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CURLY-LEAF PONDWEED

What is curly-leaf pondweed?

Photo: Paul Skawinski

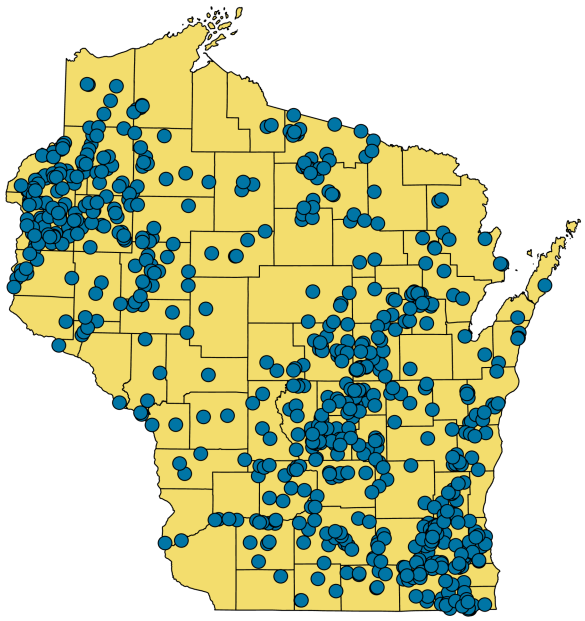
Curly-leaf pondweed (*Potamogeton crispus*) is a submersed aquatic plant native to Eurasia, Africa, and Australia. It was first verified in North America in the 1840s and quickly spread throughout the Northeast and Great Lakes regions into the early 1900s. It is hypothesized that accidental introduction of curly-leaf pondweed during fish stocking activities contributed to the species' initial spread across North America. The first verified report of curly-leaf pondweed in Wisconsin was from Lake Wingra, Dane Co. in 1906. Curly-leaf pondweed has submersed alternate leaves that are typically ½ - 3 ½ inches long and ¼ - ½ inch wide. The leaves are wavy, like lasagna noodles, and have a distinctly serrated edge. Young plants may have more flattened leaves but will still have visible serration along the leaf edge.

Curly-leaf pondweed turion Photo: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Curly-leaf pondweed typically reproduces via small (½ - 1 inch), hard turions (i.e., vegetative propagules), which are generally formed in late spring-early summer. The plant typically dies back soon after turion formation, and the turions remain dormant in the sediment during the remainder of the summer and early fall. When water temperatures begin to cool, the turions begin to germinate (i.e., start growing). While a small number of turions may germinate in the fall (and survive under the ice during the winter), the majority of the turions will germinate the following spring. Curly-leaf grows rapidly once water temperatures reach 50°F (10°C).

Where is it found?

Curly-leaf pondweed is found in the Great Lakes, the Mississippi River, approximately 700 inland lakes, and numerous creeks and rivers in almost every county in Wisconsin. However, curly-leaf pondweed often evades detection due to its unique life cycle. It is tolerant of low light levels and temperatures, and it can thrive in a wide variety of habitats but tends to prefer eutrophic (i.e., nutrient-rich) waterbodies.



Wisconsin inland lakes with verified curly-leaf pondweed populations as of 2022

How does it spread?

Curly-leaf pondweed fragments and turions can move between waterbodies by hitchhiking on boats, trailers, and other recreational equipment. A laboratory experiment found that turions exposed to air for 2 weeks can survive and remain viable. Turions are also able to spread through passive water flow and waterfowl dispersal. Curly-leaf pondweed seed viability in natural waterbodies is typically very low.

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What are the impacts of curly-leaf pondweed?

In some waterbodies, curly-leaf pondweed can form large mats that can impede recreational activities, like fishing, boating, and swimming. The effect of curly-leaf pondweed on native plants is not conclusive; some studies indicate it can outcompete native plants since its tolerance of cold temperatures allows it to start growing earlier in the year than most native species, although other research has shown that curly-leaf pondweed may not always directly compete with native species for resources because the midsummer die-off removes it from competition with native plants. The midsummer die-off of curly-leaf pondweed releases phosphorus into the water column as it decomposes, which can potentially cause an algae bloom in some lakes. The algae then decompose and use up oxygen, which can possibly lead to a dissolved oxygen crash. However, the impacts from the curly-leaf pondweed die-off on water quality and phosphorus load (i.e., the amount of phosphorus entering a lake) are highly variable depending on the lake's watershed, nutrient composition and depth. Since curly-leaf pondweed tends to grow more abundantly within high-nutrient systems, many of the negative impacts attributed to the midsummer die-off may occur naturally within a lake even if curly-leaf pondweed were absent.

Curly-leaf pondweed can also provide benefits to the ecosystem. In highly degraded or otherwise turbid sites where other plants are unable to survive, curly-leaf pondweed may provide important ecosystem services (e.g., food, habitat, spawning substrate) for native animals that would otherwise be unavailable.

