


A bed of Eurasian watermilfoil found in Joanis Lake.

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The science behind the “so-called” super weed



EWM found in Porters Lake.

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RECENT STUDIES HELP TO UNDERSTAND THE EFFECTS OF EURASIAN WATERMILFOIL ON WISCONSIN LAKES.

Michelle Nault

In the early 1990s, Eurasian watermilfoil (EWM) was described in a report to the legislature: “A super weed capable of stopping a speeding boat [which] has a chokehold on Wisconsin lakes.” In order to better understand the impacts of EWM in Wisconsin, DNR staff compiled a decade’s worth of data collected on hundreds of waterbodies across the state. The results may surprise you, and challenge some commonly held beliefs about this invasive aquatic plant species.

Eurasian watermilfoil is still absent from many Wisconsin waterbodies

Eurasian watermilfoil is a submerged aquatic plant native to Europe, Asia and northern Africa. It was first reported in the United States in the 1940s and in Wisconsin in the 1960s. Like many other invasive species, the natural factors that keep EWM populations in balance in its native range are missing in Wisconsin. This means that EWM has the potential to cause changes to our native aquatic ecosystems, as well as cause navigational, recreational and aesthetic issues when occurring at high population densities.

Since its initial introduction, EWM has spread throughout the state primarily as an unintentional aquatic hitchhiker on recreational boats and trailers. It is now documented in approximately 650 Wisconsin inland lakes and flowages. Although this number of waterbodies with EWM may seem high, less than 5 percent of the nearly 15,000 lakes within the state have EWM. The majority of lakes with public access do not have EWM, especially in the northern portion of the state. From the perspective of how many lakes could be affected, versus how many currently have EWM,

resource managers are optimistic that the low percentage of Wisconsin lakes with EWM speaks to the success of our aquatic invasive species prevention and control programs.

Preliminary results from a multi-year statewide study looking at the rate of spread of aquatic invasive species indicate that the number of newly discovered EWM populations has stabilized, further suggesting that prevention programs are successfully minimizing the spread of EWM into new lakes.

Genetics makes a difference

Eurasian watermilfoil in one lake can be quite genetically different than that found in another lake, challenging any notion of a simplified management strategy.

Eurasian watermilfoil is distinguished from other aquatic plants in having whorls of four, feather-like leaves along the stem, with each individual leaf having 12 or more pairs of hair-like leaflets. Native watermilfoil species usually have similar whorls of feather-like leaves, but have fewer than 12 pairs of leaflets on each leaf.

Several genetic DNA studies have recently been done on watermilfoil populations across the United States and within Wisconsin. Researchers have

found that what we commonly refer to as “Eurasian watermilfoil,” is actually a diverse and highly complex group of plants with unique genetic lineages. To add to this complexity, the nonnative Eurasian watermilfoil can cross-pollinate and hybridize with native northern watermilfoil, creating a viable hybrid watermilfoil which tends to have similar characteristics between the two species.

Even lakes in close proximity to one another may have unique genetic strains of watermilfoil. While there is still a lot to learn about hybrid watermilfoils, preliminary studies indicate that certain hybrid strains may grow more aggressively and can be more resistant to commonly used herbicides.

To date, 144 waterbodies in Wisconsin have been genetically confirmed to have some lineage of hybrid watermilfoil present, with the majority of confirmations reported from the southern and eastern portion of the state. Further research is ongoing to better understand the ecology as well as management responses of this diverse array of nonnative watermilfoil genetic lineages.

Abundance varies

In lakes with Eurasian watermilfoil, the abundance of the plant varies from year to year and from lake to lake.

Although EWM was first discovered in Wisconsin in the 1960s, only recently has long-term quantitative data been collected and analyzed on how this species behaves under different environmental conditions and management scenarios. In order to better understand how the abundance of EWM in a lake changes over time, researchers spent the past decade monitoring a dozen Wisconsin lakes where EWM was not being actively managed on an annual basis. This research is part of a larger project looking at the effects of management strategies and time since initial discovery of EWM.

Researchers collected aquatic plant frequency data utilizing a standard point-intercept grid sampling methodology which allows data collected across a variety of lakes and over time to be compared. They found that following introduction of EWM, expansion of the species was variable and unpredictable. In some cases EWM expanded rapidly within the first few years after being introduced, but this was not always the case.

There were several lakes where even in the absence of any active management, EWM remained at constant low levels over the entire 10-year study pe-

riod. Other study lakes exhibited initial increases in percent of EWM frequency during the first few years after introduction, but then showed a natural decline over time. Still others reached a stable equilibrium population, with moderate year-to-year variation observed over the study period.

