

A Threat to Vermont's Lakes:

# Eurasian Watermilfoil

an Invasive Non-native Aquatic Plant



DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Aquatic Invasive Species Management Program

Water Quality Division

1 National Life Drive, Main 2,

Montpelier, VT 05620-3522

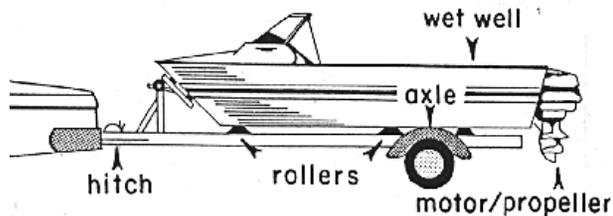
(802) 828-1535

[www.vtwaterquality.org](http://www.vtwaterquality.org)

## HOW YOU CAN HELP

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- **Prevent** further spread of Eurasian watermilfoil and other Invasive non-native aquatic species. Before moving boats between waterbodies, **remove all plant material** from:



**Discard** removed material in a trash receptacle or on high, dry ground where there is no danger of washing it into any waterbody.

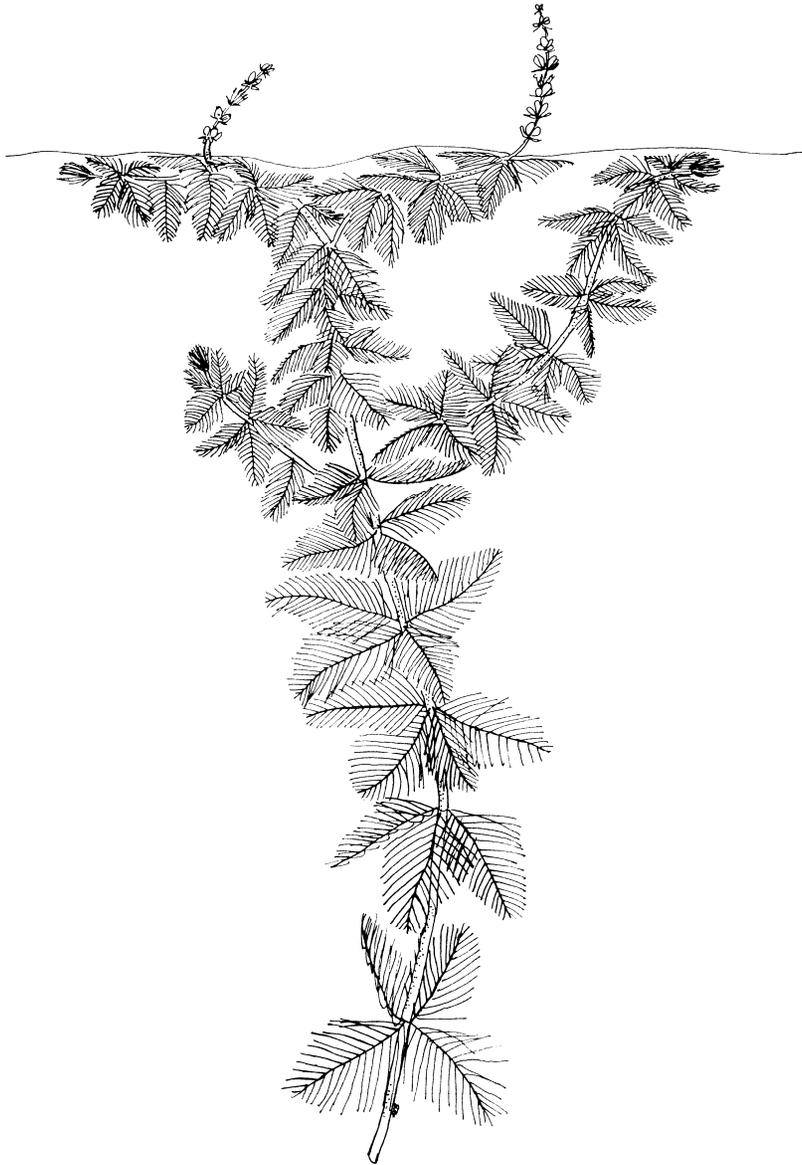
**Drain** all water from boat, boat engine, and other equipment.

