



Lake Waramaug
Task Force, Inc.

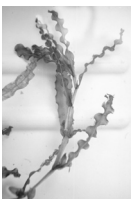
Special Report

Curlyleaf Pondweed

INVASIVE PLANT DISCOVERED IN LAKE WARAMAUG!

The Lake Waramaug Task Force has identified curlyleaf pondweed, an invasive aquatic plant in Lake Waramaug.

This *Special Report* tells you about this plant, the problem it poses and what we propose to do about it.



Curlyleaf, as pictured above, is a member of the large family of pondweeds, some of which are native plants. This invasive plant is identifiable by its alternate, undulating and minutely toothed leaves. The body of this plant remains underwater but a short flower bearing stem rises above the water surface.

If allowed to grow unchecked this plant will develop into dense mats of plant matter that die off in mid summer. The decaying plants wash onto shorelines or sink into the lake decaying and releasing phosphorous that feeds algae growth.

What Happened

We found curlyleaf at 14 sites along the State Park shore and north shore of the lake. Most of the sites had few plants – one plant at three sites and less than ten at 7 others. There were approximately 25 plants at one site and 100 plants at two other sites. However we found approximately 200 plants at two sites – at the State Park shoreline and in the cove on the east side of Arrow Point and North Shore Road.

This pattern of distribution indicates curlyleaf entered the lake from a North shore location and not from the Washington boat launch in New Preston where boats entering the lake are checked for plants prior to gaining access to the water.

We were fortunate to detect curlyleaf early in its infestation because unlike other aquatic plants it dies off and disappears usually by early July. Curlyleaf’s unique life cycle is its competitive advantage over other native and invasive plants. This cold tolerant plant begins to grow in the fall, budding out and growing slowly during the winter under the ice. Yes. Believe it or not this exceptionally hardy plant can grow during the winter months! It grows in earnest in the very early spring before almost all other plants – this is its competitive advantage. Then it dies off by mid-summer! This pattern, unless you are specifically looking for it in the spring makes it very difficult to spot a beginning infestation.

Our Goal

Our goal must be to eradicate this plant. If it grows unchecked it will spread forming curlyleaf dense mats near the surface along the lake shoreline. These large beds of plants die off in mid summer creating rafts of dead plant material that either pile up on the shore or sink into the lake and increase phosphorous concentrations that feed algae growth.

Our chief aquatic science advisors from Aquatic Control Technology, Inc. (ACT) feel this plant can be eradicated if we mount an aggressive and sustained effort. Fortunately in comparison to other common aquatic plants in Connecticut such as milfoil, hydrilla, and fanwort, curlyleaf pondweed is one of the more easily controlled submersed aquatic nuisance species.

Unlike most other invasives, curlyleaf is largely an annual plant that reportedly does not propagate through vegetative fragmentation. It propagates by seed (called “turions”) and ACT tells us that by attacking this plant early in the spring before its seeds develop we can reduce and over several years potentially eradicate this non-native highly-invasive plant.

LAKE WARAMAUG CURLYLEAF PONDWEED CONTROL AND ERADICATION PROGRAM

The Task Force's invasive control program established in 2000 has six elements: detection, delineation, quarantine, assessment, implementation and monitoring. With assistance from ACT scientists the Task Force has prepared the following report on the progress we have made to date and our plan of control and eradication of curlyleaf pondweed from Lake Waramaug.

Next year our primary objective will be to remove all or as much as possible of curlyleaf pondweed plants during the spring and early summer before plant seeds develop.

Detection

16 June 2006 – curlyleaf pondweed detected by Dr. George Knoecklein of Northeast Aquatic Research during regular aquatic plant survey conducted for the Lake Waramaug Task Force.

Delineation

16 June 2006 – Dr. Knoecklein's curlyleaf pondweed distribution map shows four general areas of infestation:

- Lake Waramaug State Park Bay – scattered plants on eastern and western shorelines
- Arrow Point Bay – dense bed of plants (at least 20 ft. x 20 ft.) on east shore of Arrow Point at intersection with North Shore Road.
- Randall's Point – western shore of point, several scattered plants over 200 feet
- Between Randall's Point and Willow Point, along North Shore Road – several isolated plants along 500 feet near midpoint of two points

28 June 2006 – Task Force retains Marc Bellaud of Aquatic Control Technology to conduct second inspection for curlyleaf and to survey and geospatially map all sites using a Differential Global Positioning System (DGPS). Task Force intern Jamie Hicks assists Knoecklein and Bellaud. Samples of curlyleaf taken to Connecticut Agricultural Experiment Station in New Haven for positive genetic identification.

Most abundant growth of curlyleaf found at the northern end of Arrow Point Bay (east side of Arrow Point). Curlyleaf plants were undergoing natural dying off by the 28 June 2006 survey. Bellaud determines "it is realistic to assume that all populations were not identified" and recommends additional comprehensive surveys in the early spring of 2007 (April).

If water clarity conditions are suitable, it may also be helpful to search for "dwarf" (recently germinated) curlyleaf pondweed plants in the fall of 2006 (September/October). July 2006 - Connecticut Agricultural Experiment Station scientists complete genetic analysis and confirm that the plant in Waramaug is curlyleaf pondweed.

Quarantine

Because of the early season life cycle of curlyleaf pondweed, most curlyleaf plants had already died-back by the end of June. Bellaud determines there is little or no chance that normal recreational use of the lake will cause further spread of curlyleaf pondweed. Therefore, quarantine is not considered necessary for the remainder of 2006.

