



MINNESOTA AQUATIC INVASIVE
SPECIES RESEARCH CENTER

UNIVERSITY OF MINNESOTA



AIS RESEARCH & MANAGEMENT SHOWCASE

OCTOBER 28, 2026

Table of Contents

Information	4
Schedule	5
Building map	9
Presentation descriptions: Minnesota Commons	10
Presentation descriptions: North Star Ballroom	16
Presentation descriptions: Cherrywood Room	19
Containment lab tour stops	22
eDNA and Larkin Lab tour stops	23
Demonstration stations	24
Conference biographies	27
Research Partnership Award winners	42
Glossary of common terms	43



Information

AIS Research and Management Showcase

Date: Wednesday, October 28, 2026

Time: 7:45am: Registration & continental breakfast; 8:30am: Program start

Location: St. Paul Student Center, 2017 Buford Ave, St Paul, MN 55108

Parking: Hourly parking available in the Gortner Parking Ramp and daily rate parking available in lot #S101 and #S106. Accessible parking is available on Buford Ave.



Fish



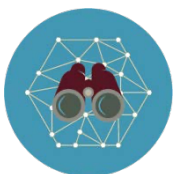
Invertebrates



Plants



Cross cutting



Modeling



Microbes

LEGEND:

Use the icons to the left to quickly select the presentation topics you would like to attend.

You will find these icons on the presentation description pages 10-22.

SURVEY:

Help us shape our next Showcase by filling out our brief survey. Your feedback is essential in making future MAISRC events even more engaging and impactful.

z.umn.edu/showcase-survey26



Schedule

7:45 AM	Registration opens; continental breakfast – North Star Ballroom
8:30 - 9:00 AM	Opening remarks Research Partnership Awards Ceremony North Star Ballroom

9:15 - 10 AM	Minnesota Commons	Ballroom	Cherrywood	Lab Tours
Session	Multimodal deterrents stop upstream passage of bigheaded carp	Restoring our underwater forests: insights from lake revegetation experiments	Integrating the Benefits Our Lakes Provide into AIS Management	
Presenters	Allen Mensinger	Abha Panda	Amy Kinsley, Molly Tilsen, and Libby Kula	

10:15 - 11 AM	Minnesota Commons	Ballroom	Cherrywood	Lab Tours
Session	◆eDNA: Project updates	Developing genetic and genomic approaches for zebra mussel control and monitoring	Lab to Lakes: Common Carp Updates	Lab Tour 1: Meet at the main entrance (First floor, outside Minnesota Commons)
Presenters	Chan Lan Chun, Satoshi Ishii, Lynn Waterhouse, and Andrew Wood	Daryl Gohl	Jake Walsh, Solomon David, and Sarah Unruh	

11:15 - 12 PM	Minnesota Commons	Ballroom	Cherrywood	Lab Tours
Session	From Boater Movement to Collaborative AIS Prevention	Early Observations Following Minnesota's First Whole-Lake Low-Dose Copper Treatment for Zebra Mussel Suppression	Supporting innovative and adaptive invasive aquatic plant management now and into the future	Lab Tour 2: Meet at the main entrance (First floor, outside Minnesota Commons)
Presenters	Amy Kinsley and Jared Langer	Liv Nyffeler	Jake Walsh, Madeline Conowall, and Melina Pakey-Rodriguez	
12 – 1:15 PM	Lunch with researchers and colleagues North Star Ballroom MAISRC researchers will be seated at reserved tables near the stage. After grabbing your lunch, feel free to join them for a chance to ask questions and learn more about their research. Each researcher's name will be displayed on table signs. If you prefer, unreserved tables will also be available during lunch.			
1:15 - 2 PM	Minnesota Commons	Ballroom	Cherrywood	Lab Tours
Session	✦ Lightning Round 1: Externships	Tracking mercury cycling changes imposed by zebra mussels and starry stonewort from the sediment to the fish you eat	Using Hand Removals to Control Chinese Mystery Snails	None
Presenters	Jimmy Marty, Tom Langer, Justin Townsend, and Phoebe Brown	Gretchen Hansen, Denver Link, and Naomi Blinick	Valerie Brady, Madison Bear, and Emily Lockling	

2:15 - 3 PM	Minnesota Commons	Ballroom	Cherrywood	Lab Tours
Session	☆ Lightning Round 2: Externships	Genetic control of invasive species	Managing hybrid cattail in Minnesota lakes	Lab Tour 3: Meet at the main entrance (First floor, outside Minnesota Commons)
Presenters	Zach Nagel, and Kelsey Taylor	Michael Smanski	Claire Rude, Amy Schrank	

3:15 - 4 PM	Minnesota Commons	Ballroom	Cherrywood	Lab Tours
Session	⚡ Lightning Round 3: New Projects	Understanding the Influence of AIS on Swimmer's Itch: Phase 1 and Beyond	Insights after year 1: Investigating the impact of Chinese mystery snails on lake food webs	Lab Tour 4: Meet at the main entrance (First floor, outside Minnesota Commons)
Presenters	John Fieberg, Víctor H. Hernández Elizárraga, and Gretchen Hansen	Amanda Schuermann	Amber Ulseth	
4:00 - 5:00 PM	Demonstration stations Light refreshments - North Star Ballroom			

◆: Environmental DNA (eDNA)

10:15: Introduction to eDNA

Presented by Chan Lan Chun

10:20: High-Throughput Simultaneous Detection of Various AIS

Presented by Satoshi Ishii

10:30: Improving sample design for detecting aquatic invasive plants with eDNA (Minnetonka Project)

Presented by Lynn Waterhouse

10:40: Portable eDNA Metabarcoding for Rapid Aquatic Invasive Species Monitoring

Presented by Andrew Wood, Chan Lan Chun, and Marissa Trombley

✧ **Lightning round 1: Externship Projects**

1:15: **Assessing Effects of Fish Exclosures on Native Milfoil Weevils and Eurasian Watermilfoil**

Presented by Jimmy Marty and Tom Langer

1:35: **Improving macroalgae ID to improve starry stonewort early detection**

Presented by Justin Townsend and Phoebe Brown

☆ **Lightning round 2: Externship Projects**

2:15: **Common Carp Movement in Response to Weather Conditions**

Presented by Zach Nagel

2:35: **Oh CRAP! Building Community Response and Action Plans**

Presented by Kelsey Taylor

⚡ **Lightning round 3: New Projects**

3:15: **Relationships between curlyleaf pondweed, management, and water quality**

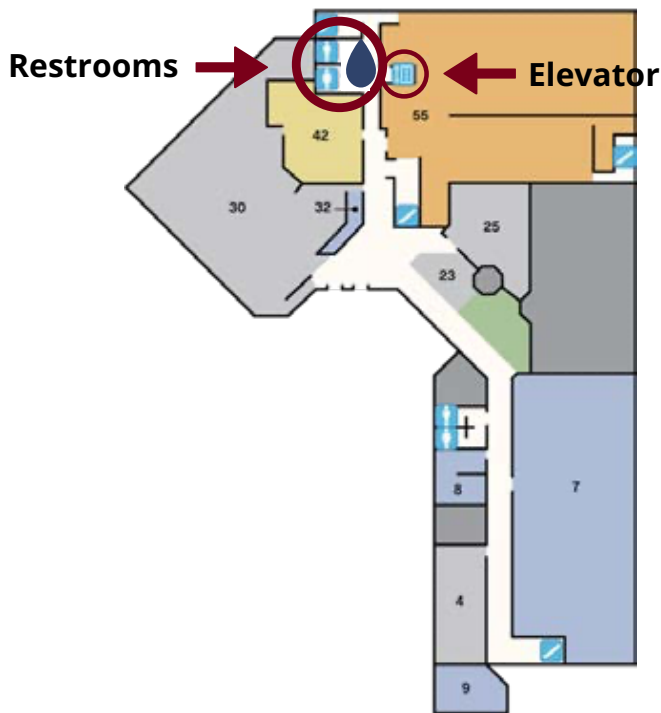
Presented by John Fieberg

3:30: **Zebra Mussel RNAi: Genomic Resources and Stakeholder Engagement**

Presented by Víctor H. Hernández Elizárraga

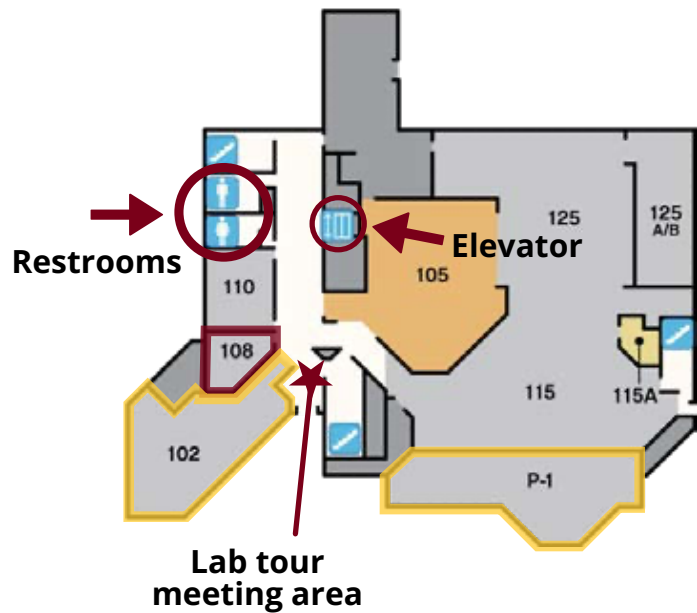
3:45: **Tradeoffs and Uncertainties in Invasive Aquatic Plant Management**