**Rinse** all boat parts with tap water (preferably above 140°F) or leave boat out of water and in sun for at least five days.

- Learn to identify Eurasian watermilfoil. Know which Vermont waters have confirmed populations.
- **Get involved!** Participate in the **Vermont Invasive Patrollers (VIPs)** and help search for Eurasian watermilfoil and other non-native invasive species in one or more of the many uninfested Vermont waterbodies.
- **Contact** the Vermont Department of Environmental Conservation immediately (802) 828-1535 if you think you have found a new occurrence of Eurasian watermilfoil.
- **Spread the word, not the plant!** Public participation in Eurasian watermilfoil control and prevention is essential to the success of the management control program.
- **Purchase an Aquatic Invasive Species sticker** to show your support for the issue, help fund control and spread prevention activities and spread awareness of aquatic nuisance species in VT. Visit our website [www.VTWaterQuality.org](http://www.VTWaterQuality.org) to find out where to buy a sticker today.

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**Eurasian watermilfoil**  
(*Myriophyllum spicatum* L.)

- **Surveys** that assess the types and amounts of aquatic plants growing in a waterbody are conducted to monitor existing watermilfoil growth and to detect newly introduced plant populations.
- **VIPs or Vermont Invasive Patrollers** (see page 11) are volunteers that are trained and supported by the Department of Environmental Conservation to monitor water bodies for non-native plant or animal infestations.
- The Department of Environmental Conservation is keeping abreast of **current research** to learn of improved control methods and their applicability for use in Vermont.
- **Demonstration projects** have been implemented on a number of Vermont lakes to evaluate new control methods as well as to refine established techniques.
- **Public Service Announcements** are aired on both radio and television stations during the summer months to inform the public of aquatic invasive nuisance species issues.
- **Technical assistance** on watermilfoil control is provided to towns, lake associations, and others.
- **Financial assistance** is often available in the form of grants to municipalities for qualified applicants to implement aquatic invasive species restoration, management, or protection projects.
- **Vermont law** makes it illegal to transport Eurasian watermilfoil, zebra mussels, water chestnut, or quagga mussels. It is also illegal to move, sell, possess, cultivate, or distribute many aquatic weeds under the Vermont quarantine rule.

## WHAT THE STATE IS DOING

The State of Vermont is working in a number of ways to control and prevent the spread of Eurasian watermilfoil and other invasive aquatic plants and animals.

- Vermonters and visitors to our state are learning about water milfoil and other aquatic invasive species through a variety of **educational materials**: pamphlets and newsletters, slide shows, identification posters, public service announcements, metal boater warning signs at access areas, and public meetings.



*BOATER WARNING SIGN posted at public and heavily used private access areas throughout the state.*

## THE PROBLEM

Eurasian watermilfoil (scientific name *Myriophyllum spicatum* L.) is a non-native aquatic plant that currently infests a number of Vermont lakes, including the state's largest, Lakes Champlain, Memphremagog, and Bomoseen, and rivers. This plant is known for its rapid growth and ability to spread, which can lead to significant problems in a waterbody. Commonly found in shallow bays and along the shoreline, watermilfoil forms dense beds that can seriously impair the recreational use of a waterbody, reduce the availability of fish spawning grounds, out-compete beneficial native plants, and otherwise alter a waterbody's natural environment.

The growth and spread of Eurasian watermilfoil is a threat to **all** our water's. Once Eurasian watermilfoil has infested a waterbody, there is no known way to eradicate it. Managers can only seek to control it by integrating the most effective, economically feasible, and environmentally sound methods available.

Through the use of this pamphlet, you can learn to identify Eurasian watermilfoil, inform the Department of Environmental Conservation of additional infestations, educate others, and help prevent watermilfoil's spread to uninfested waters in Vermont.

## ECOLOGY

Eurasian watermilfoil is not native to North America but originates from Europe, Asia, and northern Africa. As an "introduced" species to this continent, Eurasian watermilfoil has few natural controls (such as insects, bacteria, or fungi) to keep its growth in check. In North America, it has the potential to completely infest waterbodies once introduced. Native types of watermilfoils found naturally in many Vermont waters rarely attain such extensive growth.

