

EURASIAN WATER- MILFOIL

Best Management Practices for Lake
Associations

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Best management practices for lake associations and
shoreline owners in Mississippi Valley



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1.0 Introduction

Invasive species are now often considered one of the greatest threats to biodiversity, particularly in isolated freshwater systems (Vander Zanden & Olden, 2008). Any aquatic invasive species has the capacity to outcompete native species for resources, and in turn can disrupt established habitat and food sources for other native aquatic species.

It is not just biodiversity being threatened by invasive aquatic species like Eurasian water-milfoil, but also the general health of our local lakes. Dense aquatic species like milfoil can also interrupt recreational activities, such as boating, kayaking, or swimming. Not only does that impact locals enjoyment of our natural systems, but it can have an economic impact as well. The Mississippi watershed is lucky to be home to numerous lakes and waterways, which provide immense benefits to all who live here. Aiding in the management of Eurasian water-milfoil can help keep these lakes beautiful and enjoyable, for all inhabitants.

While Eurasian water-milfoil can be managed, and further spread can be prevented, it should be noted that there have been almost no cases of complete eradication once the plant has taken hold, due to its ability to regrow off of a single fragment. However, steps should be taken to help slow/stop the spread, especially to unaffected lakes.

1.1 Identification

There is more than one species of milfoil in this region, which can make identifying Eurasian water-milfoil difficult. These other species include the native Northern water-milfoil, as well as 5 other native milfoils, which should *not* be removed as they have benefits to our native lake species. The other species found in Ontario waterways is a Hybrid water-milfoil, which is a hybrid of the native and invasive milfoil species (Ontario Invasive Plant Council, 2021). The Hybrid species should also be removed; however, it is considered to be even more difficult to eradicate than the non-hybrid Eurasian variety

	Northern water-milfoil	Eurasian water-milfoil	Hybrid Milfoil
Photo			
Stems	Leafy with sparse branches Green stem tips	Leafy with many branches Reddish stem tips	Leafy with a lot of branches Colour may vary
Leaves	4-5 whorls	3-6 whorls	4-5 whorls

	Feather-like Less than 11 divisions	Feather-like 12-20 divisions	Feather-like Varying number of divisions
Flowers	Pink Small flowers Flowers in July/August	Pink or white Larger flowers Flowers in July/August	Can look like either parent plant Flowers frequently
Winter Buds	Formed near the end of growing season Egg shaped	Does not form	May or may not form

1.2 Known Distribution in MVCA’s Watershed

An international public database called EDDMapS relies on citizen reporting to track the spread of invading species. Any reported sighting is confirmed by trained verifiers before being finalized in the database. Using the data on this website, the below table has been put together to reflect the known and reported incidents of Eurasian Milfoil in larger lakes within the MVCA watershed. It is important to stress that this table only reflects the reported and confirmed sightings of milfoil. Therefore, this table is meant as a guide *only* and is not to be taken as confirmation that these species do not exist in your lake. As there are several other invasive aquatic plants within Mississippi Valley Conservation Authority’s watershed, their distribution is also outlined below (table 1).

	Eurasian Milfoil	European Frog-Bit	Flowering Rush	Phragmites	Purple Loosestrife
Bennett/Fagan					
Big Gull					
Buckshot					
Canonto Lake					
Clayton/Taylor					
Crotch					
Dalhousie					
Grindstone					
Kashwakamak					
Malcolm/Ardoch					
Mazinaw					
Mississagagon					
Mississippi					
Mosque					
Palmerston					

Patterson					
Robertson					
Shabomeka					
Sharbot					
Shawenegog					
Silver					
Sunday					

There are a few other species of concern that have not been found in our watershed, but have been found nearby and therefore should also be noted. These species include Curly Leave Pondweed, Water Chestnut, Water Lettuce, Water Soldier, and Yellow Iris (EDDMapS, 2023).

2.0 Scope

After confirming that your lake does in fact have Eurasian or Hybrid milfoil, it is important to determine how much spread has occurred. This will help inform what management technique, if any, will work best for the lake. If the population is small enough, the best method of control may simply be the prevention of further spread. There are several ways that a Lake Association can determine the scope of the issue, as laid out below.

