



2020

RESEARCH  
REPORT

# Greetings from MAISRC!

Dear friends,

It has been a wild year with lots of challenges, but I would like to personally assure you that MAISRC is still here and working as hard as ever to develop research-based solutions to reduce the impacts of aquatic invasive species in Minnesota. I hope the research highlights included in the report (which only scratches the surface of our progress!) will surprise, inspire, and give you hope.

Like the year 2020, research can often challenge the status quo. We test hypotheses, adjust to findings, and learn new things all the time. This year in particular, flexibility has been one of our strongest assets. In the spring, our research teams quickly and effectively activated socially distant work plans to complete a truly remarkable amount of field and lab work. Meanwhile, our admin team has never broken stride despite working remotely full-time since March.

To address the inability of having in-person interactions with the public, partners, and stakeholders, MAISRC shifted online compatibility and accessibility to the forefront of our priorities. In September, we successfully hosted our annual Research and Management Showcase online for the first time - with more attendees than ever! I encourage you to visit our YouTube channel and watch some of the recorded Showcase sessions and hear project updates firsthand from our Research Fellows.

Another challenge we faced this year was coordinating our biennial Research Needs Assessment. During this year's solicitation period, we received an astounding 689 responses. Respondents varied from researchers to recreationists and were from all across Minnesota and beyond. The prioritization of the submitted research topics has traditionally been a one-day, in-person event full of lively and thoughtful debates. To be truthful, I was worried that moving the workshop online this year would reduce the quality of those discussions. However, I am happy to report that not only did video conferences work seamlessly for group sessions, but we were also able to invite experts from farther distances to share their perspectives. All together, I am excited about our future projects that will address these new research priorities and move us one step closer to solutions.

From field work to webinars, MAISRC has adjusted to our new normal with resilience and determination. To accomplish what the Center has over the last year is nothing short of remarkable and I can not say enough how impressed I am with the people doing the research and supporting the teams. Though I dare not guess what 2021 will bring to the world in general, I can confidently say that MAISRC will continue forward with our directive to develop research-based solutions to our aquatic invasive species problems.

Stay safe,



Dr. Nicholas Phelps

Director, Minnesota Aquatic Invasive Species Research Center



## >> Big win

In 2020, researchers collected hundreds of samples from a Koi Herpes Virus (KHV)-endemic lake to better understand the ecology of this potentially useful virus for biocontrol of common carp. As expected, KHV was widespread within the common carp population, with increasing prevalence in gill tissue during the warmer months, indicating an active outbreak. Importantly, the replicating virus was never detected in any of the native fish tested. These findings were supported by laboratory trials that also demonstrated the high host-specificity of KHV.

[MAISRC.umn.edu/native-pathogens](https://maisrc.umn.edu/native-pathogens)

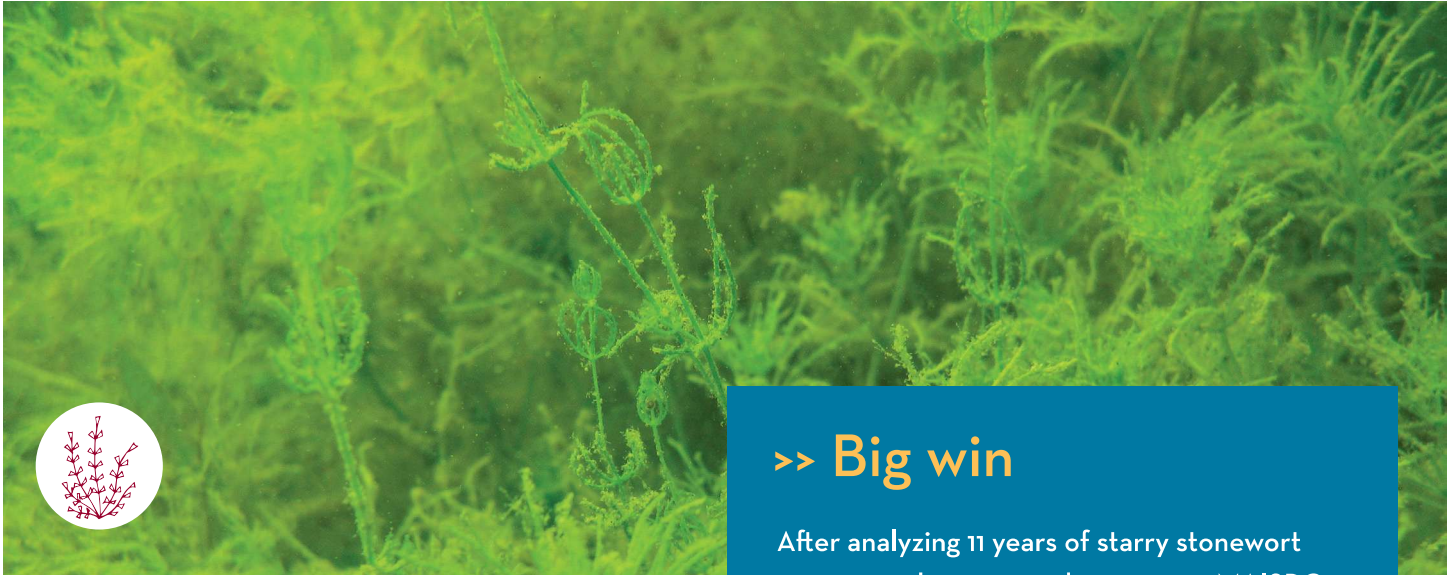
► MAISRC researchers are seeking to understand the movement dynamics, connectivity, and social behavior of common carp to enhance management strategies. To do so, researchers tagged 300 carp with microchips that record their presence and duration at staged feeding stations in two Minnesota lakes. By studying how, and in what groupings the fish visit the stations, researchers can create highly effective and specifically timed removal strategies.

