A Brief Overview:
What Makes Watermilfoil So Invasive?

Jennifer L. Jermalowicz-Jones
Water Resources Director, Restorative Lake Sciences, LLC
Certified Professional Watershed Manager

The Problem: Watermilfoil Invasions

Lake managers throughout the United States and especially in Michigan, have been inundated with inquires on how to successfully control the growth of milfoils, which mostly includes Eurasian Watermilfoil (Myriophyllum spicatum), Hybrid Watermilfoil (Myriophyllum spicatum var. another species), and even native watermilfoils such as Northern Watermilfoil (Myriophyllum sibiricum) and Variable Watermilfoil (Myriophyllum heterophyllum). The latter species (Myriophyllum heterophyllum) is considered to be invasive by some scientists and was found to have significant negative impacts on waterfront property values in New Hampshire (Halstead et al., 2003). The relative invasiveness of each milfoil species varies among lakes, reservoirs, ponds, and rivers and depends upon a variety of environmental factors such as light availability, nutrient concentrations in the sediment and water column, existence of strong native aquatic plant communities to fight against infestations (resilience), and the presence of transfer vectors such as public boat launches and other means of introduction for the spread of the milfoil. However, the majority of exotic aquatic plants (such as milfoil) do not depend on high water column nutrients for growth, as they are well-adapted to using sunlight and minimal nutrients for successful growth. Additionally, milfoils easily colonize disturbed habitats (a pioneering species) which makes their relative abundance much higher than native aquatic plant species in many developed areas and especially in lakes with low biodiversity and neighborhood ponds. Furthermore, the degree of fragmentation varies among lakes and may actually be higher in calm waters since the fragments remain in the water column longer and are transferred to shorelines more readily in lakes with high wave activity.

Eurasian Watermilfoil: A Long-Time Nuisance

Eurasian Watermilfoil (Myriophyllum spicatum; Figures 1 and 2) is an exotic aquatic plant first documented in the United States in the 1880's (Reed 1997), although other reports (Couch and Nelson 1985) suggest it was first found in the 1940's. Eurasian Watermilfoil has since spread to thousands of inland lakes in various states through the use of boats and trailers that contain fragments, seeds, or entire plants; waterfowl that may unintentionally transfer seeds or fragments from an infested water body to another uninfected water body; seed dispersal by wind; and unintentional introduction from aquaria or water gardens (though this practice is rare). Eurasian Watermilfoil is a major threat to the ecological balance of an aquatic ecosystem through causation of significant declines in favorable native vegetation within lakes (Madsen et al. 1991), and may limit light from reaching many lower-growing native aquatic plant species (Newroth 1985; Aiken et al. 1979). Additionally, Eurasian Watermilfoil can alter the macroinvertebrate populations associated with particular native plants of certain structural architecture (Newroth 1985). The diversity of submersed aquatic macrophytes can greatly influence the diversity of macroinvertebrates associated with aquatic plants of different structural morphologies (Parsons and Matthews, 1995). Therefore, it is possible that declines in the biodiversity and abundance of various native submersed aquatic plant species and associated macroinvertebrates could negatively impact the fisheries of inland lakes.

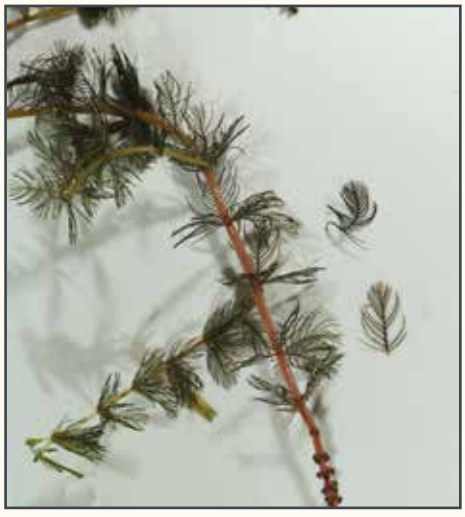

Figure 1. Eurasian Watermilfoil stem, leaves, and seeds.

Figure 2. Eurasian Watermilfoil canopy on an inland lake.

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Figure 3. Hybrid Watermilfoil stem, leaves, and seeds.

Hybrid Watermilfoil: Our Biggest Aquatic Plant Management Challenge Yet

When a species hybridizes, it undergoes a process of genetic combination where genes from each plant strain are transferred to the new plant generation. This transfer of genes allows for a robust plant that can withstand more adverse environmental conditions than the original species. This allows the newly hybridized species to rapidly colonize most habitats and quickly out-compete other native species and even the exotic Eurasian Watermilfoil. It is commonly known that hybrid vigor is likely due to increased ecological tolerances relative to parental genotypes (Anderson 1948), which would give hybrid watermilfoil a distinct advantage to earlier growth, faster growth rates, and increased robustness in harsh environmental conditions. In regards to impacts on native vegetation, hybrid watermilfoil possesses a faster growth rate than Eurasian watermilfoil or other plants and thus may effectively displace other vegetation (Les and Philbrick 1993; Vilá et al. 2000).

Hybrid watermilfoil is a serious problem in Michigan inland lakes (Figures 3 and 4). Moody and Les (2007) were among the first to determine a means of genotypic (genes) and phenotypic (appearance) identification of the hybrid watermilfoil variant and further warned of the potential difficulties in the management of hybrids relative to the parental genotypes. This threat has been realized through intense hybrid watermilfoil control efforts throughout the U.S.