Presented by Gretchen Hansen



LOWER LEVEL

- 4: Technology Help
- 7: University Bookstore
- 8: Printing Services
- 23: Larson Gallery Lounge
- 25: Paul Whitney Larson Gallery
- 32: Post Office & Satellite U Card Office
- 30: Theater
- 42: Event Services Office
- 55: Gopher Spot Game Room and Bowling
- 💧 Refillable water station

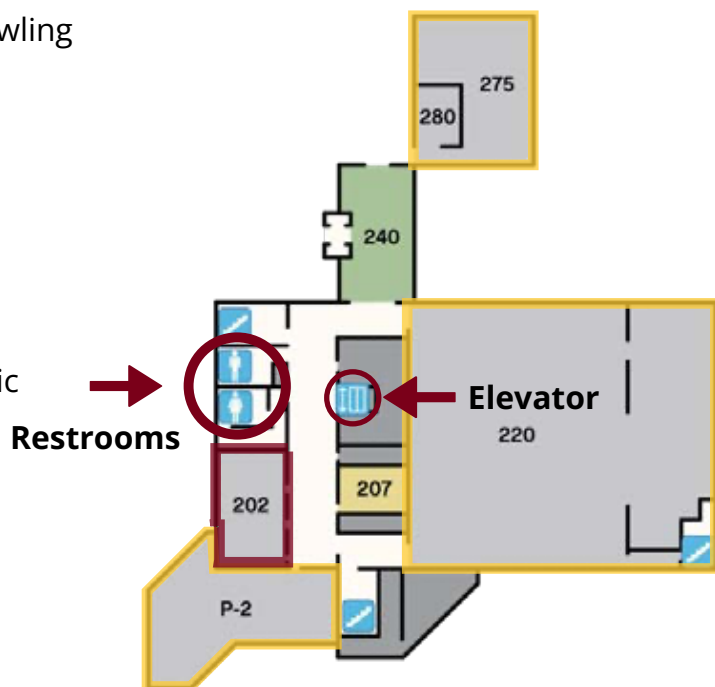


FIRST FLOOR

- 102: Minnesota Commons**
- 105: University Dining Services
- 108: Lactation space**
- 110: Conference Room
- 115-125: Terrace
- 125 A/B: Harvest Room
- P-1: Garden Terrace**

SECOND FLOOR

- 202: Quiet Space** (after 11am)
- 207: Multicultural Center for Academic Excellence (MCAE)
- 220: North Star Ballroom**
- 240: Public Lounge
- 275: Cherrywood Room**
- 280: Dexter Room
- P-2: North Star Ballroom Patio**



Areas in **bold** are accessible during this event

Minnesota Commons

Presentation Descriptions

9:15 - 10 AM 	Multimodal deterrents stop upstream passage of bigheaded carp Presented by Allen Mensinger Multimodal deterrents can be more effective at blocking invasive species over extended periods. Bigheaded carp in a model lock and dam routinely transited the lock chamber to reach the upstream pool for higher flow rates and food rewards. However, fish conditioned to associate sound with CO2 release were 100% deterred from moving upstream by an acoustic only deterrent. Additionally, previously conditioned fish influenced naïve fish from moving upstream. The multimodal deterrent had minimal impact on native fishes. These results suggested that intermittent use of CO2 can increase the effectiveness of acoustic deterrents in the field.
10:15 - 11 AM 	Environmental DNA (eDNA) updates 10:15: Introduction to eDNA Presented by Chan Lan Chun 10:20: High-Throughput Simultaneous Detection of Various AIS Presented by Satoshi Ishii There are many aquatic invasive species (AIS) of concern in Minnesota. The environmental DNA (eDNA) approach is promising for the early detection of AIS, but most of the previous eDNA methods can target only a handful of AIS at one time. In this project, we are trying to simultaneously detect various AIS, including fishes, invertebrates, plants, and microbes in many samples by using high-throughput quantitative polymerase chain reaction (HT-qPCR). By enabling timely detection of AIS, this approach seeks to inform resource allocation for AIS monitoring and guide mitigation efforts to prevent their spread.



10:30: Improving sample design for detecting aquatic invasive plants with eDNA (Minnetonka Project)

Presented by Lynn Waterhouse

Environmental DNA (eDNA) can be a powerful tool for the early detection of aquatic invasive species, including aquatic invasive plants, but specific guidance on sampling design and optimizing detections are often lacking. A comparatively inexpensive, portable, and relatively rapid tool, the Nanopore MinION device, can be used to detect aquatic plant species from eDNA samples. These samples can be quickly and easily taken in the field relative to traditional field-based plant surveys. Here we explore how detection rates are impacted by sampling volume, sampling placement, sample type, and filter type.



10:40: Portable eDNA Metabarcoding for Rapid Aquatic Invasive Species Monitoring

Presented by Andrew Wood, Chan Lan Chun, and Marissa Trombley

Early detection of aquatic invasive species (AIS) is essential for rapid response, yet traditional monitoring often misses early-stage invasions. While environmental DNA (eDNA) offers a valuable alternative, standard sequencing methods depend on lab infrastructure and long supply chains that delay results. To enable direct field deployment, we are developing a portable eDNA metabarcoding workflow using Nanopore sequencing focused on priority invertebrate AIS. We evaluate workflow accuracy using mock communities, curate a region-specific reference database, and test eDNA from 10 invaded Minnesota waterbodies. Finally, we benchmark Nanopore against short-read platforms to inform resource managers on optimal practices for rapid, cost-effective monitoring.

11:15 - 12 PM



From Boater Movement to Collaborative AIS Prevention

Presented by Amy Kinsley and Jared Langer

Recreational boaters travel between Minnesota lakes, creating pathways for AIS spread. Our research has examined how

	counties can use information about these connections to improve watercraft inspection planning and coordinate prevention efforts. We have combined boater movement networks, optimization and game-theoretic models, decision-support tools, and camera-based observations to evaluate where inspections may have the greatest impact and when collaboration can improve outcomes. This presentation highlights what we have learned about collaborative AIS prevention and how ongoing work is translating these insights into feasible strategies under changing resources.
Lunch in the North Star Ballroom	
1:15 - 2 PM	Lightning round 1: Externship Projects 1:15: Assessing Effects of Fish Exclosures on Native Milfoil Weevils and Eurasian Watermilfoil Presented by Jimmy Marty and Tom Langer Eurasian watermilfoil (EWM) is a widespread invasive aquatic plant in Minnesota with limited long-term, sustainable treatment options. Lake managers need field-tested alternatives to that are ecologically compatible, financially feasible, and scalable. We evaluated a promising biocontrol approach: establishing fish predation exclosures as refugia for existing native milfoil weevil populations. Reduced predation within exclosures may allow weevils to increase and disperse, contributing to lake wide EWM suppression. Our project established exclosures on a shallow lake in Washington County. We collected vegetation and weevil metrics to assess single-year response of EWM and weevil populations. A feasibility/methods assessment will be developed in 2027. 1:35: Improving macroalgae ID to improve starry stonewort early detection Presented by Justin Townsend and Phoebe Brown This project proposes a dual approach to starry stonewort detection, combining the development of a visual identification guide with eDNA metabarcoding to improve macroalgae

3:15 - 4 PM



Lightning round 3: New Projects

3:15: **Relationships between curlyleaf pondweed, management, and water quality**

Presented by John Fieberg

This project will investigate how curlyleaf pondweed abundance and management affect lake water quality in Minnesota. Researchers will combine statewide data on aquatic plant communities, management activities, and water quality to identify direct and indirect relationships among these factors using causal inference methods. By accounting for differences among lakes and other variables that may influence management outcomes, the project will help clarify whether and how curlyleaf pondweed control, particularly herbicide treatments, affects water quality. The findings will help inform evidence-based aquatic plant management decisions in Minnesota and other states.



