Aquatic Plant Control: Things to Consider

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Many lake communities are faced with problems related to invasive aquatic plants, and questions often arise about what direction to take to control invasive species. Common questions include: What species should be targeted? What method(s) should be used? How will control measures impact the lake? How will the project be financed? There is a lot to consider. This article covers some of these basic questions and provides an overview of common plant control methods.

Before You Begin

Before embarking on a plant control program, there are several things that should be considered. First, it is important to realize that aquatic plants are an essential part of lakes. Plants in lakes produce oxygen during photosynthesis, help stabilize shoreline and bottom sediments, and provide habitat and cover for fish and other organisms. There are several types of aquatic plants including emergent, floating-leaved, submersed, and free-floating. Each of these plant types provides important ecological functions. Most aquatic plants are beneficial.

Second, excessive removal of aquatic plants can have negative consequences. For example, broad-spectrum herbicide treatments can result in algae blooms and reduced water clarity which, in turn, can be detrimental to the fishery. Maintaining a diversity of beneficial plants is as important as controlling nuisance and exotic species.

Third, not all lakes were created equal. Some lakes will naturally support abundant vegetation while, in other lakes, vegetation is relatively sparse. Different lakes may afford different recreational opportunities. A lake that naturally supports abundant vegetation may also support a prime fishery, and may not be suited for high-speed boating and water skiing. Many lakes support a variety of uses; however, portions of the lake may be better suited for fishing and more passive recreational uses such as fishing or kayaking. Aquatic plants should not be managed with only one use in mind. Rather, one must strike a reasonable balance between desired lake uses, while preserving the functional value of aquatic plants.

Finally, the distribution and abundance of aquatic plants are dependent on several variables including light penetration, bottom type, temperature, water depth, and the availability of plant nutrients. If conditions are favorable, plants will grow. How you manage your lake shoreland can have a profound impact on plant growth in the lake.

Exotic Plant Species

An exotic species is one that is found outside of its natural range. Outside their natural range, many exotic aquatic plants have no natural competitors or predators to help keep them in check. Exotic aquatic plants often have aggressive and invasive growth tendencies. They can quickly outcompete native plants and gain dominance.

Exotic plant species that are currently a threat to Michigan lakes include Eurasian milfoil (*Myriophyllum spicatum*), starry stonewort (*Nitellopsis obtusa*), hydrilla (*Hydrilla verticillata*), and phragmites (*Phragmites australis*). Eurasian milfoil, starry stonewort, and hydrilla are submersed species, meaning that they grow underwater, and phragmites is an emergent plant that grows along the water's edge.


Eurasian milfoil (*Myriophyllum spicatum*)


Curly-leaf pondweed (*Potamogeton crispus*)


Starry stonewort (*Nitellopsis obtusa*)


Phragmites (*Phragmites australis*)

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Depending on the plant, dispersion can be by fragments, seeds, tubers or through over-wintering buds called turions. For example, Eurasian milfoil was first introduced to the United States in the 1940's and spread rapidly by "vegetative propagation" whereby fragments of the plant break off, take root, and grow into new plants. Eurasian milfoil forms a thick canopy at the lake surface that can degrade fish habitat and seriously hinder recreational activity.

Once introduced into a lake, Eurasian milfoil often out-competes and displaces more desirable plants. Starry stonewort, hydrilla, and phragmites also spread quickly and crowd out native plants.

What Can Be Done to Control Exotic Aquatic Plants?

Prevention is the first defense in exotic species control. However, once an exotic plant has colonized a lake, an "early detection and rapid response approach" is the most effective method to control the spread of the plant. What approach works best in a given situation is dependent on several variables. On a small- scale basis such as individual properties, many approaches can be used. For example, weed rollers, bottom barriers, and suction dredging can effectively prevent or control small-scale infestations of exotic plants, but may not be practical on a large scale due to costs and other considerations. For larger areas, control measures commonly considered include herbicide treatments, mechanical harvesting, and, on some lakes, biological control.

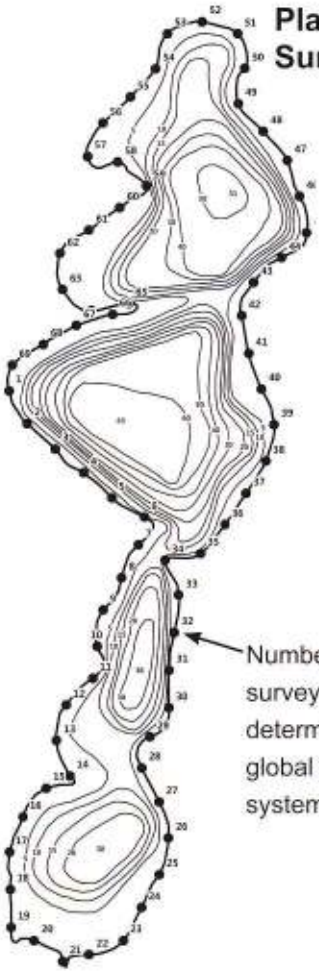
With exotic species, an ounce of prevention is worth a pound of cure!

Many exotic plants are transported on boats and boat trailers. If you trailer your boat from lake to lake, you should wash your boat and trailer before re-launching. This is a simple measure that can have big benefits.