Furthermore, the required dose of 2, 4-D or other systemic aquatic herbicides for successful control of the hybrid watermilfoil is likely to be higher since there is much more water volume at greater depths it can occupy and also due to the fact that hybrid milfoil has shown increased tolerance to traditionally used doses of systemic aquatic herbicides. There has been significant scientific debate in the aquatic plant management scientific community regarding the required doses for effective control of hybrid milfoil (Glomski and Netherland, 2010; Poovey et al., 2007). To some extent, we are left with a trial-and-error approach for controlling this new invasive as the race against time continues.

Figure 4. Hybrid Watermilfoil canopy on an inland lake.

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By Grant L. Jones

Personal Floatation Devices in MICHIGAN BOATING

Whether you operate your boat or PWC on an inland lake or on one of the Great Lakes, having the proper Personal Floatation Devices (PFDs) aboard can make all the difference. Besides being required under both State and Federal Law, lifejackets save lives. According to the U.S. Coast Guard, most boating fatalities occur from drowning with 75% of those deaths attributed to boaters not wearing a lifejacket.

The Handbook of Michigan Boating Laws and Responsibilities states that, "All vessels must be equipped with a personal floatation device for each person on board or being towed". The lifejackets must also be a U.S. Coast Guard approved Type I, II, or III personal floatation device, wearable, and of the proper size for the wearer. In addition to the above requirements, there must be at least one Type IV PFD aboard that is readily accessible. To be considered readily accessible all lifejackets need to be out of the original packaging and stowed where they are easy to retrieve in case of emergency. If the PFD is stowed in a cabin under a bunch of other gear there may be no time to get it out of storage and put it on should an emergency situation arise.

For Personal Water Craft (PWCs) Michigan law requires all persons on board or being towed to wear a PFD. PFD requirements are determined by age. All persons under age 12 must wear a Type I or Type II USCG-approved PFD, while all persons over 12 must wear a Type I, Type II, or Type III USCG-approved PFD.

The law regarding children and PFDs in Michigan recently changed and requires all children under the age of 6 to wear a Type I or Type II U.S. Coast Guard approved PFD while riding on the open deck of any vessel. Federal guidelines suggest that children under 12 years o f age wear a lifejacket while on deck.

Type I: Offshore Life Jacket

There are five types of lifejackets each with their own benefits and drawbacks. **Type I: Offshore Life Jackets** are designed for rough water or remote areas where rescue may take a while. The benefit of the Type I is that it provides the most amount of buoyancy for the wearer and will turn most unconscious wearers face up in the water. The Type I also has a built in head rest that will float the wearer's face out of the water. The drawbacks for the Type I are that it is bulky and not comfortable to wear for long amounts of time, and that they are more expensive than other types of lifejackets.

Type II: Near Shore Vests are similar in design to a Type I lifejacket but provide less buoyancy and will turn a wearer face up in the water. The Type II also sports a head cushion to float a wearer's head above the water. Type II PFDs are probably the most common type of life jacket, and are relatively inexpensive. The main drawback to the Type II PFD is that they are uncomfortable to wear for a long period of time.

Type II: Near Shore Vest

Type III: Floation Aid

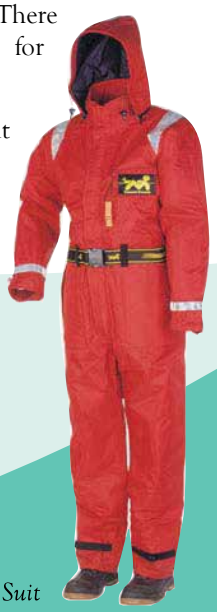
Type III: Floatation Aids are becoming more popular and have a wide variety of styles and colors to choose from including inflatable PFDs. The benefits of the Type III are that they are more comfortable for longer wear, they are generally less expensive than the Type I, and have the style choices that are not available in a Type I or Type II. The inflatable Type III Floatation Aids do tend to be more expensive and require maintenance that the more traditional styles do not. However, they will often provide more buoyancy when inflated than a Type I and less bulk than a jacket style Type III making it more comfortable to wear for long periods of time. The main drawback is that a Type III will generally not turn an unconscious wearer face up, and they are more expensive than a Type II.

Type IV: Throwable Devices are just that–a throwable PFD. They include both ring buoys and foam boat cushions. The benefits of the Type IV are that they can be thrown to a person in distress. A good idea is to tie a line to the buoy before throwing to a distressed victim to help pull them to the boat or retrieve the buoy and throw it again if you don't get it to the distressed person on the first try.

Type IV Boat Cushion & Ring Buoy

The final style of PFD is the **Type V: Special-Use Device**, these include commercial work vests, deck suits, and some designed for special activities like kayaking and wind surfing. The benefits of the Type V are that some provide hypothermia protection, and some provide excellent freedom of movement. There drawbacks are that they are only permitted for certain uses and can be expensive.

In conclusion the PFD is the most important piece of safety gear on your boat and the lifejacket needs to be worn to be effective. Which is the best PFD for you? The best answer is the one that you will wear.



Type V: Deck Suit

Grant Jones is the Division 31 Grand Haven, Staff Officer of Public Affairs and a Vessel Examiner in Training with the U. S. Coast Guard Auxiliary.