[MAISRC.umn.edu/carp-biocontrol](https://maisrc.umn.edu/carp-biocontrol)

► MAISRC researchers have compiled a list of carp management cases in Minnesota and identified lakes that have implemented carp management strategies. We are now analyzing the reports to identify which tactics are the most cost-effective. Researchers are also studying the water quality of lakes after carp management activities. Results from this study will help illustrate the relationship between the cost and benefit of different management techniques. [MAISRC.umn.edu/public-values](https://maisrc.umn.edu/public-values)

► With support from our funders and donors, MAISRC was able to purchase a new electrofishing boat in 2020. With the acquisition of the new boat, we have doubled our research capacity on the water. Utilizing updated equipment will allow our research teams to work more efficiently and effectively to understand impacts and find solutions to AIS.

# Invasive plants



## >> Big win

After analyzing 11 years of starry stonewort treatment data across three states, MAISRC researchers have found that current methods (generally copper-based algaecide treatments) are not slowing starry stonewort's expansion within infested lakes. However, treatments can be effective at reducing abundance, e.g., biomass, of starry stonewort in localized areas, providing nuisance relief. Researchers also found that if infestations are found early enough—when they are still small—sustained hand removal efforts can be highly effective for reducing and containing infestations. These findings emphasize the need for early detection/containment efforts and identify a pressing need for continued research into effective control options for established infestations.

[MAISRC.umn.edu/starry-analysis](https://maisrc.umn.edu/starry-analysis)

> Researchers have compiled over 20 years of plant occurrence data from over 3,000 surveys into a database showing where, when, and under what environmental conditions curlyleaf pondweed and Eurasian watermilfoil infestations have been found in Minnesota. Once completed, the database will be leveraged to understand how curlyleaf pondweed and Eurasian watermilfoil, and herbicidal management of these species, affect Minnesota's native aquatic plants. This knowledge will be used to help guide restoration efforts aimed at reestablishing diverse native plant communities following control efforts.

[MAISRC.umn.edu/assessment-control-research](https://maisrc.umn.edu/assessment-control-research)

> Recent MAISRC findings show that there are multiple populations of hybrid *Phragmites* in Minnesota (crosses between native and invasive *Phragmites australis*). This discovery is significant because relatively few hybrid *Phragmites* populations have been confirmed nationally and none have been reported from our region previously. Hybridization in other aquatic invasive species has posed threats to native populations and made control more challenging. This research will help guide management decisions for strategic control of invasive *Phragmites* across the landscape. [MAISRC.umn.edu/phragmites-project](https://maisrc.umn.edu/phragmites-project)

> The preliminary results from our study investigating the relationship between aquatic invasive species and lakeshore property values show that Eurasian watermilfoil is more likely to occur in lakes with above-average property values. One explanation for these results is that Eurasian watermilfoil tends to be found in the most heavily trafficked, and therefore most popular, lakes. Whether or not the infestations will eventually impact property values is still under investigation. [MAISRC.umn.edu/property-values](https://maisrc.umn.edu/property-values)



