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Is the cure worse than the disease? Comparing the ecological effects of Eurasian watermilfoil and the herbicide treatments used to control it

The Wisconsin Department of Natural Resources conducts and supports a variety of projects that improve our understanding of aquatic invasive species (AIS) and the ways we manage them.

Background

Invasive species can harm native plant communities, but so can lake-wide herbicide treatments. While research suggests that both EWM and lake-wide herbicide treatment can have negative effects on native aquatic plants, it is important to understand how the effects compare so we can be sure our management actions do not do more harm than good. This study evaluated whether the negative ecological effect of lake-wide herbicide treatments used to control EWM exceeds the negative ecological effect of EWM itself.

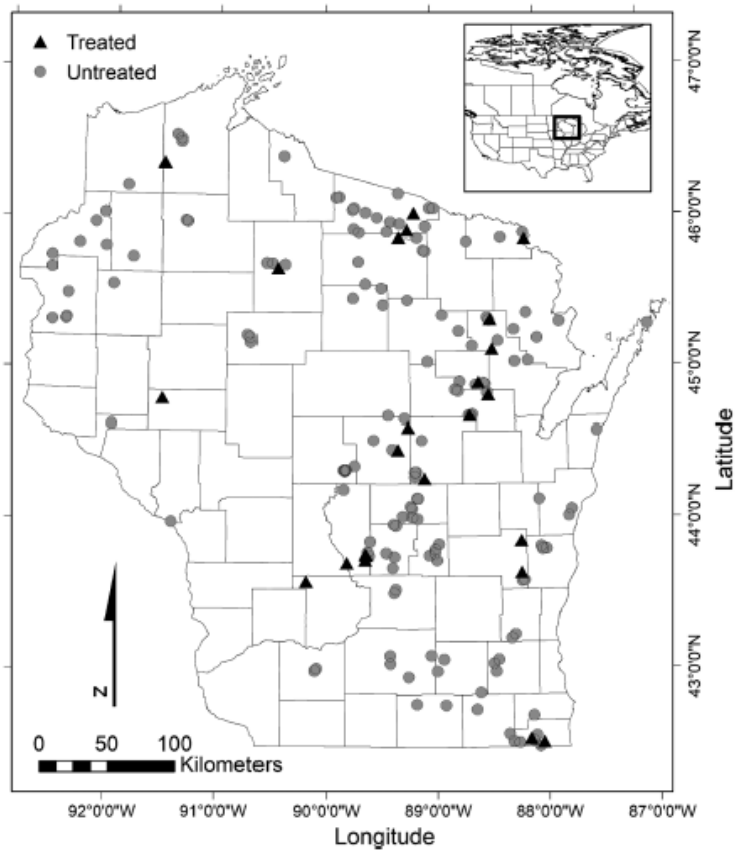

Figure 1. Map showing treated (n = 25) and untreated (n = 148) lakes.

Paul Skawinski

Eurasian Watermilfoil

The non-native aquatic plant Eurasian watermilfoil (*Myriophyllum spicatum*, EWM) has been documented in over 700 Wisconsin lakes and reservoirs. EWM can have economic, social, and ecological impacts that vary across waterbodies. EWM can pose a nuisance to recreation and outcompete native aquatic plant species in some waterbodies, while others are largely unaffected.

Research Methods

- Researchers analyzed data from aquatic plant surveys conducted on a subset of 173 Wisconsin lakes sampled between 2005 and 2012 (Fig. 1).
- Surveys employed a grid-based point-intercept sampling method, which is standard for assessing aquatic plant communities, to observe aquatic plant species presence throughout the lake.
- To evaluate the effect of lake-wide herbicide treatment on native aquatic plants, researchers explored how the aquatic plant community changed following treatment and compared those results to what they observed in untreated lakes.
- To compare the effect of EWM to that of lake-wide herbicide treatment, researchers analyzed native plant species abundance in response to each factor. Other influential variables, like water chemistry and clarity were taken into account.

Projects and outreach like these are funded in part by our AIS Research Fund. To learn more or donate, visit dnr.wisconsin.gov/topic/Lakes/SayYesToLakes

Summary of Results

- On average, native plant species declines were greater and more variable in lakes where lake-wide herbicide treatments occurred than they were in untreated EWM lakes (Fig. 2).
- Surprisingly, when EWM populations increased, other native plants increased too, or stayed the same. This doesn't mean that EWM is having a positive effect on all communities. It is more likely that EWM and native plant species are responding to favorable waterbody conditions together.
- While we don't see overwhelming evidence of EWM's negative ecological impacts on native aquatic plants, that doesn't mean they don't exist—it's just that they are not as frequent as we might assume. The species is commonly rare and rarely common, meaning EWM does not grow to high abundance in most of the waterbodies where it occurs. So, it isn't surprising that the impacts are not always large.

Integrated Pest Management (IPM)

IPM is a sustainable, science-based, decision-making process that combines monitoring, biological, cultural, physical and chemical tools to identify, manage and reduce risk from problematic aquatic plants and aquatic plant management tools in a way that minimizes overall environmental, health and economic risks.

As those that live on waters that have had AIS present in their waterbodies for decades know, AIS management is a long-term commitment. There is no magic bullet, and eradication is generally not an achievable goal. IPM is the best tool we have to guide long-term control while protecting and preserving the health of Wisconsin waters.

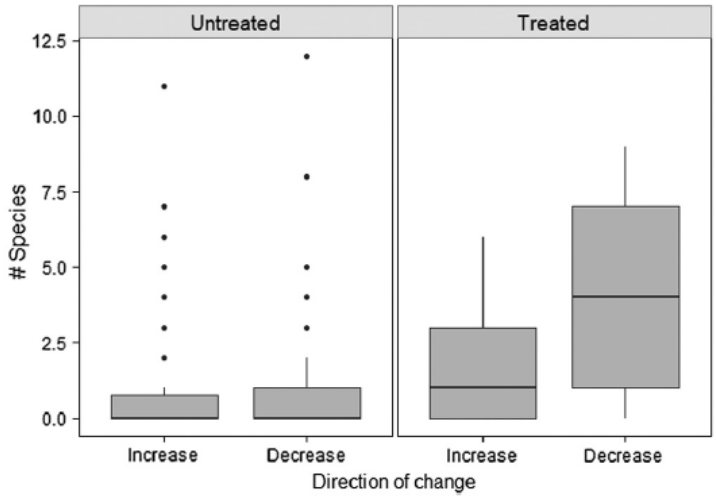

Figure 2. Number of aquatic plant species that increased or decreased between years in lakes that received a lake-wide herbicide treatment and those that did not.

Future Applications

Management decisions should always be made in careful consideration of the unique circumstances in which they occur. There is no one-size-fits-all management strategy. The decision to use lake-wide herbicide treatments will always depend on the ecological context and stakeholder goals. This study shows that unless there is strong evidence of high ecological, social, or economic impact for an invasive aquatic plant, chemical control at a lake-wide scale could do more harm than good. When lake-specific effects of the invasive species are clear, a lake-wide herbicide treatment may be an appropriate technique to consider as part of an integrated pest management (IPM) strategy. Development of an aquatic plant management plan can help assess all available management options and guide decision making.

Related Publications and Resources

Mikulyuk, A. et al. 2020. Is the cure worse than the disease? Comparing the ecological effects of an invasive aquatic plant and the herbicide treatments used to control it. FACETS 5(1):353-366.

Hansen, G.J.A. et al. 2013. Commonly rare and rarely common: comparing population abundance of invasive and native aquatic species. PLoS ONE 8(10):e77415.

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