3:30: **Zebra Mussel RNAi: Genomic Resources and Stakeholder Engagement**

Presented by Víctor H. Hernández Elizárraga

MAISRC researchers are working on the development of safe, effective, and species-specific genetic control methods for invasive zebra mussels using RNA interference (RNAi). Researchers will sequence the genomes of key Minnesota aquatic species to identify potential unintended effects on native species, including those that are endangered, threatened, or of special concern. The project will also examine state and federal regulations governing RNAi-based control methods and engage stakeholders, Tribal representatives, and experts through focus groups and a workshop to understand their perspectives, concerns, and priorities. The findings will help guide the development, safety testing, and potential future use of targeted zebra mussel control technologies while informing regulatory decisions and building public understanding.



3:45: **Tradeoffs and Uncertainties in Invasive Aquatic Plant Management**

Presented by Gretchen Hansen

Scientists plan to evaluate the tradeoffs between controlling invasive aquatic plants and protecting threatened and endangered species in Minnesota. Researchers will develop a structured decision-making framework to assess how different management approaches, including herbicide treatments and mechanical harvesting, may affect populations of pugnose shiners and Blanding's turtles. Using literature reviews and simulation models, the project will estimate potential population impacts and identify the uncertainties that most influence management decisions. The findings will help inform the Minnesota DNR's permitting process and identify research priorities to support more effective, evidence-based aquatic plant management.

North Star Ballroom

Presentation Descriptions

9:15 - 10 AM 	Restoring our underwater forests: insights from lake revegetation experiments Presented by Abha Panda Current efforts to manage invasive plants in lakes rely on costly and repeated herbicide treatments. These treatments alone are often ineffective at long-term eradication of invaders and frequently lead to a lack of native plant recovery. As such, focusing on revegetation, or the active reintroduction of native plants following invasive species management, may be a means to make lakes more resilient to reinvasion. To develop practical solutions, we have been working with local partners to conduct in-lake revegetation experiments, including both transplanting and seeding of native aquatic plants. We have also been conducting greenhouse germination trials to increase our capacity for growing native aquatic plants and using them for restoration purposes.
10:15 - 11 AM 	Developing genetic and genomic approaches for zebra mussel control and monitoring Presented by Daryl Gohl Zebra mussels are a damaging invasive species that have spread rapidly throughout North America. We are using information from the sequencing of the zebra mussel genome to develop genetic biocontrol tools. This work includes applying RNA interference to knock down expression of zebra mussel target genes and working towards developing methods to directly manipulate the zebra mussel genome. In addition, we are using genomics to track the spread of zebra mussels and identify source populations for newly infested waterbodies in order to help inform management decisions.

11:15 - 12 PM 	Early Observations Following Minnesota's First Whole-Lake Low-Dose Copper Treatment for Zebra Mussel Suppression Presented by Liv Nyffeler Zebra mussels (<i>Dreissena polymorpha</i>) have spread to nearly 380 lakes across Minnesota and, once established, are difficult to control. While prevention is the primary management strategy, there is a need to evaluate scalable approaches for reducing established populations and restoring ecosystem function. Our overall goal is to develop and evaluate a whole-lake control framework for zebra mussel suppression using low-dose copper sulfate treatments. To test this, we conducted Minnesota's first whole-lake low-dose copper treatment in Lake Riley in July 2026. Treatment was applied over three weeks using EarthTec QZ®, with copper concentrations tailored specifically to the lake's chemistry to increase suppression while minimizing harm to non-target species.
Lunch in the North Star Ballroom	
1:15 - 2 PM 	Tracking mercury cycling changes imposed by zebra mussels and starry stonewort from the sediment to the fish you eat Presented by Dr. Gretchen Hansen, Denver Link, and Naomi Blinick Zebra mussels and starry stonewort alter aquatic ecosystems in ways that influence mercury cycling and accumulation in fish. Our research combines statewide fish contaminate data with intensive, multi-trophic sampling of surface water, sediment, porewater, plankton, periphyton, plants, invertebrates, and fish to identify where changes in mercury cycling occur when these invasive species are present. We also develop tools, like predictive models and harvest scenarios, for managers and anglers to make consumption decisions that fit their risk tolerance. These approaches connect ecosystem-level changes imposed by prevalent aquatic invasive species to mercury accumulation in fish while providing tools for mitigating consumption risk.

2:15 - 3 PM 	Genetic control of invasive species Presented by Michael Smanski New tools in precision genetic engineering are accelerating the development of innovative new approaches for population control. This talk will introduce this field to the audience and describe how we are translating several approaches to provide new tools for managing invasive carp.
3:15 - 4 PM 	Understanding the Influence of AIS on Swimmer's Itch: Phase 1 and Beyond Presented by Amanda Schuermann Anecdotally, cases of and public concern about swimmer's itch seem to be increasing in Minnesota. At the same time, AIS such as zebra mussels (<i>Dreissena polymorpha</i>) or mystery snails (Chinese, <i>Cipangopaludina chinensis malleata</i>; banded, <i>Callinina georgianus</i>), have also been spreading. As a result of mounting public concern, researchers have aimed identify if these AIS may play any role in an increase in swimmer's itch cases. The hosts and causative agents of swimmer's itch are largely understudied in Minnesota, and any link between aquatic invasives and swimmer's itch cases have not been explored. This research aims to fill this knowledge gap to better understand the complex interactions that result in swimmer's itch.

Cherrywood Room

Presentation Descriptions

9:15 - 10 AM 	Integrating the Benefits Our Lakes Provide into AIS Management Presented by Amy Kinsley, Molly Tilsen, and Libby Kula Aquatic invasive species can affect many of the benefits people derive from lakes, such as recreation, fishing, water quality, biodiversity, and cultural connections. These benefits, often described as ecosystem services, can be challenging to characterize and quantify. We are working with state and county AIS managers, Tribal resource managers, lakeshore property owners, and recreationists to identify which benefits they value most and how those benefits can be protected from AIS. This project will integrate these values into AIS decision-making to better characterize and communicate the broader benefits of prevention and management.
10:15 - 11 AM 	Lab to Lakes: Common Carp Updates Presented by Jake Walsh, Solomon David, and Sarah Unruh Evaluating the outcome of management plans is complex. The Lab to Lakes initiative is pairing research with active management of common carp to bring more of MAISRC's research into implementation in Minnesota's lakes. A key part of Lab to Lakes is researching the impact of common carp on native fishes, native plants, zooplankton, and water quality. This work will not only aid in evaluating the success of the project in our study lakes but will also inform future research and management of common carp.
11:15 - 12 PM 	Supporting innovative and adaptive invasive aquatic plant management now and into the future Presented by Jake Walsh, Madeline Conowall, Melina Pakey-Rodriguez Lake managers and concerned citizens spend millions each year reducing the harm of invasive aquatic plant populations; yet

	Minnesota lacks the centralized and harmonized datasets needed to evaluate and improve the effectiveness and selectivity of these projects. We will discuss our Phase I effort to collect and harmonize permitting and treatment data to pair with MAISRC's PI Charter app and database of aquatic plant data, including what we've learned about supporting these projects into the future. We will also preview our goals for Phase II: developing rigorous evaluation methods and building accessible approaches to sharing special, often unique innovative projects
Lunch in the North Star Ballroom	
1:15 - 2 PM 	Using Hand Removals to Control Chinese Mystery Snails Presented by Valerie Brady, Madison Bear, and Emily Lockling Two lakes on the reservation of the Fond du Lac Band of Lake Superior Chippewa have been invaded by Chinese Mystery Snails, which could damage wild rice. Fond du Lac invasive species staff, along with the Maajii-akii-gikenjigewin field crew from the Conservation Corps of Minnesota and Iowa, conducted hand removals to determine if this control method could reduce snail populations and the level of effort required. In heavily infested areas, one person using a D-frame dip net in wadable depths could often remove a pound or more of snails per hour.
2:15 - 3 PM 	Managing hybrid cattail in Minnesota lakes Presented by Claire Rude and Amy Schrank Invasive hybrid cattails form dense stands in Minnesota lakes, altering shoreline habitat and reducing biodiversity. Our research evaluates whether small-scale mechanical cattail removal restores ecological function in nearshore lake zones. By monitoring plants, fish, and water quality across cattail invaded, managed, and uninvaded zones, we found that targeted cattail harvesting increases dissolved oxygen, promotes native plant regrowth, and supports fish communities. To put research into action, we launched the Minnesota Cattail Collaborative. Partnering with watershed managers, lake associations, tribal partners, and others we deploy standardized removal and monitoring protocols to restore diverse nearshore habitats and empower local lake stewardship.

3:15 - 4 PM



Insights after year 1: Investigating the impact of Chinese mystery snails on lake food webs

Presented by Amber Ulseth

Chinese mystery snails (CMS) are widespread across Minnesota lakes, yet we do not know how these invasive snails may impact lake ecosystems. CMS can potentially impact lakes by 1.) outcompeting native invertebrates for food resources and habitat and 2.) reducing food availability to fish as these snails can become too large to consume. We aim to quantify the density of CMS in nearshore habitats and contribution of CMS to lake food webs. We will report on the details of our study plan and initial findings of year 1 of our project to quantify the impact of CMS to lake ecosystems.