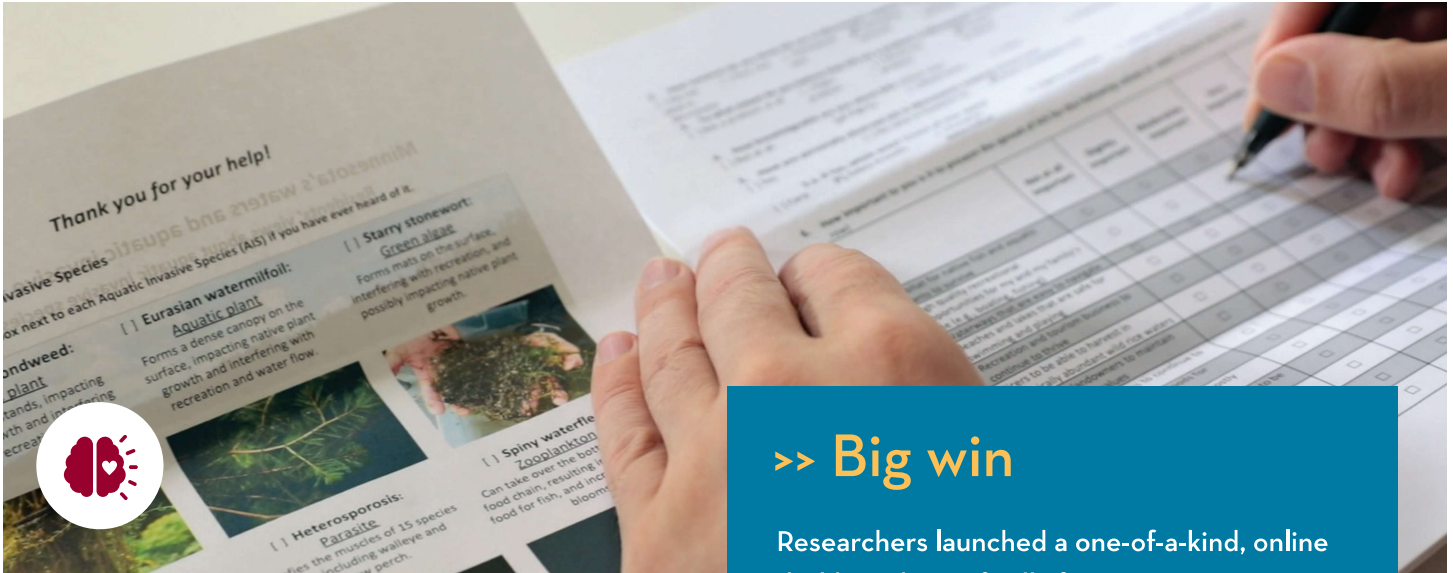
## >> Big win

Our researchers have identified downrigger and surface fishing line and residual water in bait buckets/livewells to be two of the highest risk factors for spreading spiny water fleas. Armed with this knowledge, MAISRC, in partnership with St. Louis County and Minnesota Sea Grant, began a multi-media communications and awareness campaign to educate Minnesotans. Efforts have included PSAs on local television stations in areas with infestations and the distribution of 6,000 absorbent towels printed with tips for how anglers can help stop the spread.

[StopSpiny.org](http://StopSpiny.org)

- ▶ Exciting preliminary field testing of enzyme-based coating has shown a significant decrease in biofouling on the treated surfaces over 22 months of underwater submersion. The new coatings are environmentally friendly and contain no heavy metals. By decreasing biofouling, we can reduce the settlement of zebra mussels. If successful, this project could help protect boats and underwater infrastructure—including water intake pipes—from being clogged with zebra mussels and save property owners and companies from costly maintenance and repairs. [MAISRC.umn.edu/coatings](http://MAISRC.umn.edu/coatings)
- ▶ In 2019, MAISRC moved a zebra mussel suppression project using a low dose of copper from the lab to lake. In 2020, the team revisited the treatment site to assess recruitment of zebra mussels and recovery of non-target species one year later. Results have been promising and have led to a third phase of the project where researchers will attempt to dial in the lowest possible dose of copper to still be effective while minimizing non-target impacts. [MAISRC.umn.edu/copper-control](http://MAISRC.umn.edu/copper-control)
- ▶ MAISRC researchers are expanding a study examining how zebra mussels and spiny water fleas interrupt an infested lake's natural food web. As of the 2020 field season, over 1,700 tissue samples from walleye and perch were collected and analyzed to assess their feeding behaviors (nearshore versus open water). Researchers are also using the samples to quantify mercury concentrations in the tissues to identify pathways of mercury bioaccumulation and how it is influenced by zebra mussel-induced shifts in food web configuration. With food availability and growth being large determining factors of survival for young fish, this study will help assess the outlook on the future of sport fishing in Minnesota. [MAISRC.umn.edu/walleye-ais](http://MAISRC.umn.edu/walleye-ais)