Early Detection and Rapid Response

Monitoring

Monitoring is key to early detection and essential to planning, implementing, and evaluating plant control measures. The Michigan Department of Environmental Quality's (MDEQ) Procedures for Aquatic Plant Surveys provides guidance for conducting surveys. With the MDEQ procedures, assessment sites are established around the perimeter of the lake and the type and relative abundance of plants species within the lake is determined around the entire shoreline. These days, plant surveys are often conducted with a global positioning system that allows the specific location of aquatic plants to be documented. Mapping and monitoring data are used to evaluate the scope of control needed, and to communicate and coordinate with the plant control contractor.



Herbicide Treatments

Herbicides are commonly used to control invasive exotic plants. In Michigan, a permit is required from MDEQ to apply herbicides to lakes. The permit lists the herbicides that are approved for use, respective dose rates, use restrictions, and indicates specific areas of the lake where treatments are allowed. In an attempt to balance recreation use and environmental impacts, MDEQ will generally limit the treatment of native plants to 100 feet of frontage per property out to the 5-foot depth contour or 300 feet from shore, whichever comes first.

Herbicide application

Herbicides must be registered and approved by the Environmental Protection Agency (EPA). There are currently more than 300 herbicides registered with the EPA. Of those, only about a dozen are approved for use in the aquatic environment. In addition to Michigan's permitting system, federal regulations were recently adopted that require herbicide applicators to acquire a pesticide general permit and to prepare and submit a pesticide discharge management plan.

There are two basic types of herbicides: systemics and contacts. Systemic herbicides are taken up by the plant and translocate to the root system which helps to provide season-long control. With systemic herbicides, it generally takes several weeks for plant impacts to become apparent. Contact herbicides only affect the portion of the plant that comes into contact with the herbicide. Plants usually die-back within a week of treatment, but some plants like Eurasian milfoil may grow back later in the season since the roots remain intact.

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Unlike systemic herbicides that are somewhat selective, contact herbicides can impact a broad spectrum of plant species, but timing and rate of application can be used to minimize non-target impacts. Deciding which herbicide to use in a particular situation will depend on the plant(s) being targeted, potential impacts to non-target species, costs, use restrictions, and other factors. In general, herbicide treatments should target nuisance exotic species such as Eurasian milfoil and have minimal impacts on most native plant species.

Mechanical Harvesting

Mechanical harvesting involves cutting and removing vegetation from the lake. Harvested plants are off-loaded with a conveyor and disposed in an upland location. Harvesting has the advantage of removing biomass and can help slow the rate at which plant material accumulates on the lake bottom. One potential disadvantage of harvesting is that all vegetation in the path of the harvester is impacted; it is often not possible to selectively remove one plant over another. When harvesting in shallow waters, harvesters have limited operational flexibility and can agitate bottom sediment and temporarily increase turbidity. In some lakes, finding a place to launch harvesting equipment and to off-load plants can be a challenge. Attempts to control certain plant types by harvesting alone may not prove entirely effective. This is especially true with Eurasian milfoil due to the fact that this plant may proliferate and spread via vegetative propagation (small pieces break off, take root, and grow) if the plant is cut.

Mechanical harvesting

Biological Controls

The milfoil weevil (*Euhrychiopsis lecontei*) is an aquatic insect that is native to North America and appears to be common in the Midwest.The weevil has been found to feed almost exclusively on milfoil species, especially Eurasian milfoil. Researchers have documented declines in Eurasian milfoil populations as the result of weevil feeding. These declines have been attributed largely to the burrowing and tunneling action of weevil larvae that cause the milfoil plant to lose buoyancy and fall from the water column. In addition, weevil burrowing can reduce the plant's ability to translocate nutrients and carbohydrates which can further reduce milfoil's competitive edge and ability to regrow the next spring. Stem fragments damaged by weevils have reduced viability and ability to produce new roots. Weevil burrowing may also increase the susceptibility of milfoil to infection by pathogens.

Milfoil weevil

In a comprehensive review of research on biological control of Eurasian milfoil, Dr. Ray Newman of the University of Minnesota summarized his research findings as follows:

The milfoil weevil...can be effective...if adequate densities can persist through the summer and among years. However, many of the sites investigated have failed to sustain sufficient herbivore [weevil] density to effect control. We currently cannot predict when and where herbivore populations will reach sufficient densities nor when or where declines and suppression will occur. Both adequate agent [weevil] densities and proper plant response are required for predictable control...Further identification and prioritization of factors limiting herbivore populations is needed and methods to ameliorate these limiting factors must be developed before biological control of milfoil can be reliably applied on a large scale.

Additional research and data are needed to evaluate the full potential of weevil stocking as a long-term Eurasian milfoil control technique. As with herbicide treatments, repeated stocking of weevils will likely be required to effect control.

Integrated Control

Integrated control involves using a combination of control measures. For example, many lakes use a combination of herbicide treatments and mechanical harvesting. Herbicide treatments are performed early in the growing season to control Eurasian milfoil (that can fragment and spread if cut) and harvesting is conducted later in the season to control growth of other nuisance plants. In some lakes, weevils are stocked in certain areas and herbicides are applied in others.

The Bottom Line

Aquatic plant control is an ongoing challenge, and an early detection and rapid response approach is often critical to controlling the spread of invasive aquatic plants. Annual monitoring to detect infestations of invasive aquatic plants is essential to planning, executing, and evaluating control measures.

Many plant control programs in Michigan are organized at the local level by concerned lake residents and local governmental units. Under Michigan law, special assessment districts can be established to finance programs to control the spread of exotic aquatic plants.

The approach or combination of approaches that work best in a particular lake depend on local conditions and the expectations of lake residents. Once an exotic plant has been introduced in a lake, complete eradication is unlikely and a sustained effort is often required to ensure control.