Containment Lab Tour

Tour Stop Descriptions

Zebra Mussel Larval Rearing 	A barrier to future research studies of invasive zebra mussels is the ability to spawn and rear them in the lab. Our work combines husbandry techniques derived from culturing jellyfish and planktonic sea urchin larvae with providing essential first foods and clean water free from waste and competitive organisms. Despite how well zebra mussels reproduce in the wild, controlling all these environmental factors is complex and still in need of modifications to be able to consistently produce larval test subjects for this potential population control method.
Culturing Microalgae to Support Aquatic Invasive Species Control	Laboratory care of zebra mussels for population control experiments is challenging. To provide the most complete diet, our team is culturing five different algae. Research into feeding frequency, photoperiod, and feeding behavior is ongoing with the aim of providing more robust research subjects for current and future MAISRC zebra mussel projects.
Genetic biocontrol for common carp 	The Smanski lab is developing innovative genetic biocontrol technologies to control established, reproducing populations of invasive common carp. During this tour, visitors will learn about the different methods of genetic biocontrol being developed in the lab, as well as the specialized fish husbandry techniques that allow us to produce genetically modified common carp embryos year-round. The tour will conclude with a showcase of our genetically modified fluorescent common carp and discuss the applications of these new genetic biocontrol technologies.

eDNA Lab & Larkin Lab Tour

Tour Stop Descriptions

eDNA Lab 	On this tour stop, you'll see part of MAISRC's eDNA testing lab. eDNA, or environmental DNA, can help detect aquatic invasive species early. This summer, volunteers across Minnesota collected and filtered water samples and sent them to MAISRC to test for zebra mussel eDNA. The lab builds on previous MAISRC research demonstrating that water samples collected by volunteers can be just as accurate as those collected by scientists. The testing results will give lake stewards valuable information about zebra mussel presence and help MAISRC researchers better understand the risk of AIS spread and provide actionable data to support management decisions. Website: eDNA Lab z.umn.edu/edna-lab
Larkin Lab 	Explore how MAISRC researchers are using native plant revegetation to restore lake vegetation and help prevent invasive aquatic plants from returning. This hands-on demonstration will showcase seed germination, plant growth, and innovative revegetation experiments aimed at identifying effective ways to rebuild healthy, resilient native plant communities in Minnesota lakes. Website: Cultivating resilience: native revegetation for AIS resistance z.umn.edu/revegetation

Demonstration Stations

Join us after the conference for a social hour with interactive demonstrations and light refreshments.

Can AI-enabled autonomous underwater robots help find AIS? 	Traditional manual surveys show promise for detecting aquatic invasive species (AIS), but murky water and thick lake vegetation severely limit their real-world coverage. To overcome these challenging environmental conditions and scale up surveillance efficiency, we integrated advanced stereoscopic cameras and a newly acquired 3D acoustic sonar onto the open-source MeCO autonomous underwater vehicle (AUV). Driven by deep-learned AI, this multimodal system fuses real-time visual data and acoustic imaging to robustly detect and classify hidden Chinese and banded mystery snails. At this station, interact with the physical MeCO AUV and its sonar payload firsthand, explore the high-resolution 3D point-cloud maps generated via underwater Simultaneous Localization and Mapping (SLAM), and learn about how automated robotic mapping transforms targeted, risk-based surveillance to stop the spread of AIS across Minnesota waterbodies. Research project: Investigating the case of invasive mystery snails z.umn.edu/ms-technology
Will your AIS management plan work as intended? 	Minnesota lake stakeholders have diverse priorities and goals for lake management, which can make it challenging to identify the most effective strategies for specific lakes and situations. Expanding on the boater connectivity and habitat suitability models that power AIS Explorer with dynamic population models and a range of management strategies, AIS CASCADE is an interactive decision-support tool. It is designed to help lake managers evaluate management options and make informed, collaborative decisions about aquatic invasive species. Join us for a hands-on introduction to this innovative tool, then compete against other participants to create the most effective management plan!

	Research project: Developing simulation-based decision support tools for AIS management z.umn.edu/cascade
Will Surveillance Safeguard Our Salamanders? 	Salamanders and other amphibians face growing threats from invasive microbes that have caused devastating declines in other parts of the world. At this interactive exhibit, discover how we use disease surveillance to protect Minnesota's wildlife before these microbes become established. Learn how researchers safely collect skin swabs from amphibians, use environmental DNA (eDNA) and disease risk maps to guide surveillance, and combine field observations with laboratory testing to detect emerging diseases early. Research project: Surveillance and Risk Management of Chytrid Fungi in Amphibians z.umn.edu/chytrid-fungi
How can aquarium businesses and hobbyists engage in aquatic invasive species management? 	Aquarium and pond fish and plants released into the environment can have significant ecological impacts. To better understand the perspectives of aquarium businesses and hobbyists on invasive aquatic species, we conducted interviews and surveys with both groups. Using interactive activities, we will demonstrate how social science data are collected and engage participants in discussions about translating those findings into management strategies. We will share insights from our research while showcasing how social science can inform aquatic invasive species management. Research project: Social dimensions of trade pathways of AIS spread z.umn.edu/social-dimensions
What is the relationship between zebra mussels and bacteria?	Adult zebra mussels often attach to surfaces covered in bacterial biofilms, which are communities of bacteria that communicate using chemical signals. This communication, called quorum sensing (QS), may help zebra mussels identify suitable surfaces to attach. MAISEC research found that zebra mussels preferred surfaces with bacterial biofilms and changed their behavior



when exposed to bacterial signaling molecules. Researchers also found that adding biodegradable, eco-friendly enzymes that disrupt these signals (known as quorum quenching (QQ) enzymes) to paint reduced zebra mussel attachment. These findings show that zebra mussels can detect and respond to bacterial signals. They also suggest that QQ enzymes could offer a promising, environmentally friendly way to prevent zebra mussels from attaching to surfaces.

Research project:

Development of durable, potent biologicals to mitigate the spread of sessile AIS
z.umn.edu/biofouling

**How can I
contribute to AIS
research and
detection?**



Regular members of Minnesota's lake-loving community are often the ones making important aquatic invasive species discoveries. The AIS Detectors program, jointly supported by the Minnesota Aquatic Invasive Species Research Center and University of Minnesota Extension, helps everyday Minnesotans become part of the solution to aquatic invasive species problems through participatory science programs.

These programs provide Minnesotans with the tools and resources they need to support early detection and reporting of invasive species. Current programs include Starry Trek (for early detection of starry stonewort and other AIS), Spiny Surveillance (for early detection of spiny water flea), and Zebra Mussel Safari (to contribute to long-term zebra mussel datasets for research teams).

Research project:

AIS Detector program
z.umn.edu/ais-detectors

Conference Biographies

- Lab Tour
MAISRC staff **Tuhinur Arju** began her career at the International Centre for Diarrheal Disease Research, Bangladesh, working on immunity, maternal and child malnutrition, and molecular diagnostics. She also worked in COVID neuroimmunology and traumatic brain injury research at the University of Minnesota, as well as cardiometabolic disease research in the Physiology and Cell Biology Department at the University of Arkansas for Medical Sciences. Tuhinur's role will involve generating high-quality laboratory research data for the MAISRC Lab to Lakes project using polymerase chain reaction (PCR) in the eDNA lab. She received her MS in Zoology (Parasitology) from the University of Dhaka, Bangladesh. She is also passionate about gardening!
- Demo station **Christina Arroyo** is a conservation sciences Master's student in Dr. Jake Walsh's lab. She received her B.S. in Biological Sciences from Cornell University and has previously held aquatic ecology monitoring roles in the Long Island Sound, Cape Cod National Seashore, and NY's Lower Hudson Valley. Christina's current research focuses on monitoring and evaluating lake responses (e.g., changes in macrophyte communities, water quality, and zooplankton communities) to common carp management.
- MAISRC staff **Alex Bajcz** is a plant ecologist and environmental scientist by training; his past research has explored how and why plants reproduce as they do, how global change processes may disrupt that reproduction, and why invasives may experience enhanced reproductive success over their native peers. He strives to find actionable solutions to ecological problems like invasion and empower stakeholders to implement them. This goal led him to pursue computational and quantitative skills, which hold profound promise for guiding and shaping how these types of problems will be solved in the 21st Century and beyond. Alex's primary responsibilities include overseeing MAISRC's data collection, management, and dissemination efforts and consulting with MAISRC research fellows and stakeholders on quantitative matters.
- Demo station **Madison Bear** is the Invasive Species Program Manager for the Fond du Lac Reservation in Cloquet, MN. She has been working in invasive species management for nearly 9 years, both aquatic and terrestrial management, early detection, prevention, and education and outreach. The goal of the FDL invasive

species program is to restore native plant populations and protect culturally significant species.