# Cross cutting



## >> Big win

Researchers launched a one-of-a-kind, online dashboard specifically for aquatic invasive species surveillance and watercraft inspections in Minnesota. The dashboard uses a robust lake-connectivity network generated by over 1.6 million data points of boater movements and a complex array of river connections. The dashboard both forecasts the introduction risk of aquatic invasive species to individual waterbodies and provides decision-making support for optimizing watercraft inspection efficacy. MAISRC also hosted multiple workshops to train state and local resource managers how to use the dashboard.

[AISexplorer.umn.edu](https://AISexplorer.umn.edu)

► MAISRC researchers successfully developed an environmental DNA filter that captures 50-100% of eDNA within 10 seconds. The new eDNA kits capture five times more DNA and are five times cheaper than commercially available filters. These results can have a significant impact on the widespread adoption of eDNA technology, which will help managers enhance the accuracy and quality of the data and improve decision making for the management of invasive species.

[MAISRC.umn.edu/edna-technology](https://MAISRC.umn.edu/edna-technology)

► In a statewide survey with over 600 responses, researchers found that approximately 20% of anglers who use live baitfish will illegally release the unused bait at least some of the time. These findings suggest that even pathogens at low prevalence in the baitfish supply may be introduced hundreds of thousands of times into Minnesota waters. The findings justify the importance of monitoring the baitfish supply, as well as outreach efforts to reduce the release of unused bait into lakes by anglers.

[MAISRC.umn.edu/baitfish-risk](https://MAISRC.umn.edu/baitfish-risk)

► To further understand the value Minnesotans put on the active management of aquatic invasive species, researchers conducted on-site surveys at public water accesses. The data showed participants had an overall willingness to pay an additional fee per day for aquatic invasive species at the lake they recreate at. Understanding the socioeconomic factors (e.g., income, primary purpose of lake visit, awareness of aquatic invasive species problems and risks) of recreationists will help resource managers build support for aquatic invasive species management. [MAISRC.umn.edu/public-values](https://MAISRC.umn.edu/public-values)



## >> Big win

Due to COVID-19, MAISRC pivoted on our outreach initiatives to provide a variety of digital content to our stakeholders and the public. In September, our annual Research and Management Showcase was held online for the first time. Despite being an untraditional format, researchers and over 300 attendees were able to connect and discuss current research studies and management options. Additional online engagement opportunities included providing recorded Showcase presentations online, monthly AIS Detectors webinars, and online input opportunities for our biennial Research Needs Assessment. By moving these events and resources online, we are able to break down geographic and time barriers and expand the accessibility of our content.

Watch the 2020 Showcase presentations online: [z.umn.edu/ShowcaseVideos](https://z.umn.edu/ShowcaseVideos)

> This year marked the fourth annual ‘Starry Trek’—an AIS Detectors program event that mobilizes volunteers from across Minnesota to survey high-risk lakes for aquatic invasive species, with a focus on starry stonewort. In 2020, volunteers found seven new aquatic invasive species infestations, including one new report of starry stonewort at Lake Carnelian in Stearns County. In total, 238 lakes (an event record) were searched by 212 people this year. [StarryTrek.org](https://StarryTrek.org)

> ‘AIS Management 101’ is an online course organized by the AIS Detectors program that teaches participants to make informed AIS management decisions through an understanding of control options, pesticide science, aquatic ecology, and relevant regulations. This fully online course was designed to deliver a quality, fully online learning experience tailored for the general public. In the inaugural year of the course, 71 people completed the training.

[MAISRC.umn.edu/ais-detectors/ais-management](https://MAISRC.umn.edu/ais-detectors/ais-management)

> In 2020, MAISRC hired our first ever Research Outreach Specialist, Meg Duhr. Meg works closely with resource managers, lakeshore associations, and the public to distribute research findings and proven management techniques. Want to get involved? Connect with Meg at [mduhr@umn.edu](mailto:mduhr@umn.edu)!



## THANK YOU

The Minnesota Aquatic Invasive Species Research Center thanks all of the federal, state, tribal, 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 [MAISRC.umn.edu/donate](https://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 [MAISRC.umn.edu](https://MAISRC.umn.edu), signing up for our newsletter at [z.umn.edu/AISnews](https://z.umn.edu/AISnews), and by following us on Facebook and Twitter.

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