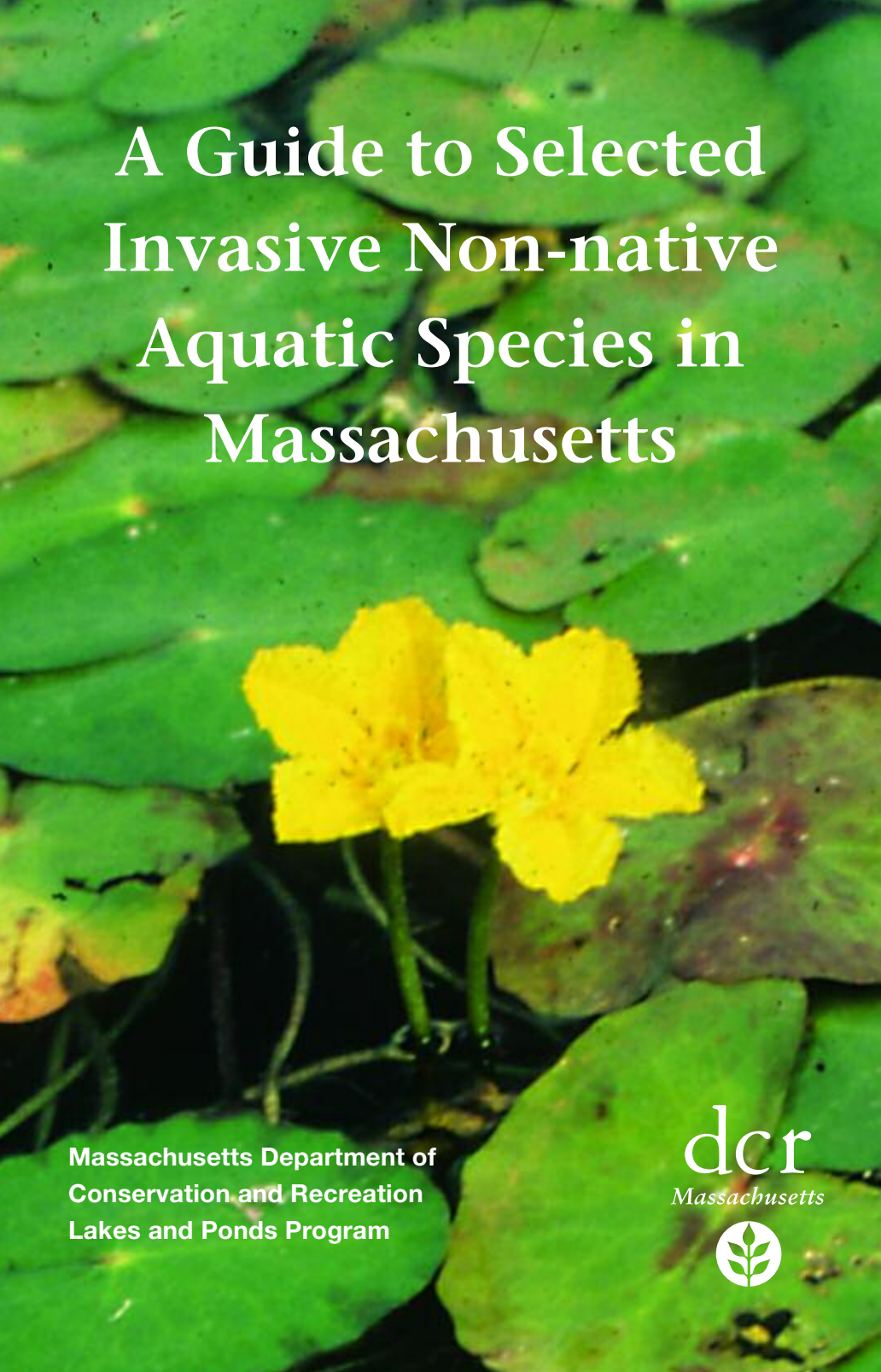
A Guide to Selected Invasive Non-native Aquatic Species in Massachusetts



Massachusetts Department of
Conservation and Recreation
Lakes and Ponds Program

dcr
Massachusetts

Stop the Spread of Non-native Species!