Presenter **Naomi Blinick** is a MAISRC-affiliated researcher in multiple labs in the Fisheries, Wildlife, and Conservation Biology department at the University of Minnesota, with over 15 years of experience as a field biologist specializing in aquatic ecosystems. She holds a graduate degree in Conservation Sciences from the University of Minnesota, where, as a MAISRC graduate scholar, she investigated the impacts of invasive zebra mussels on food webs and mercury concentrations in Minnesota walleye lakes. Naomi completed her undergraduate studies in environmental and marine studies at Prescott College in Arizona, giving her a strong interdisciplinary foundation. Her current research with MAISRC continues to focus on zebra mussels and fish mercury, as well as aquatic revegetation post-treatment for aquatic invasive plants. Naomi is also an experienced scientific diver and photographer, and in her free time enjoys knitting, reading, and spending time outside with her dog, Burch.

Presenter **Valerie Brady** leads the Water Research Group at NRRI and is a senior aquatic ecologist. Her current research includes the use of aquatic invertebrates and fish as indicators for assessing the condition of stream and wetland ecosystems; investigating major determinants of invertebrate community structure in streams and wetlands; investigating the use of aquatic invertebrates as diagnostic indicators of particular causes of ecosystem impairment; and investigating impacts of aquatic invasive species on food webs and ecosystems.

Presenter **Chanlan Chun** is an environmental engineer and assistant professor at the University of Minnesota Duluth who is interested in studying the impacts of human activities on natural water system. Chun and her research team aim to understand chemical and microbial contaminants in natural (e.g. lakes, streams, and estuary) and built (e.g. sewer system, treatment facility and stormwater systems) environment and develop improved treatment technologies and mitigation strategies.

Presenter **Madeline Conowall** is a staff researcher in the Walsh Lab, where she primarily focuses on improving the management of invasive aquatic plant management data. She earned her B.S. in Fisheries, Wildlife, and Conservation Biology from the department in 2022 and returned in May 2025 for her current role. Prior to joining the Walsh Lab, Madeline worked on several research projects in Minnesota related to water quality, agricultural practices, and spatial modeling. She is passionate about integrating and repurposing existing data to expand

research capabilities. Outside of work, Madeline enjoys being active, cooking, seeing live music, and traveling to visit friends and family.

Presenter **Solomon David** is an assistant professor of aquatic ecology interested in fish biodiversity, conservation, and science communication. His current research in the Department of Fisheries, Wildlife, and Conservation Biology at the University of Minnesota focuses on the ecology and life history of ancient fishes (e.g. gars and bowfins), and how those species can help us better understand and conserve aquatic ecosystems. Additional projects involve conservation of non-game native fishes and peripheral populations of species. He also communicates science through traditional and social media to raise awareness of the value of aquatic ecosystems and freshwater biodiversity.

Presenter **Víctor H. Hernández Elizárraga** is interested in applying omic-based techniques to develop new research tools. He is particularly interested in aquatic organisms and their intricate biological processes. In his previous research, Victor studied the survival mechanisms of fire corals (*Millepora spp.*) using proteomic and transcriptomic approaches. Currently, he is working as a researcher at the University of Minnesota Innovation Lab (UMGC IL). Victor is testing RNAi techniques to alter the expression of essential genes in invasive zebra mussels to ultimately control zebra mussels (*Dreissena polymorpha*) with high specificity. Dr. Hernandez enjoys teamwork and collaboration, and one of his commitments is to pursue answers to scientific hypotheses.

Demo station **Mikael Elias** received his B.S. and M.S. degrees from Université de Lorraine (France) and his Ph.D. degree from Université Aix-Marseille (France). He joined the Weizmann Institute of Science as a Postdoctoral Fellow, where he worked as a Visiting Scientist and later as a Marie Curie Fellow. Since 2014, he has been an assistant professor at the University of Minnesota. His research lies at the interface of biology and chemistry. He studies the structure, function and evolution of proteins and enzymes, in particular. His scope of studies extends to microbiology with an emphasis on microbial chemical languages. With the Minnesota Aquatic Invasive Species Research Center, he is evaluating enzymatic coatings to suppress zebra mussel populations.

Lab Tour **Leland Feist** is a PhD candidate in the Smanski lab at the University of Minnesota, where he develops genetic biocontrol technologies to address the invasive common carp. His research focuses on technologies such as Engineered Genetic Incompatibility (EGI) and Sex Ratio Biasing, which aim to collapse established, reproducing populations of common carp by disrupting

reproductive processes. He also develops innovative techniques to improve the efficiency of producing genetically modified common carp, advancing the development of emerging genetic biocontrol technologies.

Presenter **John Fieberg** specializes in quantitative ecology and is interested in helping people make robust statistical inferences when confronted with a variety of messy data situations. Being a quantitative ecologist requires identifying and solving problems arising from the way data are collected in ecology and natural resource management fields. He recently completed a project with the Minnesota Aquatic Invasive Species Research Center focused on developing recommendations for underwater survey methods to estimate zebra mussel population abundance and distribution. He is leading a new project to develop a modeling framework for integrating professional and citizen-science data, leading to smarter surveillance and improved estimates of AIS distribution that account for imperfect detection and sampling biases. When not at work, he enjoys playing ultimate frisbee with his wife, watching his girls play hockey, playing guitar or bass with his son (a drummer), and traveling and camping with his family.

Lab Tour
MAISRC staff **John Gerritsen** is a lifelong resident of Minnesota who pursued his academic endeavors at Winona State. He gained professional experience as a laser technician before embarking on a career transition that led him to return to school at the University of Minnesota, where he successfully earned a degree in Fisheries, Wildlife, and Conservation Biology (FWCB). John currently serves as a lab assistant with the Minnesota Aquatic Invasive Species Research Center.

Presenter
Lab Tour **Daryl Gohl** is an Assistant Professor in the Department of Genetics, Cell Biology, and Development. His work focuses on developing new techniques for genomics-based measurements and genetic manipulation of complex biological systems. Daryl helped lead the team that sequenced the zebra mussel genome and is now working to use this genomic information to develop methods to genetically manipulate zebra mussels and to identify a genetic Achilles' heel that could aid biocontrol efforts. In addition to his academic work, Daryl is a co-founder of CoreBiome, Inc. (now Diversigen, Inc.) and Objective Biotechnology. A native of Central Minnesota, Daryl enjoys hiking, canoeing, and camping throughout the state with his family.

Presenter **Gretchen Hansen** is an associate professor in the Fisheries, Wildlife, and Conservation Biology Department at the University of Minnesota. Her research focuses on large scale drivers of change in freshwater ecosystems, including

climate, land use, and invasive species. She is especially interested in how local management and lake characteristics influence the resilience of fish populations and communities to regional and global change. Gretchen previously worked as a research scientist for state fisheries management agencies and is committing to conducting actionable science via collaboration with stakeholders and managers. To answer complex questions, she employs multiple approaches including statistical analyses of historical data, observational field studies, simulation modeling, and large-scale experimentation.

Lab Tour
MAISRC staff

Maddie Hayden holds the position of Research Outreach Specialist at MAISRC. In this role, Maddie functions as the crucial link between MAISRC's research endeavors and our valued stakeholders. She plays a pivotal role in facilitating the connection between individuals and groups interested in ongoing research, thereby contributing to the development of evidence-based strategies for managing local AIS challenges. Maddie offers vital support for outreach and research translation initiatives associated with our ongoing projects. Her extensive background and expertise in the field make her a valuable asset to our team. Prior to joining us, Maddie dedicated more than 12 years of her professional career to the study of freshwater mussels and river ecology.

Demo station

Amreen Hossain started her Ph.D. in Fall 2025. Before starting as a Ph.D. student, she earned her B.Sc. in Computer Science and Engineering from Brac University in Bangladesh. Her research interests include robot perception, sensor fusion, and human-robot interaction. In her free time, she enjoys creating digital art.

Demo station

Michelle Isaacson is an Extension Program Coordinator for the Minnesota Aquatic Invasive Species Research Center and University of Minnesota Extension. Michelle fosters the AIS Detectors volunteer community and its impacts by maintaining relationships, coordinating program logistics, delivering content during trainings, and enlisting and interacting with volunteers, professionals and community members to manage aquatic invasive species across Minnesota. With a B.A. in Environmental Studies and Psychology from Gustavus Adolphus College, she combines her education and work experiences to provide programmatic and volunteer support.

Presenter

Satoshi Ishii is an Associate Professor in the Department of Soil, Water, and Climate, as well as the BioTechnology Institute at the University of Minnesota – Twin Cities. His research aims to address environmental challenges by applying microbiology and biotechnology techniques. He has developed and

implemented high-throughput gene detection tools to identify and quantify pathogens, antibiotic resistance genes, and other target genes or organisms in soil and water samples. His research has informed strategies to protect public health and mitigate pathogen pollution in aquatic environments. Dr. Ishii applies this technology to the study of aquatic invasive species (AIS).

