# **APCRP: Improved understanding of invasion ecology and genetics to inform management strategies for hybrid watermilfoils**

### Capability

Difficulties in managing hybrid watermilfoils (Myriophyllum spicatum x Myriophyllum sibiricum) have generated concerns from aquatic plant managers and stakeholders across the northern tier of the United States (Figure 1). Recent genetic techniques have documented multiple new finds novel hybrid watermilfoil of genotypes. These findings have been associated with numerous anecdotal claims of management failures, presumably due to the increased presence of hybrid watermilfoils. Prior U.S. Engineer Research and Development Center (ERDC) research funded by the Minnesota Department



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Figure 1: Invasive hybrid watermilfoils are increasingly found along northern tier states from Washington to New York. There have been multiple anecdotal claims that these hybrid populations are more aggressive and more tolerant to traditional herbicide strategies. This research is focused on developing information to help managers select appropriate strategies for mitigation of these invasive hybrids.

of Natural Resources (DNR), the Wisconsin DNR, and the Aquatic Ecosystem Restoration Foundation documented greater tolerance of specific hybrid watermilfoil genotypes to aquatic herbicides (Glomski and Netherland 2010; LaRue et al. 2013; Berger et al. 2012; Berger et al. 2015). Such results suggest a complex picture whereby specific hybrid watermilfoil genotypes may express varying levels of herbicide tolerance or increased ecological fitness. An invasive hybrid that may be particularly ecologically fit or tolerant to herbicides (or both) would represent an increased threat for the spread of the hybrids to other water-bodies.

There has been little progress made in describing the invasion-ecology or comparative ecological fitness of hybrid genotypes. Preliminary lab studies suggest increased fitness by the hybrids, yet these trials have not been confirmed in mesocosms or in the field (Figure 2). Also, limited research exists to determine if genetic information can be used to predict invasiveness or tolerance to herbicides. It is unknown whether management is rapidly selecting for hybrids, or if certain hybrids have greater ecological fitness and therefore are destined to become the dominant genotype within a water body. Therefore, mechanisms by which hybrid watermilfoil genotypes might become more competitive or expand into new ranges requires additional research and focus. Results of the research will improve understanding of the ecological performance and susceptibility to herbicides of invasive hybrid watermilfoils and will be invaluable to public resource managers throughout the north. The abundant anecdotal claims on both the invasive nature and potential herbicides, and underlying genetic mechanisms research is performed. This research will provide the needed insight concerning invasive hybrid watermilfoil genotypes improving decisions and increasing waterway management capabilities.

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### Applications

The invasion ecology component of this research is being partially conducted via a Cooperative Ecosystem Studies Unit (CESU) project.

ERDC Projects funded via CRADA's with the Minnesota DNR and Aquatic Ecosystem Restoration Foundation have resulted in some early findings.

Determination of factors influencing the growth, spread, and herbicide response of select hybrid watermilfoil genotypes will provide information to improve selective control strategies.

#### Status

This research is being funded by the Aquatic Plant Control Research Control Program (APCRP). This work was initiated in FY16 and is scheduled to continue through FY19

#### **Documentation and References**

Berger S., M. Netherland, and G. MacDonald. 2015. Laboratory documentation of multiple-herbicide tolerance in a hybrid watermilfoil. *Weed Science*. 63(1): 235–242.

Berger, S. T., M. Netherland, and G MacDonald. 2012. Evaluating fluridone sensitivity of multiple hybrid and Eurasian watermilfoil accessions under mesocosm conditions. *Journal of Aquatic Plant Management*. 50:135–140.

Glomski, L. M. and M. D. Netherland. 2010. Response of Eurasian and hybrid watermilfoil to low use rates and extended exposures of 2,4-D and triclopyr. *Journal of Aquatic Plant Management*. 48:12–14.



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Figure 2: Field and mesocosm studies to determine factors that promote invasive hybrid watermilfoil growth and response to maangement are planned. Mesocosm trials can inform field studies, and information gleaned from the field can be used to ask better research questions at the mesocosm scale.

## **Article Sources and Contributors**

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