However, because curlyleaf pondweed typically thrive in areas with disturbed sediment it is recommended the Task Force and lake property owners restrain from any activity that would significantly disturb the lake bottom especially in areas that are known to already harbor the infestation.

Assessment

Solicit input and support from major stakeholder groups - shoreline property owners, town officials and various state agencies. Information and management plans will likely need to be disseminated through press releases, newsletters and public hearings.

Implementation

Carry out an integrated management plan to control the spread of the existing curlyleaf infestation and prevent further spread of the plant. Management efforts will need to be sustained over a period of at least several years to exhaust the existing seed (turion) reserves and to potentially eradicate this nuisance species from Lake Waramaug. Management efforts will need to occur early in the season (between mid April and mid May) to inhibit seed formation.

Plan

The focus of our plan is to control or remove all curlyleaf pondweed growth before seed (turion) development.

Of the options listed below we plan to employ diver hand pulling, bottom barrier installations and as it stands we believe we must consider chemical treatment for the two sizable areas of infestation. Suction harvesting is a possibility but it appears that this method will not be as effective as spot use of chemicals. Obviously we will only use chemicals if we are convinced it is necessary and only after everyone has had an opportunity to learn about this option. Mechanical harvesting is not recommended at this time.

Diver Hand-Pulling

- Used in areas with widely scattered plants (less than 500 stems per acre) or small dense patches (less than 1,000 square feet).
- Cost varies depending on whether volunteers are used.
- This method will be effective in all locations where there are small patches of curlyleaf.

Suction Harvesting

- This option can be considered in areas with moderate infestations of more than 500 stems over a 1 acre area.
- Fragment barriers need to be used to prevent plant fragments from escaping.
- Cost estimated at more than \$5000 per acre, but will vary substantially depending on plant density and other factors.
- Possible technique on State Park shoreline and east side of Arrow Point.
- We are in the process of determining if suitable equipment and personnel will be available and steps needed for necessary permits.
- This method may be an alternative to chemical application if it is determined that it will be at least as effective as chemical use.

Bottom Barrier Installations

- This option must be limited to areas with small, dense growth over less than a quarter of an acre in area.
- Installations need to be monitored and combined with diver hand-pulling efforts.
- Cost estimates for installation and anchoring \$1.25-\$1.50 per square foot.

Chemical Treatment

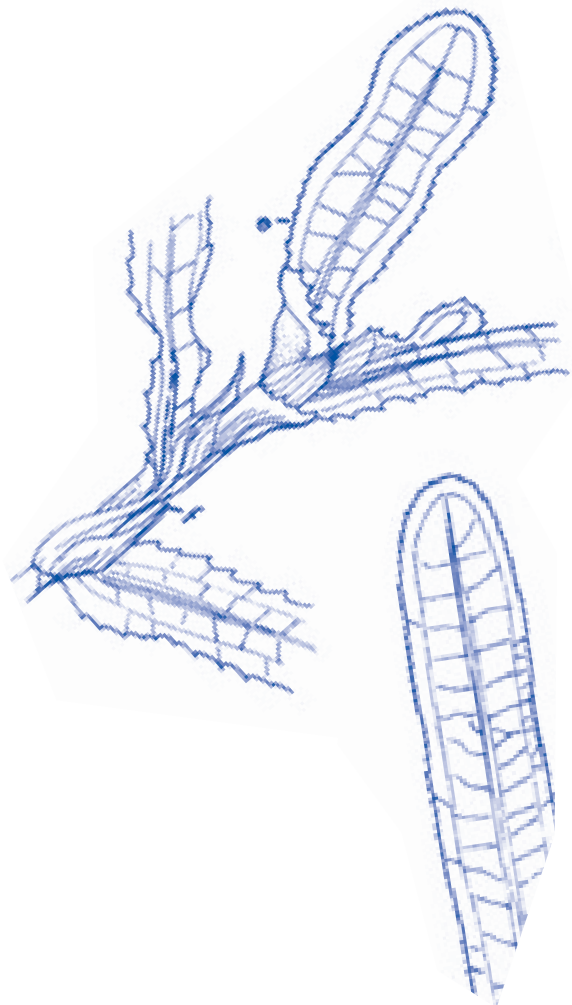
- Localized or “spot” treatment” must be considered where plant infestations are more than 1/2 acre in area. We believe this option must be considered for the two sizable areas of infestation.
- Initial indications are that the safest and the most effective application may be “Aquathol” (active ingredient endothrall) which is effective for spot treatments in the early season when cold water temperatures are less than 60 degree F). Another product recommended for consideration is “Aquathol Super K” which is a granular herbicide that can be used to minimize impacts to non-target plants.
- Expenses will include holding meetings on chemical use, education, permitting, treatment and follow up monitoring at two major sites covering 6 acres.

Mechanical Harvesting

- Early season harvests may remove turions and seed-heads.
- This method may “harvest” 95% of the plants in a location but is typically used where there is a larger infestation than at Waramaug. Therefore mechanical harvesting is not recommended at this time.

Monitoring


Comprehensive monitoring of the lake will play a critical role in accurately identifying the extent of the curlyleaf pondweed infestation (April 2007, 2008 and 2009) and in guiding implementation efforts. Surveys will be conducted using DGPS technology so that plant sites can be relocated for removal. Divers will be required to accurately document the extent of the infestation. Monitoring should also occur following all implementation efforts to document results and evaluate effectiveness.





Legend:

- Curlyleaf Pondweed GPS Locations 06/28/06
- Potential 2007 Treatment Areas




Curlyleaf Pondweed	
Lake Waramaug	
Warren, Washington, Kent CT	
Survey Date	Map Date:
06/28/06	07/20/06