Demo station **Reed Jacobson** is a PhD Student in the Biochemistry, Molecular Biology, and Biophysics program at the University of Minnesota. He studies bacteria and their communication, bacterial biofilms, and antibiotic resistance in bacteria. His aim is to better understand the links between bacterial communication, biofilms, and biofouling organisms such as zebra mussels, as well as to develop better treatments for antibiotic resistant bacteria.

Lab Tour **Colby Johnson** is a PhD candidate in the Smanski and Phelps labs at the University of Minnesota. He is working to establish germ cell surrogacy between common carp and fathead minnows to quicken the development of common carp genetic biocontrol technologies. By working in a faster-maturing surrogate, common carp genetic biocontrol strains should be able to be brought to a field-ready state more rapidly. He is also working to characterize the hybrid between the common carp and the fathead minnow, referred to as the "marp".

Presenter
Demo station **Amy Kinsley** is an assistant professor in the Department of Veterinary Population Medicine at the University of Minnesota. Dr. She earned her DVM and doctorate in veterinary medicine from the University of Minnesota and specializes in aquatic epidemiology. Kinsley and her research team use network modeling, disease modeling, fieldwork and optimization techniques to understand how aquatic invasive species and infectious diseases spread in aquatic environments, and design effective and efficient prevention and mitigation strategies. With a passion for interdisciplinary collaboration, Dr. Kinsley leads research projects integrating disciplines such as epidemiology, ecology, social sciences, civil engineering and computer science while incorporating substantial stakeholder and community engagement to advance aquatic ecosystem health.

Presenter **Alexis Kreider** is a researcher in Dr. Dan Larkin's lab supporting the coordinated treatment and monitoring of invasive *Phragmites* in Minnesota's statewide control effort. In this program, she collaborates with professionals and stakeholders to bridge the gap between research and management. Additionally, she aids in research of ecological restoration following invasive

Phragmites management and teaches the University of Minnesota Extension's ecological restoration training programs.

Demo station **Jennifer Lamb** is a professor of biology at St. Cloud. Her scholarly work is focused on the ecology, natural history, behavior, and conservation of amphibians and reptiles. Her research group uses a variety of approaches, including genetic tools, to answer questions in these fields. Dr. Lamb's research has been published in several peer-reviewed publications.

Presenter **Jared Langer** is a master's student in Conservation Sciences at the University of Minnesota. He earned undergraduate degrees in Aquatic Biology and Environmental Studies from Bemidji State University. His background includes managing aquatic invasive species projects across Minnesota, focusing on ecological monitoring of lakes in the Twin Cities metro area. While completing his master's degree, Jared also works full-time as a Minnesota Sea Grant Science & Policy Fellow hosted by Anoka County, supporting environmental initiatives such as monarch butterfly conservation along highway rights-of-way, urban stormwater outreach, and efforts to reduce road salt use to help prevent chloride pollution in local surface and groundwater.

Presenter **Tom Langer** is a natural resource professional specializing in watershed management, shoreland protection, aquatic ecology, and environmental regulation. His work with the Carnelian-Marine-St. Croix Watershed District combines ecological monitoring and assessment with permitting, restoration, and policy development. He brings a practical, science-based approach to protecting water resources, working with landowners, local governments, and agency partners to translate technical information into effective conservation practices.

Lab Tour
MAISRC staff **Dan Larkin** specializes in aquatic and wetland plant management and restoration. His research addresses applied problems concerning how to reduce the spread and impacts of invasive plant species and support the recovery of impacted areas through ecological restoration and management. His work with MAISRC involves research and extension outreach on risk assessment, control, and post-treatment restoration of aquatic habitats impacted by Eurasian watermilfoil, curly-leaf pondweed, non-native *Phragmites*, starry stonewort, and other invasive plants.

Lab Tour **An Le** is a recent graduate from the University of Minnesota with a B.S. in Fisheries, Wildlife, and Conservation Biology. She is now a research technician

for the Larkin Lab. An has had experience in entomology, plant ecology, and aquatic ecology.

Presenter **Denver Link** is a research scientist working with Dr. Gretchen Hansen in the Fisheries, Wildlife, and Conservation Biology Department at the University of Minnesota. His research primarily focuses on the biological impacts of zebra mussel invasions, though he has experience studying various landscape stressors on aquatic ecosystems. Denver enjoys exploring the complex intersection of ecology, social science, and culture inherent in invasion biology. He leverages his quantitative and scientific expertise to provide valuable, accurate, and meaningful research to resource users and management agencies.

Presenter **Emily Lockling** is the Maajii-akii-gikenjigewin Program Coordinator, and aids in the completion of challenging and impactful conservation and service projects throughout the Fond du Lac Reservation and within the 1837, 1842, and 1854 ceded territories. Emily began her education in Environmental Science at Fond du Lac Tribal and Community College and continued in ESG and GIS at the University of Minnesota – Duluth. In her free time, she collects earrings and can usually be found reading.

Presenter **Jimmy Marty** has 11 years of experience as an environmental scientist specializing in wetland science, environmental due diligence, and natural resource surveys and monitoring. Combined with a research background in ecological restoration, he possesses a well-rounded skill set that contributes to a wide variety of projects, ranging from desktop-level reviews and analysis to expansive field efforts and site assessments.

MAISRC staff **Cori Mattke** is MAISRC's Associate Director. Cori's work centers on organizational operations and advancement, program development, grants administration, research support, and overseeing MAISRC's strategic communication and public engagement initiatives. Her professional experience is in the administration of environmental and conservation nonprofits, and she holds a degree in Environmental Studies from Northland College in Ashland, Wisconsin.

Presenter **Allen Mensinger** is a professor in the Swenson College of Science and Engineering at University of Minnesota Duluth. His research is focused on neural mechanisms of behavior. Specifically, how fish detect, integrate, and respond to external cues in the environment. He and his team have developed an

implantable electrode and telemetry system to record physiological signals from free swimming fish. He also has been investigating the potential of acoustic deterrents to be used against invasive bigheaded carp. Dr. Allen Mensinger and his lab are interested in how fish detect, integrate and respond to external cues. Their goal is to understand and exploit fish sensory systems to develop environmentally friendly and cost-effective deterrents to invasive fishes.

Lab Tour **Ben Minerich** has spent the last 15 years at public aquariums rearing jellyfish, coral, and native mussels. His research at the UMN focused on rearing zebra mussel larvae to facilitate new population control strategies such as gene manipulation. This project will expand algae rearing capabilities at MAISRC to provide food for zebra mussels at the facility and to examine what algal species and quantities meet their nutritional needs.

Demo station **Galia Modabbernia** holds a DVM and a PhD in Parasitology from the University of Tehran. Now based at the University of Minnesota, her research focuses on the dynamics of infectious diseases, including in amphibian populations. She applies modeling techniques to predict disease distribution and assess risks, aiming to develop effective disease monitoring and control strategies. Her work combines veterinary expertise and ecological knowledge to support conservation and disease prevention efforts.

Demo station **Ranjan Muthukrishnan**'s research focuses on the dynamics of major shifts in ecological communities, such as the impacts of biological invasions, and particularly in the context of anthropogenic influences on natural systems. He addresses these topics using a combination of observational studies, manipulative experiments, and theory development, synthesized through computational models. He also integrates natural science and social science methods in studying environmental decision-making with a particular focus on management of aquatic invasive plants in Midwestern lakes.

Presenter **Zach Nagel** earned his B.S. in environmental science from the University of Wisconsin - River Falls. He currently works for Prior Lake - Spring Lake Watershed District as their Field Operations Coordinator. In this role, he assists in a variety of different programs, one of which encompassing aquatic invasive species management.

Presenter **Liv Nyffeler** is a PhD student in the Phelps Lab at the University of Minnesota. Her research uses a structured decision-making (SDM) framework to develop a low-dose copper treatment plan to reduce zebra mussel populations in inland

lakes. She works closely with multiple agencies and governing bodies to build a management plan for Lake Riley in Eden Prairie, MN, while continuing to study how zebra mussels continue to alter freshwater food webs.

MAISRC staff **Ethan O'Brien** (he/him) is a communications and design professional with 15+ years of experience translating complex research into clear, compelling stories. As communications manager at MAISRC, he leads efforts that connect scientists, policymakers, and the public with MAISRC's research findings to protect Minnesota's waters. Ethan brings expertise in digital strategy, graphic design, and science communication.

Lab Tour **Lindsey O'Brien** is a member of the UMN Genomic Center Innovation Lab. She works on a variety of projects to help develop novel tools and technologies for genomics research. Her current area of research includes genetic biocontrol of zebra mussels, algal culture, and single-nuclei and single-cell preparation and sequencing. Outside of research, Lindsey enjoys reading sci-fi novels, running, and playing World of Warcraft.