Method	Advantages	Disadvantages
Drone Footage	<ul style="list-style-type: none"> Allows for a “birds eye view” Can help determine full spread Videos can help with monitoring success of removals 	<ul style="list-style-type: none"> Requires trained users Can be expensive Can be time consuming Some areas may have drone bans
Citizen Reporting Tools (EDDmapS, iNaturalist)	<ul style="list-style-type: none"> Anyone can use Trained staff can verify species, lowering the risk of false ID 	<ul style="list-style-type: none"> Some areas can easily get missed, especially if they are inaccessible May not know how to use these tools
Local Users	<ul style="list-style-type: none"> Many locals have used the lake for years and can easily spot new outbreaks Private landowners can determine instances on their own property Landowners/locals may be more motivated to identify 	<ul style="list-style-type: none"> May not be educated on proper identification May be uninterested

	Can be combined with reporting tools	
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3.0 Integrated Pest Management (IPM)

Once the scope of the infestation has been determined, the next step is to decide on the best management plan. Regardless of what removal type, if any, is determined to be the best for your lake, Integrated Pest Management (IPM) should always be practiced in order to get the best results. IPM is an environmentally sensitive approach that aims to incorporate prevention and education into removal strategies (EPA, 2022). This approach focuses both on removal and prevention, often resulting in higher success rates and overall higher cost saving.

3.1 Outreach/Education

As part of an IPM approach, it is extremely important to educate those who live around and/or enjoy your lake. There are several ways this can be done, and for several different purposes. There is no “one size fits all” approach to outreach education, but the below aims to provide some ideas on how to educate on different topics. Some of the things you may wish to include in your education and outreach plans include, but are not limited to:

1. Identification
2. Prevention (Clean, Drain, Dry)
3. Reporting Avenues (EDDmaps, iNaturalist)
4. Removal Best Management Practices (BMPs)

There are multiple ways to provide this information, both to your lake association and to the general public. You may wish to use social media to provide information to lake users. Awareness/identification sessions can be provided to your Lake Association during Annual General Meetings, or you may wish to hold outreach events that involve removal training. MVCA is always happy to help with these events.

You may also receive signage from Canadian Council on Invasive Species (image 1), which can be displayed in popular boating areas.



Image 1. Clean, Drain, Dry sign example. Retrieved from: [Clean Drain Dry - Canadian Council on Invasive Species \(canadainvasives.ca\)](http://canadainvasives.ca)

3.2 Restoration

Another important part of deploying IPM is adding a restorative element. This will help slow or prevent the return of the Eurasian Milfoil. The area can be replanted with native plants, particularly when using benthic barriers- the native plants can actually be ingrained into the mat.

If this is not possible or desirable, there are other ways to aid in reducing milfoil growth. An increase in phosphorus in a lake has been shown to increase aquatic plant growth. While lakes go through natural changes in phosphorus levels, human activity can certainly impact these levels. Easy ways to lower the amount of phosphorus in a lake include:

- use less fertilizers.
- ensure cleaning products and detergents are phosphorus free
- follow septic guidelines and have them tested regularly.
- add more native vegetation along shorelines.

Adding vegetation can help in more ways than one, as it absorbs phosphorus and prevents bank erosion- the number one cause of phosphorus increases in lakes (USGS, 2018). MVCA offers shoreline plantings through their Shoreline Naturalization Program, which provides both financial and technical assistance to landowners looking to plant along waterways.

4.0 Best Removal Practices

Once the location and density of the milfoil has been established, lake associations or individuals may decide to pursue removals in addition to their education and outreach efforts. There are several known methods of milfoil removal, with varying benefits, drawbacks, costs, and rates of success. The method most suitable for removal may differ from lake to lake, from season to season, or even from section to section. It is once again important to state that there are almost no cases of complete eradication of milfoil, but removals can assist in controlling outbreaks and aid in slowing spread.