Even though EWM can exist at low or high levels in certain lakes for many years, annual environmental conditions and random disruptive events (such as floods or sudden nutrient pulses) may cause EWM frequencies to increase or decrease.

Many populations remain low

Of the lakes with Eurasian watermilfoil, the majority currently have populations at low frequencies, with relatively few lakes exhibiting very dense EWM growth.

Historically, once EWM was first reported in a waterbody, many lake users perceived the waterbody as “infested” or “diseased” and were fearful that the invasive plant would quickly “kill” the lake or make it unusable.

To look at the current frequency of EWM in waterbodies across the state, researchers compiled the most recent aquatic plant point-intercept data on 397 lakes and flowages with EWM populations. Analysis of this data found that the majority of lakes surveyed had very low frequencies (less than 10 percent) of EWM observed in the littoral zone (area of the lake where there is enough light for plants to grow).

This low frequency is below the level where most lake users would consider the plant to be a “nuisance.” Further examination of lakes with very low frequencies revealed that many of these waterbodies were being regularly monitored and following aquatic plant management plans to guide management actions and keep EWM populations low and from spreading to other areas of the lake.

However, other lakes observed with very low EWM populations had not undergone any active management at all, providing evidence that in certain lakes there may be environmental conditions that limit EWM’s ability to spread.

In contrast, relatively few lakes had EWM observed as a dominant plant species, which could likely cause recreational and ecological impairments. Examination of lakes with high EWM frequencies revealed that while some of these lakes were not being actively managed, there

were other lakes that were, indicating that whatever management techniques currently used on those particular lakes are likely ineffective at reducing EWM populations over the long term, and alternative management strategies should be explored.

In general, higher EWM populations tended to occur on reservoirs and flowages versus natural lakes, lakes in the south versus the north, and in lakes where EWM had been established longer versus newly established populations in lakes. This statewide data analysis illustrates that while EWM can undoubtedly become a dominant species capable of causing recreational and aesthetic nuisances in certain lakes, more often than not it does not exhibit these tendencies. Interestingly, this trend of nonnative species being “rarely common and commonly rare” has also been documented across many other invasive species, many for which control is not attempted.

Eradication may be unrealistic

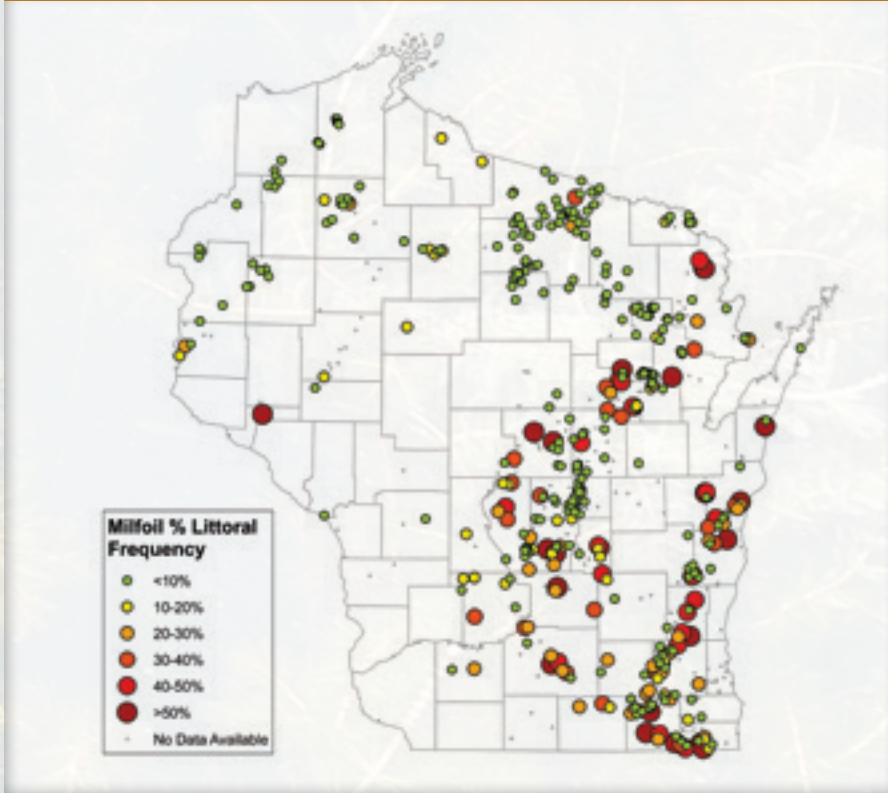
Unfortunately once EWM is introduced into a waterbody, complete eradication of the species is very often an unrealistic management goal. However, preliminary evidence indicates that early detection of an invasion greatly reduces the amount of time and effort spent on control over the long run.