Presenter **Melina Pakey-Rodriguez** is a master's student from the University of Minnesota and a scholar in the Minnesota Aquatic Invasive Species Research Center. She received her Bachelor of Science from Cornell University. Her research focuses on lake ecology and invasive aquatic plant management.

Presenter **Abha Panda** is a graduate student in the Larkin Lab pursuing a Ph.D. in Conservation Science. She received her B.S. in Environmental Studies from the University of Michigan and has previously held research and communications roles related to water resources and environmental justice. Abha's current research focuses on actively restoring native plants to lakes following invasive plant management to build more invader-resistant plant communities.

Presenter
MAISRC staff **Nick Phelps** is professor in and head of the Department of Fisheries, Wildlife and Conservation Biology, and the director of MAISRC. He studies emerging threats to aquatic systems at both the macro and microbial scales in the fields of fish health and aquatic invasive species, which lie at the intersection of animals, humans and the environment. His goal is to identify threats, understand risks, and ultimately develop long-term evidence-based management solutions to balance the needs of all relevant stakeholders.

Demo station **Amit Pradhananga** is a researcher and affiliate faculty at the Department of Forest Resources, Center for Changing Landscapes. His research centers on

investigating linkages between natural environments and human systems. He has applied qualitative and quantitative social science research methodologies to examine the human, social, and policy dimensions of natural resources in the context of water resource, forest, invasive species, and recreation resource management, as well as climate change adaptation. His research areas include: 1) social and psychological drivers of conservation behavior, and 2) diversity and inclusion in environmental planning and management. In the area of AIS management, he is interested in understanding public perceptions and values related to AIS and AIS management.

MAISRC staff

Thalya Reyes is MAISRC's Administrative & Communications Assistant. In this role, she supports organizational operations and administrative processes, collaborates on communications initiatives, and assists with program delivery. Thalya holds a degree in Environmental Studies with minors in Geography and Geographic Information Science from Rowan University. After serving two AmeriCorps terms, Thalya went on to earn a dual Master's in Public Policy and City & Regional Planning (MPP/MCRP) from the Bloustein School at Rutgers University- New Brunswick. Thalya's experience includes time working in environmental monitoring and education, policy and planning research, community GIS/mapping, Spanish translation and interpretation, and marketing and communications.

Presenter

Claire Rude is a research fellow at MN Sea Grant and is managing a field project to understand if and how mechanical removal of invasive cattails can restore fish and plant communities in nearshore lake ecosystems across Minnesota. Claire is studying her Master of Science in Fisheries Biology at Iowa State University. She received her Bachelor of Science in Fisheries, Wildlife and Conservation Biology and Environmental Sciences, Policy, and Management at the University of Minnesota Twin Cities.

Demo station

Junaed Sattar's primary research focus is on making robots work safely and intuitively with people, so humans and robots can coexist and collaborate. This means looking into improving a robot's perception about people, their intentions, and/or actions, engaging in dialog, as well as the environment. Perceiving the world robustly, particularly under changing and degraded conditions is an open challenge; this research interest extends into multi-modal sensory perception. Past research has been heavily influenced by making robots work with humans in unstructured environments, particularly underwater, and current and work involve field robots in the air, water, and outdoor, all-terrain platforms.

Presenter **Amy Schrank** is a fish ecologist studying how hybrid cattail affects fish communities in lake ecosystems. Her research also focuses on how human effects such as dams and increased water temperature affect movement patterns of stream fishes. In addition to research, she also collaborates with fisheries and aquaculture researchers and stakeholders around Minnesota to provide research support and a bridge to communicate technical information to stakeholders, managers, and the public.

Presenter **Amanda Schuermann** is a PhD student with an interest in aquatic invertebrates and invasive species. Her research is focused on understanding the impacts that the invasive zebra mussel has on the snails that cause swimmer's itch in northern Minnesota lakes.

Presenter **Michael Smanski** is an associate professor at the University of Minnesota in the Department of Biochemistry, Molecular Biology, and Biophysics and the BioTechnology Institute. Dr. Smanski received a B.S. degree in Biochemistry and Cell Biology from the University of California – San Diego and a Ph.D. in Microbiology from the University of Wisconsin. His current lab develops enabling technologies to engineer biology in ways that address challenges in medicine, agriculture, and the environment.

Presenter **Seth Stapleton** works as the Director of Conservation and Research for the Minnesota Zoo, where he supports conservation initiatives in Minnesota and the Upper Midwest targeting prairie butterflies, native and zebra mussels, wood turtles, bison and the expansion of the Motus wildlife tracking network in Minnesota, along with the Zoo's international efforts including community-based black rhino conservation in Namibia and chinchilla conservation in Chile. Prior to his tenure at the Zoo, Seth earned his PhD at the University of Minnesota studying polar bear population ecology and previously earned degrees from the College of William and Mary (BSc) and the University of Georgia (MSc). Seth is particularly passionate about marine turtles and, in his free time, manages a long-term study of the critically endangered hawksbill in Antigua, West Indies. He also serves as adjunct faculty at UMN in the Department of Fisheries, Wildlife and Conservation Biology.

Presenter **Kelsey Taylor** began working in invasive plant management in 2014 as a crew leader with the Conservation Corps in Minnesota and Iowa. She later served as an invasive species technician for the 1854 Treaty Authority. Taylor went on to spend eight years as Invasive Species Program Manager for the Fond du Lac

Band of Lake Superior Chippewa, where she developed, planned, implemented, and evaluated short- and long-term tribal conservation projects focused on invasive species, natural resource management, and environmental compliance. Her work spanned more than 10 million acres across three ceded territories.

Presenter **Molly Tilsen** is a University of Minnesota Water Resources Science master's student. Her graduate research leverages training in aquatic biology, modeling, and laboratory-based experiments to explore questions involving aquatic invasive species and human dimensions through data-driven, stakeholder-engaged research. Her undergraduate degree in Ecology, Evolution, and Behavior provides a strong background in ecosystem dynamics, statistical and mathematical techniques, and a passion for freshwater health and creative approaches to address today's challenges.

Presenter **Justin Townsend** has spent nearly two decades hand pulling and rearing weevils for Eurasian watermilfoil, helping with early stages of PI Charter, and exploring the latest in eDNA detection in more recent years. Having been involved with numerous state, local, academic, and private partnerships he has found that success is built on collaboration across many organizations. Currently he is the Director of the Ramsey Soil and Water Conservation Division and AIS Coordinator. He holds a M.S in Conservation Biology.

Presenter **Marissa Trombley** is a University of Minnesota Water Resources Science M.S. student advised by Dr. Chan Lan Chun at the Natural Resources Research Institute. Marissa's thesis work focuses on environmental DNA (eDNA) metabarcoding using MinION nanopore sequencing technology to detect invasive benthic macroinvertebrate species with the goal of developing an accurate and cost-effective workflow that can be used by natural resource managers for aquatic invasive species eDNA monitoring. Marissa's interests include interdisciplinary approaches to aquatic ecosystem management, aquatic ecosystem restoration, and non-invasive sampling methods for ecological monitoring.

Presenter **Amber Ulseth's** research centers on ecosystem and community ecology in freshwater environments. Because freshwater is one of society's most essential resources, she studies how human activities and invasive species disrupt natural processes within these systems. Her work focuses on understanding how streams, rivers, ponds, lakes, and wetlands transform, store, and export energy and nutrients, and how these ecosystems respond to disturbances - including

the impacts of invasive species. Through this research, she aims to improve the ability to predict and mitigate threats to freshwater ecosystems.

Presenter
Lab tour
MAISRC staff **Sarah Unruh** is the Lab to Lakes Project Manager with the Minnesota Aquatic Invasive Species Research Center. She has a passion for translating research into actionable science. They hold a PhD in biological science and a master's in library and information science, making her highly qualified to provide book recommendations.

Lab tour **Jack Vannurden** is a graduate scholar with MAISRC. They have lived in Minnesota their whole life and have grown to love its waters and aquatic inhabitants. He is passionate about fish as creatures and hopes to work in the field of fisheries management in the future. Jack is quite happy to have the opportunity to conduct research that relates so heavily to this passion and hope to transfer this experience to their future career endeavors.

Presenter **Jake Walsh** is an assistant professor in the Department of Fisheries, Wildlife, and Conservation Biology. His research focuses on quantifying connections between freshwater biological communities, ecosystem processes and services, and natural resources management. Jake is currently investigating interactions between aquatic plants, fishes, and their management at multiple scales in the Upper Midwest to more holistically manage these two communities.

Presenter **Lynn Waterhouse's** research focuses on stock assessment, population dynamics of fishes, and statistical methods - with the goal of analyzing and solving relevant, real-world problems. Research is done in both marine and freshwater systems. Simultaneously communicate and work on solutions with key stakeholders, especially through public outreach.