Regardless of method chosen, there are some important notes to remember around removal:

- No in-water work can be completed before June 15th, as it can interrupt fish spawning season
- Removal should not take place past September, as milfoil becomes brittle and breaks off too easily
- Focus on boat launch/popular boating areas if resources are limited, or on outlier populations
- Ensure all permits and rules set out by the province are followed
- Safety first- always work in pairs while doing in-water work

4.1 Hand Pulling

Permit:

- does not require a permit, *if* all [rules](#) laid out by the province of Ontario are followed

Cost Estimate: low, especially if using volunteers

BMPs/Considerations:

- a minimum of one person in the water pulling/raking, while at least one other is in a boat/on a dock to watch for and catch fragments
- use a large net to catch any fragments
- always keep the plant in front of you so you can see if any fragmentation occurs
- wrap the plant around your hand or around the rake to lower the chances of fragmentation
- ensure care is taken when pulling the root- if too much sediment is disturbed from the lake bed, it will be difficult to see and will increase fragmentation
- best done on cloudy days, for visual purposes

Best For:

- smaller sites
- sites closer to shore/in shallow areas, unless scuba divers are working
- outlying populations

4.2 Barrier Mats

Permit:

- requires a permit from MNRF

Cost Estimate: mid, depending on materials used

BMPs/Considerations:

- hold down with rebar, or use a mat heavy enough to remain at the bottom
- care should be taken to only use in areas that have a high percentage of milfoil coverage, as to not disturb native species
- should encompass entire population- otherwise it is likely that populations nearby will once again takeover once mat is removed
- native plants can be added to biodegradable benthic mats, which will lower the risk of milfoil repopulation

Best For:

- small, dense populations

4.3 Mechanical Harvesting

Permit:

- requires a permit from MNRF

Cost Estimate: mid to high

BMPS/Considerations:

- non-selective method that can indirectly impact native species
- machinery can cause fragmentation, so measures should be taken to collect fragments immediately

Best For:

- larger infestation areas
- around boat launches/docks

4.4 DASH

Permit:

- requires a permit from MNRF

Cost Estimate: mid to high

BMPS/Considerations

- requires a diver
- should not be used directly on the sediment- instead, use the suction to transport the hand-pulled milfoil to the surface without risking fragmentation
- BMPs for hand-pulling apply when the diver is hand pulling the plant
- At least one person should be monitoring the plant transport to ensure no fragments end up in the water
- needs to be repeated several times
- can result in milfoil returning faster due to the nutrient release (can also trigger an algae bloom) if suction is used directly on the lake bed

Best for:

- smaller populations
- deep water

4.5 Biological Intervention

Permit:

- unknown

Costs: high

BMPS/Considerations:

- mixed results from lakes using this method
- must augment levels as natural levels of milfoil weevils are not high enough to impact milfoil

Best For:

- when no other options are available

4.6 Disposal

Once the Watermilfoil has been successfully removed, it is important to take the proper steps to dispose of it. Leaving it out or even putting it directly in the trash/compost can result in more growth, as it can make its way back into the watershed. Removed Watermilfoil should be tied in black garbage bags and

left in the sun for 7-10 days, far away from the high water-mark. After that, the garbage bags may be taken to the landfill (Ontario Invasive Plants, 2021).

4.7 Monitoring

It is important to continue to monitor the spread and recurrence of Eurasian water-milfoil. This can be done via drone footage or via in-person investigation, but regardless it is important to determine whether or not control methods have been impactful.

5.0 Additional Resources

5.1 Potential Grant Avenues

[Invasive Species Centre](#): Offer microgrants and other smaller grant opportunities for removal/education

[Species at Risk Stewardship Program](#): Only eligible if lake has documented species at risk

[Community Conservation Action Program](#): For community-based conservation actions

[FEF Grant](#) TD Projects that focus on involving and educating public, which can be part of an IPM

[Funding Guidelines and Eligibility - RBC](#) For technology-based solutions to environmental issues

5.2 Additional Information

[Eurasian water milfoil - ontario.ca](#)

[Eurasian-Water-Milfoil \(ontarioinvasiveplants.ca\)](#)

6.0 Acknowledgments/References

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