Eurasian watermilfoil stems can reach the surface in anchored up to 20 feet of water, growing up each year from a fibrous root system anchored in the lake bottom. Watermilfoil grows and spreads extremely quickly, forming dense surface mats. Unlike most native aquatic plants, which are usually associated with particular water qualities, Eurasian watermilfoil will grow readily in many types of lakes, as well as on almost any lake bottom type: silty, sandy, or rocky.

The presence of Eurasian watermilfoil often brings a change in the natural aquatic environment. Over time, it may out-compete or eliminate the more beneficial native aquatic plants, severely reducing natural plant diversity within a waterbody. Dense watermilfoil beds create poor spawning areas for fish and may lead to populations of stunted fish. Although many aquatic plants serve as valuable food sources for wildlife, waterfowl, fish, and insects, Eurasian watermilfoil is rarely used for food. Commonly found in shallow bays and in bands along the shoreline, dense surface mats of watermilfoil can also make fishing, boating, and swimming virtually impossible.



*Profile of a Watermilfoil bed*

Eurasian watermilfoil reproduces almost exclusively by fragments; broken stem pieces that can drift away, sink, develop roots, and grow into new plants. A fragment just a few inches long is capable of starting a new plant. Watermilfoil fragments occur both naturally and as a result of human activity. Within a lake, wind and waves may break plants loose. Fragments drift into new locations and root. Boating activity through dense watermilfoil beds also contributes to the fragmentation and spread of watermilfoil plants.

The State of Vermont is concerned about the impacts certain watermilfoil control methods could have on the environment. Bottom barriers, all mechanically powered devices (harvesters, hydrorakes), herbicides, and biological controls require **permits** from the Vermont Department of Environmental Conservation before they can be used to control nuisance aquatic plant growth. Contact the Department at (802) 241-3777 to determine if your proposed control method requires a permit and to obtain a permit application for your specific activity.

## VIPS (Vermont Invasive Patrollers)

Because Eurasian watermilfoil is so difficult to control once it has become established, early detection of watermilfoil growth is critical in stopping the plant from becoming a widespread problem in a waterbody. The Vermont Department of Environmental Conservation trains interested volunteers as Vermont Invasive Patrollers or **VIPs** to assist in the early detection of Eurasian watermilfoil and other invasive aquatic plants and animals.

The Department of Environmental Conservation conducts VIP training workshops upon request. These workshops emphasize species identification and lake searching methods, and bring participants up to date on the status of nuisance species in and outside of Vermont. Volunteers agree to "watch" a lake each summer and report to the Department any areas of suspected watermilfoil or other species growth. Additionally, VIPs take leadership in educating others about the threat this and other nuisance aquatic species pose to Vermont waters.

Education and citizen involvement will not in themselves solve the watermilfoil problem in Vermont; however, prevention of further spread will be aided greatly by the participation of active and informed Vermont citizens. Thanks to the volunteer efforts of Vermont's Watchers, many lakes are currently being watched for an introduction of Eurasian watermilfoil.

Contact the Department of Environmental Conservation if you are interested in becoming a **VIP**.

**Rotavating** involves a machine that "tills" the lake bottom, dislodging both the roots and stems of the plant. Plants are either collected by a mechanical harvester or, if conducted in the late fall, are allowed to wash ashore and dry over the winter. This method has had little use in the U.S. and has not been used in Vermont.

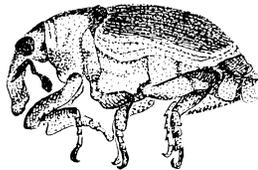


*Rotavating*

There are a number of federally registered aquatic **herbicides** that control Eurasian watermilfoil. Considerations for use include cost, the potential need for repeated applications, and product label restrictions that prevent their application in lakes used as water supplies.

**Biological** controls such as insects, bacteria, or fungi with the potential to impact watermilfoil are in the experimental stages only. Their use as a watermilfoil control method may prove to be the control of the future. The use of plant-eating fish such as the grass carp, a native to China, is currently illegal in Vermont.