Prior to implementing any management strategy, it is important to develop a lake-specific aquatic plant management plan that carefully considers all the various management options and tools available. In addition to quantifying the potential risk that EWM may pose to the waterbody, a good management plan will also gauge stakeholder support for the various control methods available.

It is important to identify a feasible management goal, such as a measurable percent reduction of EWM over time in order to achieve a low lakewide abundance no longer requiring intensive management actions. Reasonable management goals should be set after careful consideration of the most recent available science, as well as the costs and benefits of all available management options.

Successful management of EWM often requires a long-term commitment of both time and resources, and even the best designed and well-executed management plan will require follow-up monitoring to assess progress toward goals, as well as possible additional management actions.

EURASIAN WATERMILFOIL PRESENCE IN WISCONSIN'S LAKES



Control techniques

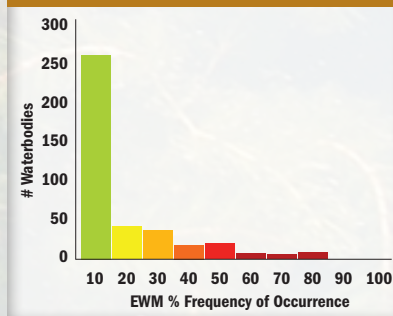
Effective control of Eurasian watermilfoil can be achieved through a variety of alternative techniques, in addition to more commonly utilized chemical herbicide applications.

There are a variety of management techniques available for EWM control, including pulling it by hand, diver-assisted suction harvesting (DASH), water level drawdowns, weevil (beetle) biocontrol, herbicide treatments and mechanical harvesting.

While lake organizations and managers in Wisconsin have primarily relied on herbicides, especially 2,4-D, in attempts to achieve EWM control, research on the efficacy and selectivity of these treatments has only recently been conducted at a statewide scale.

Studies found that effective control of EWM using small-scale spot type herbicide treatments (generally for less than 5 acres) was often difficult to achieve due to quick movement (dissipation) of the herbicide out of the treatment site and into surrounding waters. While larger-scale herbicide treatments may be more effective at achieving EWM control, nontarget impacts to certain native plants, uncertain long-term effects on other aquatic organisms such as fish and zooplankton, and water quality such

NUMBER OF WISCONSIN LAKES WITH PERCENT OF EWM ABUNDANCE



as increasing algae and decreasing water clarity, demonstrate the need for additional research, monitoring and field studies.

It is important to remember that each management technique has pros and cons, and the best overall management approach will integrate several of these techniques in order to achieve specific management goals. The use of several techniques together is often referred to as integrated pest management (IPM), and as science and management evolve together, integrated pest management is becoming a standard tool for EWM control. It is widely acknowledged that appropriate planning and implementation is essential to success, as manag-

ers need to balance the desired effects of the management on EWM, while also minimizing any unintended harm to native communities. It is important to note that many EWM management activities (including, but not limited to chemical treatments) require a DNR permit and approval prior to implementing; contact your regional DNR lakes biologist for additional information. Contact information can be found here: dnr.wi.gov/lakes/contacts/contacts.aspx?role=AP_MNGT.

You can help stop the spread of Eurasian watermilfoil!

Regardless of whether you live on a lake or just enjoy being on the water, Wisconsin's lakes and rivers are public resources, owned in common by all Wisconsin citizens under the state's Public Trust Doctrine. This means that we all need to do our collective part to help prevent the spread of EWM (and other aquatic invasive species), and keep Wisconsin's waters healthy for generations to come. To aid in these efforts, Wisconsin state law requires that before leaving a waterbody, all boaters and anglers:

- Inspect their boat, trailer and equipment.
- Remove any attached aquatic plants or animals.
- Drain all water from boats, motors and equipment.

There's more to do

We have learned a great deal about Eurasian watermilfoil ecology and management, but there are still many questions left to answer.

While EWM is still of management concern in certain lakes, it does not appear to be the "super weed" that many feared it would be. Data collected over the past decade 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, as well as how effective integrated management techniques control EWM over both the short and long term. The data collected on EWM populations over the past decade will help guide the development of statewide control strategies, and provide a baseline for future research questions.

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