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Eurasian watermilfoil: long-term trends in unmanaged populations

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

A wide variety of AIS, including aquatic plants, fish and invertebrates are "commonly rare and rarely common". This is true of Eurasian watermilfoil, which is found in many Wisconsin lakes at low abundances, and in only a small number of lakes at high abundance. Previous studies have also illustrated that many invasions have a peak, then a decline, and then an oscillation over time. Studying long-term trends in unmanaged populations of Eurasian watermilfoil helps to understand the environmental factors contributing to population dynamics and helps provide context when developing both local and statewide management plans for this species.

Research Methods

Recognizing the need for a long-term ecological data set on EWM populations, DNR water resources staff have collected lake wide aquatic plant data on 12 unmanaged lakes in three WI ecoregions from 2005-present (Fig 1). The purpose of this data collection is to better understand the roles that management, establishment time, and interannual variation have on EWM frequency of occurrence and abundance, and to provide managers and policy makers with science-based information.

Eurasian watermilfoil

The non-native aquatic plant Eurasian watermilfoil (*Myriophyllum spicatum*, EWM) has been documented in over 700 Wisconsin waterbodies. Impacts of EWM varies across waterbodies and can be economic, social, and/or ecological. EWM populations have been shown to be capable of creating recreational nuisances and outcompeting other plant species in certain waterbodies, while in other waterbodies these impacts are not strongly evident.

Photo Credit: Alison Fox, University of Florida, Bugwood.org

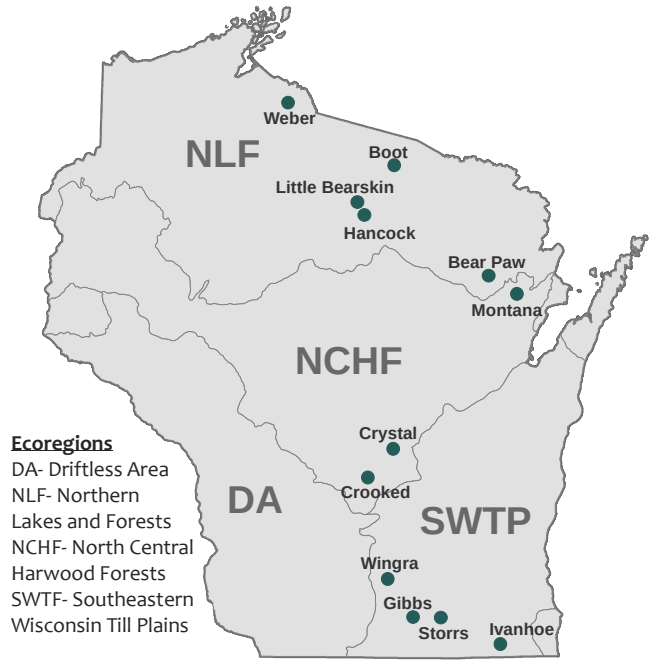

Figure 1. Map of unmanaged lakes and WI Level 3 ecoregions.