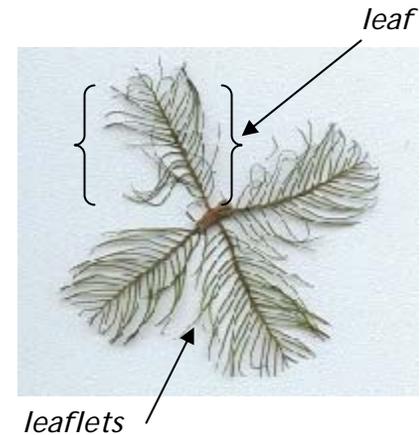
The Vermont Department of Environmental Conservation has been working with the watermilfoil weevil *Euhrychiopsis lecontei*, since 1989. The weevil was responsible for at least one Eurasian watermilfoil decline in Vermont, in Brownington Pond in Brownington. It has been found naturally occurring in many of Vermont's watermilfoil-infested lakes. The weevil, a native aquatic insect, has shown promise as a potential biological control agent for Eurasian watermilfoil and is currently the subject of ongoing research.



**Adult Watermilfoil Weevil**  
(Actual size approximately 2-4 millimeters)

## DESCRIPTION

Eurasian watermilfoil is recognized by its whorls of typically four feather-like leaves around the stem. Each leaf is finely divided into paired leaflets, 12 to 21 pairs per leaf. Identification characteristics for this species may vary; don't be fooled by only 3 leaves around the stem or less than 12 pairs of leaflets. The number of stems per plant increases as the plant ages. Each individual stem may branch several times as it nears the water surface, creating a dense floating mat over the surface. Dense Eurasian watermilfoil beds usually occur in water between 3 and 20 feet deep. The tops of the watermilfoil plants, both stems and leaves, often turn red in color.



*stem in cross section:* Typically four leaves form a whorl around the stem. On average, each leaf has 12 or more pairs of leaflets.

**Eurasian watermilfoil** (*Myriophyllum spicatum* L.)

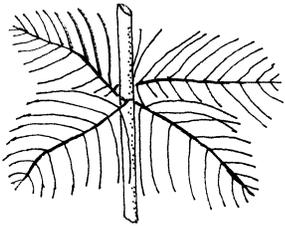
## DISTINGUISHING EURASIAN WATERMILFOIL FROM NATIVE PLANTS

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Since many aquatic plants found in Vermont's lakes look quite similar, distinguishing one type of plant from another can be difficult.

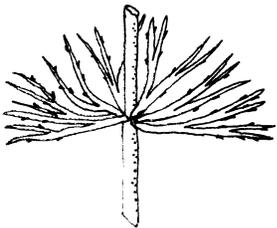
A few native aquatic plants found in many Vermont lakes are easily mistaken for Eurasian watermilfoil and are shown below. These illustrations depict each plant's leaf arrangement on the stem and are intended to help in distinguishing one species from another.

### Northern watermilfoil (*Myriophyllum sibiricum* Kom.)



A native watermilfoil with overall growth similar to Eurasian watermilfoil, except it branches less and the tips are green and rarely red. Leaves are arranged in whorls of 4 around the stem but each leaf has fewer than 12 pairs of leaflets.

### Coontail (*Ceratophyllum demersum* L.)



This plant is not rooted in the lake bottom, but is free-floating, often lying along the bottom. Leaves are arranged in a whorl around the stem. Each leaf is toothed and branches only once or twice. At the tips of the plant, the leaves are folded up unto themselves resembling a raccoon's tail.

A **hydrorake** removes plant roots and shoots by raking the lake bottom. Any removed material must then be deposited on shore. Hydroraking has had limited use in the state but is most practical for providing short-term relief from small areas of dense watermilfoil infestations.



*Hydrorake*

When done properly, **pulling** watermilfoil plants by **hand** is highly effective for controlling small, newly introduced watermilfoil populations.



