’s AIS problems. As I look back on 2019, it is amazing what has been accomplished.

Six research projects concluded this year, each advancing our scientific understanding and providing new tools and options for managers, professionals, and the public. These projects included work on invasive bighead carp, non-native *Phragmites*, and zebra mussels – highlights are included in the following pages. The approaches to each project were as varied as the species, but all remained focused on solutions-oriented research and end user engagement. Congratulations to the project teams for getting their work over the finish line and beyond!

As old projects sunsetted, new projects began – MAISRC launched ten new projects in 2019, seven building off ongoing projects and three new lines of research informed by our comprehensive research needs assessment. It is exciting to track the progress of our work: first, from needs identified by stakeholders, then to proposals, then to active projects, and, ultimately, to applied outcomes. I am confident that this next group of projects will push the science even further and provide critical insights into the prevention, management, and control of Minnesota’s most problematic AIS.

On behalf of all MAISRC researchers, I say “thank you!” to the many individuals and organizations that have supported our work over the last year. We are grateful to the Environment and Natural Resources Trust Fund and the Minnesota Legislature for providing funding for our research. We also thank lake associations and individual donors for their generosity and commitment to finding research-driven solutions to AIS. We are also thankful for the countless in-kind contributions of time, advocacy, advice, and words of encouragement. We truly appreciate it and could not do it without you!

Lastly, as we look forward to 2020, I would encourage all of us to find opportunities to work together toward our common goal. We are making progress. We are all getting smarter, partnerships are getting stronger, and public engagement is as high as it has ever been. Having the privilege to lead MAISRC, I can tell you that I’m optimistic that we can solve our AIS problems, and I hope you are too.



Dr. Nicholas Phelps
Director, Minnesota Aquatic Invasive Species Research Center

Invasive plants



- Mapped the distribution of invasive *Phragmites* in Minnesota, showed that spread risk is positively correlated with genetic diversity, developed strategies for coordinated response, and released region-specific management recommendations
- Launched a new project to evaluate the economic impacts of Eurasian watermilfoil on property values under current and future climate scenarios
- Sampled 64 lakes to genetically confirm the presence or absence of Northern, Eurasian, and hybrid watermilfoil in each, and began to screen herbicides that could control hybrid genotypes
- Created various models that predict the risk of starry stonewort and zebra mussel spread and likelihood of establishment. These models were used to prioritize locations for statewide volunteer search efforts and to inform the location of watercraft inspectors



>> Big win:

Provided the first evidence of starry stonewort's impacts to native plants in Minnesota lakes, and shared findings on multiple occasions to increase awareness and understanding of the species.

Invasive invertebrates



- Quantified the impact of zebra mussels on Minnesota's nine largest walleye lakes and found that walleye in infested lakes are approximately 10% smaller after the first growing season and less likely to survive to year two
- Tested the feasibility of using multibeam sonar to detect and distinguish zebra mussels from native mussels and substrates in the lab
- Used paleolimnology to find that spiny waterflea arrived in Minnesota decades before they were first reported
- Scaled from lab to field to test the effectiveness of low-dose copper treatments on zebra mussel veligers and identify non-target impacts
- Field tested the effectiveness of an innovative new coating that can be applied to equipment surfaces to prevent the attachment of zebra mussels
- Evaluated survey designs for estimating zebra mussel density in newly infested lakes and created a publicly available instructional video, data entry sheets, and recommendations to managers



>> Big win:

In partnership with the University of Minnesota Genomics Center, MAISRC mapped the genome of the zebra mussel and released it publicly. This groundbreaking effort unlocks endless possibilities for control.

Invasive fish



- After learning that carp can be trained to aggregate, researchers are now looking at carp social learning strategies, and how these could be used to optimize baiting strategies and maximize carp removal
- Developed engineered genetic incompatibility in zebrafish, which results in reproduction disruption. This is an important step toward developing species-specific genetic biocontrol options for common carp
- Evaluated and optimized a sound deterrent system that is over 97% effective at stopping invasive bighead carp in the lab; versions have now been installed in two rivers
- Isolated the koi herpesvirus from wild common carp, which is now being used in the lab to test the species specificity of this potential pathogenic biocontrol agent
- Developed a filter that captures >90% of eDNA within 10 seconds – a game-changer for detecting rare native or invasive species



>> Big win:

MAISRC researchers tested an innovative combination of the Procom electric guidance system and the Whooshh fish transport system to remove thousands of invasive common carp from Long Lake.

Communications & outreach



- Held five AIS Detector workshops across the state, bringing our total to 299 certified AIS Detectors!
- Engaged over 250 volunteers for Starry Trek, a statewide search for starry stonewort and other invasive species. After searching 270 public accesses, no new infestations of starry stonewort were found (one new infestation of Eurasian watermilfoil was found)
- Published peer-reviewed scientific papers, on topics ranging from Asian carp to zebra mussels, that will drive AIS research and management forward
- Our AIS Detectors program was recognized by University of Minnesota Extension with the 2019 Dean's Award for Distinguished Team
- Hosted 300 people at our annual AIS Research and Management Showcase – our highest number ever! Missed out? Join us on campus on Sept. 22, 2020 for the seventh annual event



>> Big win:

We're taking our outreach to the next level in 2020 by hiring MAISRC's first-ever Outreach Specialist. Soon, you'll be seeing even more white papers, webinars, and public engagement from MAISRC.



THANK YOU

The Minnesota Aquatic Invasive Species Research Center thanks all of the federal, state, local, and private support that makes our research possible; especially the Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources. We couldn't do this work without you.

JOIN US

If you would like to support the research and outreach programs going on at the Minnesota Aquatic Invasive Species Research Center, please visit www.MAISRC.umn.edu/donate. Gifts of any size are appreciated and help us develop and advance research-based solutions to aquatic invasive species.

KEEP IN TOUCH

Stay up to date on all the research from the Minnesota Aquatic Invasive Species Research Center by visiting www.MAISRC.umn.edu, signing up for our newsletter at z.umn.edu/AISnews, and by following us on Facebook and Twitter.

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