Demo station **Megan Weber** is an Extension Professor at the Minnesota Aquatic Invasive Species Research Center and University of Minnesota Extension. Megan's work focuses on the development and delivery of AIS education, volunteer, and citizen science programs that work towards solutions to aquatic invasive species problems. A native Minnesotan, Megan studied marine biology in California and received her B.S. from University of California Santa Cruz and her M.S. in environmental studies from San Jose State University.

Demo station **Rob Weiner** is a postdoctoral researcher and resident social scientist working in Dr. Ranjan Muthukrishnan's Integrated Ecology Lab at St. Olaf College. He received his Ph.D. in Science Communication and his M.S. in Natural Resources

Social Science, both from Purdue University. Broadly, Rob is interested in the ways in which scientists and the public understand and interact with one another. His current research focuses on the development of a decision support tool meant to help lake management stakeholders integrate more scientific information into their decisions about AIS management.

Presenter **Andrew Wood** has extensive experience using -omics approaches to investigate evolutionary and ecological questions across diverse study systems, including venomous marine snails, songbirds, and microbes. His recent work focuses on aquatic microbiology, using metagenomic data to better understand the factors driving cyanobacterial blooms in Lake Superior. Wood is particularly interested in how microscopic organisms can have large-scale impacts on ecosystems. He applies his expertise to understanding how microbes influence ecological processes and how they might be harnessed to address critical environmental challenges in Minnesota and around the world.

Glossary of Common Terms

Aerenchyma: Tissue filled with air spaces in stems and other plant parts that allows plants to draw air from above the waterline down into roots. This tissue, which is especially well developed in wetland plants, supports the respiratory demand of the roots and allows oxygen to leak into the surrounding soil.

Assay: A method for making an experimental measurement. In other words, an assay is a fancy term for a test. It is what we measure to determine whether some biological or molecular process has happened. The best assays are quantitative and can show more subtle differences in the process being studied.

Benthic: The benthic zone is the ecological region at the lowest level of a body of water such as an ocean, lake, or stream, including the sediment surface and some sub-surface layers.

Biocontrol: Biological control or “biocontrol” is a method for reducing populations of a pest or invasive species through intentional introduction of natural enemies, i.e., predation, parasitism, herbivory or other food web interactions that are detrimental to the target species.

Bulbils: A bulbil (also referred to as bulbel or bulblet) is a small, vegetative reproductive structure along the parent plant's stem or in place of a flower on an inflorescence. Bulbils give rise to young plants that are clones of the parent plant that produced them; they have identical genetic material. Bulbils are an important mode of regrowth and spread in starry stonewort.

Chara: *Chara* is a genus of green algae in the family Characeae (a group also referred to as “charophytes”). They are multicellular and superficially resemble land plants because of stem-like and leaf-like structures. They are found in freshwater, particularly in limestone areas throughout the northern temperate zone, where they grow submerged, attached to the bottom.

Challenge test: In the context of invasive species research, a challenge test is a procedure in which a target species is challenged by exposure to specified types and doses of pesticides in a highly controlled environment. By closely observing and assessing the efficacy of various treatments, scaled up control trials can be more effectively planned.

DNA sequencing: DNA sequencing is the process of determining the nucleic acid sequence – the order of nucleotides in DNA. It includes any method or technology that is used to determine the order of the four bases: adenine, guanine, cytosine, and thymine. The advent of rapid DNA sequencing methods has greatly accelerated biological and medical research and discovery

Eutrophic: Nutrient-enriched. Eutrophic lakes have an abundance of nutrients and minerals, some coming from external sources like farm run-off and some coming from internal sources like aquatic plant decay. Eutrophic lakes tend to have lower water clarity and support more plant and algae growth.

Fetch: the maximum length of open water that wind can travel over. Waves are formed by wind; therefore, the highest energy waves are going to form where there is a long expanse of unobstructed water and sustained high winds. In other words, the longer that wind blows over a greater expanse of open water, the greater the fetch and wave action will be.

Genotype: the genetic makeup of an organism or group of organisms with reference to a single trait, set of traits, or an entire complex of traits.

Growing degree days: Growing Degree Days (GDD) reflect cumulative conditions that support plant development and are used to estimate the growth and development of plants (and insects) during the growing season. The basic concept is that development will only occur if the temperature exceeds some minimum development threshold, or base temperature.

Hierarchical model: A hierarchical model is a model in which lower levels are sorted under a hierarchy of successively higher-level units.

Hypereutrophic: An extreme state of nutrient enrichment. Hypereutrophic lakes are frequently afflicted by nuisance or toxic algal blooms, low clarity, and low biodiversity.

Limnology: The scientific study of lakes and ponds, and the physical, biological, and chemical processes that drive them.

Littoral: Refers to the shallow, nearshore part of a lake where there is enough light to support plant growth.

Macroalgae: Multicellular aquatic plants that are easily observed by the unaided eye and whose “thallus” (plant body) is typically characterized by holdfasts for attachment.

A good example of this is filamentous algae that is common in lakes during late summer months.

Macrophyte: A macrophyte may be an emergent, submergent or floating type of an aquatic plant. Its ecological significance is to provide cover for fish and acts as substrate for aquatic invertebrates, as well as to produce oxygen and serve as food for some fish and other wildlife.

Mesocosm: A mesocosm is any outdoor experimental system that examines the natural environment under controlled conditions. In this way mesocosm studies provide a link between field surveys and highly controlled laboratory experiments.

Mesotrophic: A lake with an intermediate amount of nutrients and minerals; in-between eutrophic and oligotrophic

Nutrient loading: Nutrient load means the total amount of a nutrient such as nitrogen or phosphorus entering the water during a given time, such as "tons of nitrogen per year", or "pounds of phosphorus per day." Nutrients may enter the water from runoff, groundwater recharge, point source discharges, or the air (in the form of wet deposition such as rain or snow as well as dry deposition).

Oligotrophic: A lake that is low in nutrients and supports relatively limited plant growth and biodiversity. In Minnesota, most oligotrophic lakes are in the northern part of the state.

Pelagic: The pelagic zone is the open-water part of a lake away from shore and inclusive of deeper waters. Also called the limnetic zone.

Phytoplankton: The photosynthetic components of the plankton community and a key part of aquatic ecosystems because they form the base of the food web. Phytoplankton convert energy from the sun into nutrients and energy.

Plankton: Plankton are the diverse collection of small organisms found in water that are unable to propel themselves against a current. This is a general term that includes both plants (phytoplankton) and animals (zooplankton).

Resuspension: The action of placing cells or particles in suspension in a fluid again. Frequent and repeated resuspension of lake sediments lowers water clarity and can lower ecosystem health and functionality.

Sedimentation: Sedimentation is the deposition of sediments. It takes place when particles in suspension settle out of the fluid in which they are entrained and come to rest against a barrier.

Terrestrialization: In our context, this term refers to the way some plants (invasive hybrid cattails in our case) can convert a previously open water habitat to a more terrestrial habitat like a wetland or wet meadow. Terrestrialization can also refer to the evolutionary processes of aquatic organisms gradually evolving into land-based organisms.

Thermocline: A thermocline is a thin but distinct layer in a large body of fluid in which temperature changes more drastically with depth than it does in the layers above or below.

Trophic level: The trophic level of an organism is the position it occupies in a food web. A food chain is a succession of organisms that eat other organisms and may, in turn, be eaten themselves. The trophic level of an organism is the number of steps it is from the start of the chain. A food web starts at trophic level 1 with primary producers such as plants, can move to herbivores at level 2, carnivores at level 3 or higher, and typically finish with apex predators at level 4 or 5. The path along the chain can form either a one-way flow or a food "web". Ecological communities with higher biodiversity form more complex trophic paths.

Turbid: Turbidity is the measure of relative clarity of a liquid. The more turbid, the cloudier the water. It is an optical characteristic of water and is a measurement of the amount of light that is scattered by material in the water when a light is shined through the water sample. Material that causes water to be turbid include clay, silt, very tiny inorganic and organic matter, algae, dissolved colored organic compounds, and plankton and other microscopic organisms.

Zooplankton: Zooplankton are the animal components of the planktonic community. Plankton are aquatic organisms that are unable to swim effectively against currents and consequently drift or are carried along by currents in the ocean, or by currents in seas, lakes or rivers.

LAND ACKNOWLEDGEMENT

The University of Minnesota system has campuses that are located on the homelands of the Dakota and Anishinaabe peoples, and the eleven Tribal Nations of Minnesota. It is important to acknowledge the peoples on whose land we live, learn, and work as we seek to improve and strengthen our relations with our tribal nations. We also know that words are not enough. We must ensure that our institution provides support, resources, and programs that increase access to all aspects of higher education for our American Indian students, staff, faculty, and community members.

MAISRC is committed to coordinating and collaborating with Tribal Nations in Minnesota to address AIS issues. Our aim is to work with tribal staff and community members to develop strategies for AIS prevention and management that enhance both ecological and cultural resiliency.



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