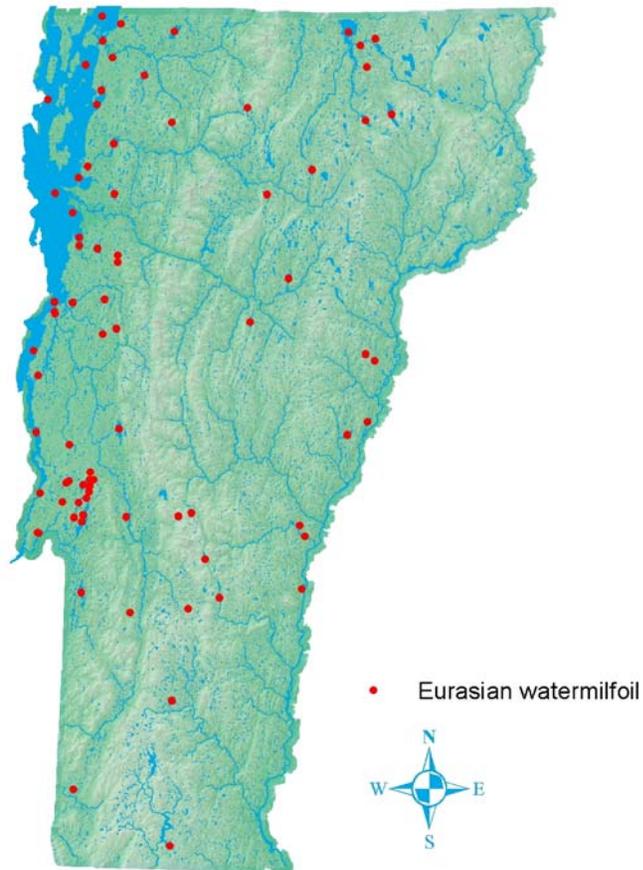
*Mechanical Harvester*

**Mechanical harvesters** cut off the watermilfoil (and any other plants) below the water surface, gathering the cut material as they move through the plant bed. Watermilfoil roots are not removed in this process. Mechanical harvesting, like lawn mowing, merely reduces the height of plant growth temporarily in order to make the lake more usable for recreation. Removing the plant material from the lake does however prevent the plants from contributing to the sediment which rapidly accumulates under dense aquatic plant beds. Mechanical harvesting has been used on several heavily infested Vermont lakes.

## WHERE EURASIAN WATERMILFOIL IS FOUND

Eurasian watermilfoil was accidentally introduced to North America in the mid 1900s, and is now widespread throughout the United States. Watermilfoil's rapid spread around the country has been aided by its use as an aquarium plant and by the ease with which it is transported through recreational activity. First identified in St. Albans Bay of Lake Champlain in 1962, the spread of watermilfoil in Vermont has steadily increased since that time. As of October 2007, watermilfoil has been confirmed in 64 Vermont lakes/ponds and 25 other waters, including the Connecticut River and many Lake Champlain tributaries.

Figure 1: Vermont Waterbodies with Known Eurasian Watermilfoil Populations



## SPREAD

Human recreational activities typically account for the majority of non-native aquatic plant and animal spread between lakes. Fragments of aquatic plants cling to the propellers of boat motors or to boat trailers and, if not removed, can start new populations when the boat is launched into another waterbody. Unfortunately, once Eurasian watermilfoil has been introduced into a lake, there is no way to completely eradicate it.

To stop the further spread of non-native aquatic species, it is imperative that **all** plant fragments are removed from boats before putting in or leaving a lake's access area. Removed plant material should be properly disposed of in a trash receptacle or on high, dry ground where there is no danger of it washing into any waterbody.



*PREVENT WATERMILFOIL SPREAD: Remove all plant fragments from your boating equipment.*

Vermont law makes it illegal to transport Eurasian watermilfoil, water chestnut, zebra mussels, or quagga mussels to or from any Vermont surface water. Any person transporting these species to or from a Vermont lake or pond is in violation of this law. Violators are subject to a penalty of up to \$1,000 per violation (pursuant to 10 V.S.A. § 1266 and § 3317). A state noxious weeds quarantine rule also prohibits the transport of many aquatic weeds, as well as their sale, distribution, possession, or cultivation. For a complete listing of the plant species covered by this rule, contact the Vermont Water Quality Division at 802-241-3777, or visit the website at [www.vtwaterquality.org](http://www.vtwaterquality.org).

## CONTROL

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Since there is no way to completely eradicate Eurasian watermilfoil from a lake once it has been introduced, management efforts focus on controlling newly introduced infestations, preventing further spread of the plant, or reducing the nuisance level of the problem in a waterbody. Some methods are more appropriate for well-established populations, while others are better suited for recent introductions.

**Benthic barriers** are specially made sheets of materials such as fiberglass, polypropylene, or poly vinyl chloride (PVC), which when anchored to a lake bottom will prevent plant growth by blocking sunlight. Bottom barriers are most appropriate for controlling growth in localized areas such as in swimming areas, around docks, or to create boat lanes out to deeper water.

