

# Minnesota Aquatic Invasive Species Research Center

## Priorities for New Research-2015

### Based on 2015 Research Needs Assessment

The mission of the MAISRC is to use innovative science to find solutions to Minnesota's aquatic invasive species problems. It will do this by developing scientific expertise in a variety of disciplines so that new solutions can be devised and extant ones improved while educating management agencies and the public. In fulfilling its mission, the MAISRC brings together researchers from various disciplines—including civil engineering, veterinary medicine, public health, and ecology.

MAISRC researchers study the biology and ecology of invasive species that threaten Minnesota's aquatic ecosystems to identify key weaknesses in their life histories that can then be exploited for their prevention and control. MAISRC goals include development of new means to measure the presence of AIS; prevent and control AIS; and even in some cases to eradicate AIS. Additional goals are to disseminate new, useful scientific information on AIS that assists the MN DNR, watershed districts, lake associations, and citizen groups around the state with control strategies.

MAISRC was created in 2012 with initial funding for projects to advance Asian carp detection, prevention, control and eradication (6 projects); common carp detection and control (4 project); zebra mussel detection, prevention, and control (1 project); Eurasian water milfoil and curly leaf pondweed control (1 project); VHS surveillance (1 project); and 2 projects involving Extension education and outreach.

More research is clearly needed for MAISRC to fulfill its mission to find solutions to aquatic invasive species problems in Minnesota. In many cases, more diverse research on priority species is warranted. In determining its future research, the Center needs to be strategic about where and how best to have the greatest impact for Minnesota. To assist with this effort, MAISRC conducted a systematic needs assessment in 2014 and 2015 that included AIS managers, researchers, and the public, to identify and prioritize research related to aquatic invasive species impacting or likely to impact Minnesota.

Following are the high priority research needs that emerged from the process.

**The Center plans to seek researchers and funding in 2015 to address the research needs on this list; which and how many topics will become research projects depends on availability of funding.**

Note that because the realities of AIS are fast-changing, MAISRC will review this list of priorities annually and generally conduct a full assessment every two years. Changes to research priorities are likely to result from new or reduced AIS threats, funding secured for priority projects, and research advances.

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Not in priority order

#### **Control & management of priority species- creating and improving options**

- Determination of the critical densities of adults and veligers (larvae) needed to establish stable or growing populations of zebra/quagga mussels. Evaluations of the potential effectiveness of early stage treatment options (mechanical, chemical, biological) should be coupled to the population studies, through experiments and modeling
- Characterization of ecosystem impacts of aquatic invasive species, especially assessment of the potential for changes in food-webs to have long-term impacts on fish populations. Most needed is research on food-web consequences to game fish caused by the specific changes and abundance in phytoplankton communities in lakes relative to the extent of zebra mussel spread
- Improvements to herbicidal control of Eurasian water milfoil, including studies of efficacy and non-target risks of new active ingredients, studies of minimum effective dosing of currently used herbicides, and studies of treatment approaches that facilitate re-assembly of native submersed aquatic plants
- Assessment of the importance of reducing curly leaf pondweed propagules (seeds, turions) as a control approach
- Development of more effective control approaches for hybrid/narrow leaf cattail
- Development of a toxin-delivery system for common carp using existing toxicants (e.g., Antimycin), as a component of an integrated control strategy for this species
- Determination of factors affecting recruitment of common carp in shallow lakes
- Development of dynamic information systems to advance control and management options for lake managers (data repositories for adaptive management)

#### **Preventing establishment and spread of key AIS**

- Determination of the likelihood of spread of zebra/quagga mussels at different life stages and by different mechanisms (e.g., bait buckets, boaters, residual waters, docks, lifts, attachment to plants and animals). This study should include a statistical assessment of the reliability of boat inspections and other prevention practices and relate this to the total set of spread pathways

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- Development of carp (common, bighead, silver) barriers and deterrents for use in small waterways (ditches, streams, flowages between wetlands)
- Evaluation of human-assisted movement of bait and bait fish as an invasion pathway for AIS microbes and invertebrates (e.g., faucet snails)
- Development of rapid response approaches for aquatic invasive fish, invertebrates, and plants
- Development of dynamic information systems to enhance prevention efforts and effectiveness of boat and other inspection programs

### Risk assessment and early detection of new AIS threats

- Development of systematic, comprehensive surveillance/monitoring approaches for aquatic diseases of vertebrates, invertebrates, and plants in Minnesota
- Assessment of the likelihood that *Heterosporis sutherlandae* is causing population level effects on key host fish species. Characterization of *Heterosporis* life cycle and physiological/fitness impacts to fish hosts are a necessary part of this research
- Characterization of potential/probable pathways for the spread of high risk species to MN inland waters. Priority species for these studies include: killer shrimp, New Zealand mud snails
- Development of dynamic information systems to facilitate early detection efforts, including via citizen reporting, occurrence verification, and mapping, and treatment