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

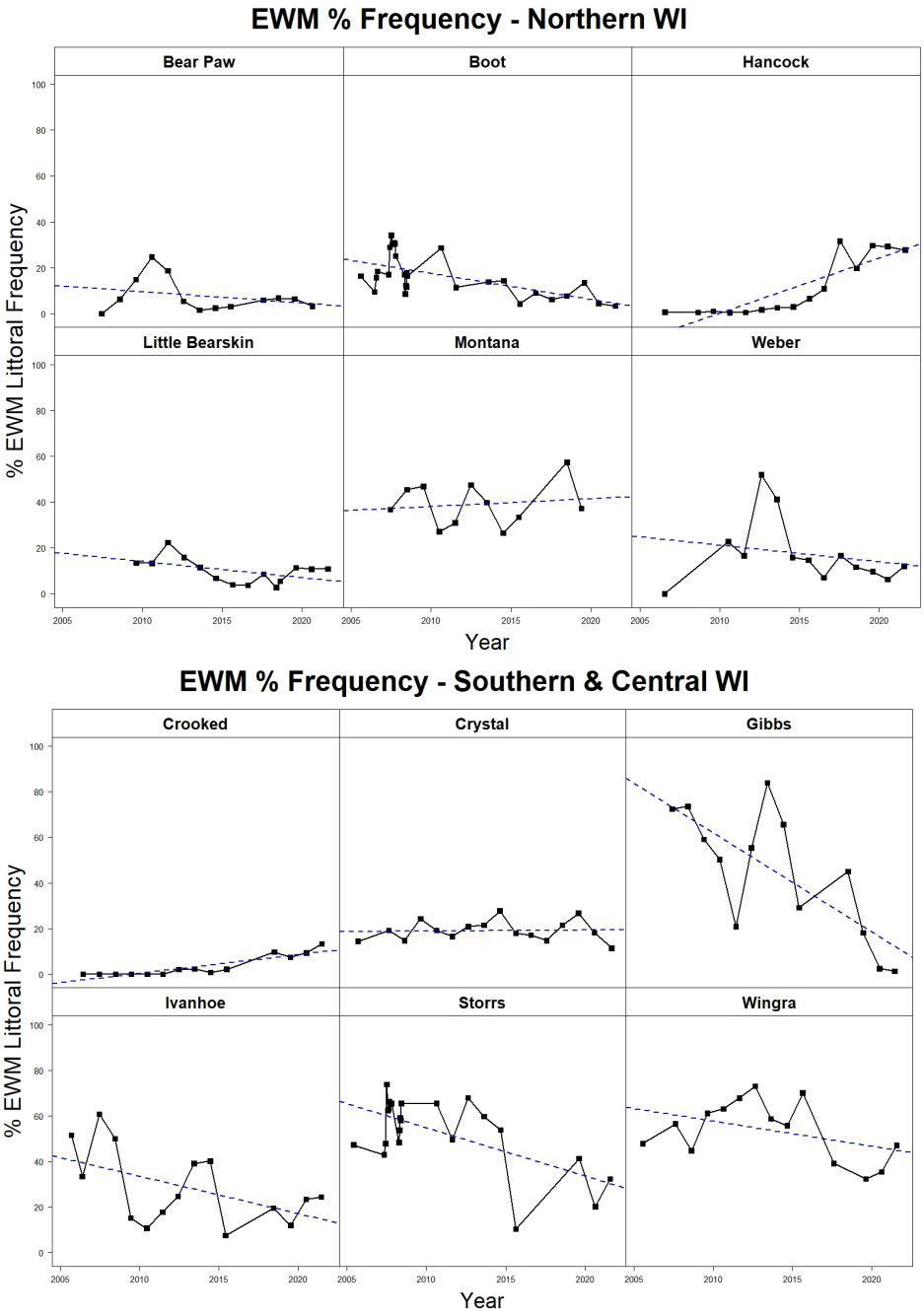

Figure 2. Percent littoral frequency of EWM in 12 unmanaged lakes from 2005-2021. The blue dashed line illustrates the directional trend in EWM frequency over time; 8 of the 12 study lakes have shown a declining trend in EWM over the study period.

Long-term Trend Findings

- EWM populations are often small in scale. Higher EWM abundances tend to occur in southern lakes, reservoirs, lakes with low water clarity, and drainage lakes.
- EWM isn't always associated with lower native plant species richness. A recent study found that lake wide herbicide treatments aimed at controlling EWM had a larger negative effect on native aquatic plants than the effects observed in lakes which did not actively manage EWM.
- EWM populations vary over time (Fig 2). Varying trajectories have been observed: decrease over time, increase over time, constant low level, and substantial year-to-year variation. This long-term dataset provides evidence that in certain lakes there may be environmental conditions that limit EWM's ability to spread.
- Even though EWM can exist at low levels in certain lakes for many years, random disruptive events (like floods or sudden nutrient pulses) can cause EWM to increase.

Future Applications

Results of this and other studies have informed the department's approach to managing EWM in the state. Data indicate that EWM populations in Wisconsin are complex and ongoing research will help us better understand the role that a lake's ecology contributes to EWM population dynamics.

Related publications and resources:

Kujawa, E.R., P. Frater, A. Mikulyuk, M. Barton, M.E. Nault, S. Van Egeren, and J. Hauxwell. 2017. Lessons from a decade of lake management: effects of herbicides on Eurasian watermilfoil and native plant communities. Ecosphere 8(4):e01718.

Nault, M. 2016. The science behind the "so-called" super weed. Wisconsin Natural Resources Magazine. Aug. 2016:10-12.

Mikulyuk 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 5:353–366.

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

Carpenter, S.R. 1980. The decline of *Myriophyllum spicatum* in a eutrophic Wisconsin lake. Canadian Journal of Botany 58(5):527-535.

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