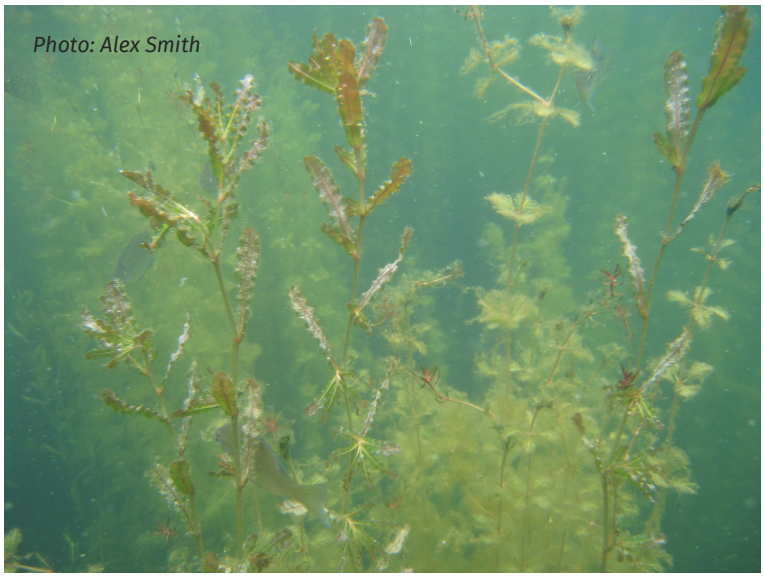
Photo: Alex Smith

What can be done to manage it?

Implementing simple aquatic invasive species prevention steps can reduce impacts from invasive species even when other management options are unavailable. Curly-leaf pondweed management is very challenging due to its unique life cycle. Turions can remain viable for several years and are formed in the late spring-early summer, which means management aimed at reducing the number of curly-leaf pondweed plants over time must be conducted in the limited timeframe between when plants are actively growing, but before turion formation occurs to deplete the number of viable turions in lake sediments over time. Many lakes in Wisconsin have had curly-leaf pondweed present for decades and have not seen it grow to nuisance levels, so active management of this species is not recommended in many cases. If curly-leaf pondweed is causing a recreational or navigational impediment, it can be mitigated by using management strategies commonly utilized for other nuisance causing plants (e.g., mechanical harvesting of navigation lanes and other high-use areas).


Photo: Paul Skawinski

Chemical management requires multiple years of early season applications to deplete the turion bank, which is expensive and has not been successful at achieving eradication or at maintaining control over the long-term. For example, a lake in northwestern Wisconsin attempted to achieve long-term control of curly-leaf pondweed through five contiguous years of whole-lake chemical treatments. Although the plant and turion frequency decreased during treatment years, curly-leaf pondweed was never completely eradicated and increased substantially during the year that treatments ceased. Whole-lake chemical treatments were then conducted for eight additional years, and as of 2023, they have spent nearly $600,000 on herbicide costs alone and have still not achieved eradication of curly-leaf pondweed. Chemical applications can also cause phosphorus release into the water column as the plants die back. Chemical management conducted in early spring when plant biomass is low and water temperatures are cool may help in minimizing nutrient release.

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Endothall is the most commonly used herbicide for controlling curly-leaf pondweed. However, several beneficial native plant species, including many native pondweeds, are also susceptible to endothall. While small-scale chemical treatments are often proposed as a method for controlling curly-leaf pondweed, they are not recommended for endothall because the chemical dissipates too quickly away from targeted treatment areas to be effective at controlling curly-leaf pondweed. The manufacturer of endothall has recommended that endothall treatments be greater than 5 acres for effective curly-leaf pondweed control. Small-scale endothall treatments may be appropriate if chemical dissipation off-site is significantly reduced (e.g., by using a limno-barrier curtain to contain the herbicide within the target area). Small-scale treatments using an herbicide with a shorter contact time (e.g., diquat) may also be able to provide temporary nuisance relief, and may be appropriate to consider in some treatment scenarios. Larger-scale endothall treatments can be more effective at maintaining desired target concentrations and increase the likelihood of achieving curly-leaf pondweed control but have also been documented to have negative impacts to the native plant community.

Although mechanical harvesting will not eradicate curly-leaf pondweed, it can be helpful in mitigating recreational and navigational impairments for a single season. Harvesting will also remove plant biomass from the waterbody, which removes the phosphorus stored in the plants from the lake system; however, this will only be impactful if curly-leaf pondweed has been shown to be a major contributor to the lake's phosphorus load. Mechanical harvesting of aquatic plants can also potentially impact non-target native plants and result in incidental removal of fish and other aquatic organisms. Dense curly-leaf pondweed growth is oftentimes a symptom of a high-nutrient lake system rather than a cause of nutrient loading itself, so reducing a lake's phosphorus load may also be helpful in alleviating curly-leaf pondweed abundance.

How can I help prevent the spread of curly-leaf pondweed?

All recreational users of a lake should make sure that their boat and equipment are free of any plant fragments and turions before travelling between waterbodies. The Clean Boats, Clean Waters program provides an opportunity for lake groups concerned about curly-leaf pondweed spread to educate recreational users about prevention methods; learn more about the program and how you can get involved here.

The Healthy Lakes & Rivers program provides information on best practices for improving water quality that lakeshore property owners can implement in their backyards, as well as funding assistance for lake organizations and local governments to implement the practices on a larger scale. Learn more about the program here.

Reporting invasive species is important in containing their spread. You can find instructions for reporting an invasive species finding to the Wisconsin Department of Natural Resources here.

Photo: Travel Wisconsin