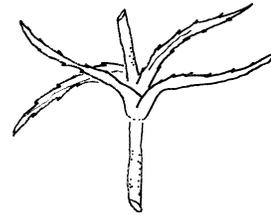


*Benthic Barrier*

With **diver operated suction harvesting**, scuba divers dislodge individual plants by hand and then use suction hoses powered by a surface compressor to transport plants to the surface. Although too labor intensive on a large scale, this method has proven to be highly successful at combating newly established infestations in some Vermont lakes.

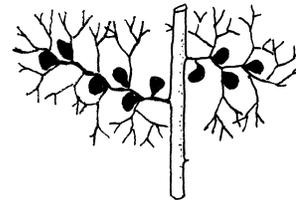
- Most methods described in this booklet require a permit before they can be used in Vermont waters. Contact the Vermont Department of environmental conservation at (802) 241-3782 for more information.

### Bushy pondweed (*Najas flexilis* Willd.)



*Bushy pondweed will not usually get as tall as watermilfoil and does not form floating mats on the water's surface. Leaves are opposite on the stem but appear whorled. Each leaf is toothed and tapers to a sharp point.*

### Common bladderwort (*Utricularia vulgaris* L.)



*Bladderworts lack roots and are free-floating. Leaves are green and are arranged alternately on the stem. Each leaf branches many times and often bears small sacs or bladders.*

There are many other aquatic plants in Vermont. Identification can be further complicated by poor visibility due to weather and water conditions. If there is any uncertainty about aquatic plant identification, a sample should be sent to the Vermont Department of Environmental Conservation.

To mail an aquatic plant sample for identification, obtain the entire plant (including stems, leaves, and flowers if present). Wrap the sample in a wet paper towel and place it in a sealable plastic bag. Make note of the date, collection location, and any other details about the site where the plant was found. Mail the sample as soon as possible to the address on page 15 of this booklet. Include your name and contact information; a Department biologist will identify the sample and inform you of the result.

## FOR MORE INFORMATION

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For further information on invasive non-native aquatic plants and animals, the permitting process for controlling these species or for assistance with identification of plants suspected to be Eurasian watermilfoil, visit the Department of Environmental Conservation's aquatic invasive species website at:

<http://www.vtwaterquality.org>

or contact ,

### Vermont Aquatic Invasive Species Management Program



**VERMONT**  
DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
Watershed Management Division  
1 National Life Drive, Main 2,  
Montpelier, VT 05620-3522  
(802) 2828-1535



### DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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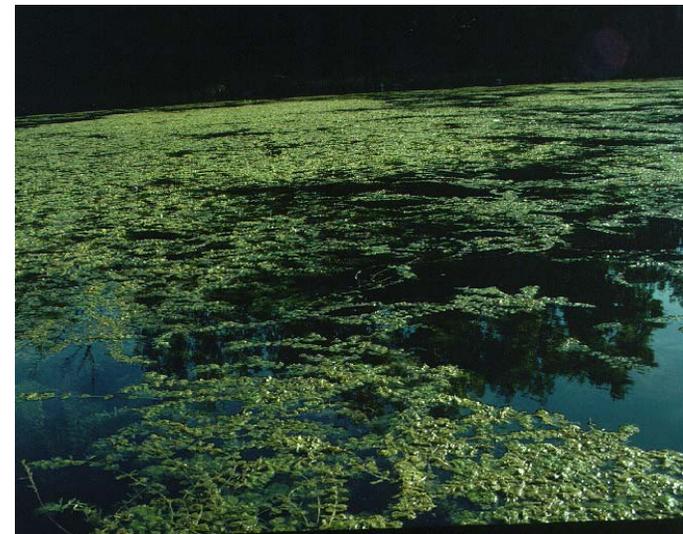
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The Vermont Department of Environmental Conservation is an equal opportunity agency and offers all persons the benefits of participating in each of its programs and competing in all areas of employment regardless of race, color, religion, sex, national origin, age, disability, sexual preference, or other non-merit factors.

This document is available upon request in large print, braille or audio cassette.

VT Relay Service for the Hearing Impaired  
1-800-253-0191 TDD>Voice - 1-800-253-0195 Voice>TDD

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**Spread the word, not the plant!**