Non-native (or exotic) species are plants or animals that were brought to an area from another region. Many of these species have not evolved predators to keep their populations under control and as a result they often spread rapidly. A species that is able to invade and alter or disrupt an ecosystem is considered invasive. Many exotic plants grow rapidly, displacing the native plants and animals, resulting in a loss of biodiversity. Native plants are an essential part of the aquatic ecosystem, providing food, shelter and oxygen for other aquatic life. Some species have roots that stabilize the shore line, absorb nutrients and toxins and slow the flow of sediments into a waterbody. In addition to impacting native populations, exotic plants often form dense mats of vegetation that can impede boating, fishing and other recreational activities. Aesthetic appeal and property values frequently decline when an exotic species takes over.

Exotic species were introduced to our region in a variety of ways including hitching rides in ship ballast water, accidental release from aquariums, escape from water gardens and intentional introduction. Exotic species are further spread unintentionally by boaters when plant fragments are tangled on boats, motors, trailers, fishing gear, and dive gear. Some species, including the Zebra Mussel, have a microscopic larval form that can travel undetected in ballast water, cooling water, live-well water and bait bucket water to new locations.

Once an exotic species is established, it is almost impossible to eradicate and very expensive to control. The best way to protect a waterbody is through prevention, education, early detection and rapid response.

YOU CAN HELP!!! By learning to identify the exotic species in this guide and reporting any new infestations to the Department of Conservation and Recreation at michelle.robinson@state.ma.us, and by removing any plants or animals from your boat, trailer and gear before leaving or entering a waterbody.

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www.mass.gov/lakesandponds

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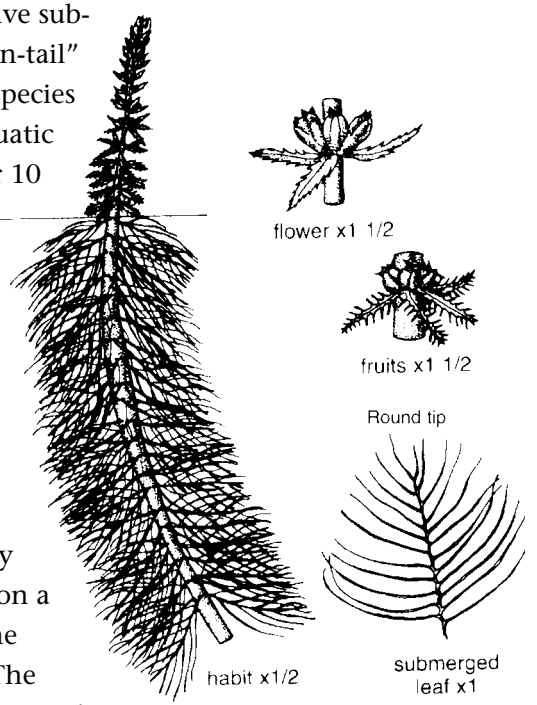
Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs
Department of Conservation and Recreation
Office of Water Resources
Lakes and Ponds Program

Deval L. Patrick, Governor
Timothy P. Murray, Lt. Governor
Ian A. Bowles, Secretary
Rick Sullivan, Commissioner

Variable Milfoil

Myriophyllum heterophyllum

Variable Milfoil is a non-native submerged plant with a “raccoon-tail” appearance. This is a hardy species that tolerates a variety of aquatic conditions, can grow in over 10 feet of water, and produces dense mats of vegetation. This species spreads very rapidly from fragments.



Key Identifying Features

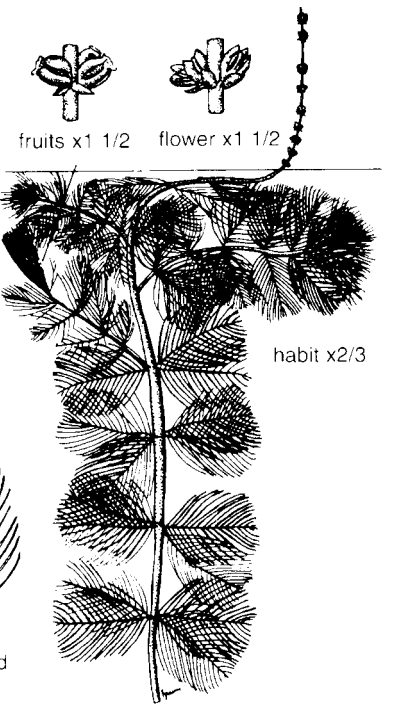
The feathered submerged leaves are 2" long and 1" wide with rounded tips. Leaves are arranged in closely spaced whorls of four to six on a thick reddish stem, giving the plant a shaggy appearance. The rigid emergent bract that forms in late summer has variable (serrated and smooth) leaf types.

ESTABLISHED

Eurasian Milfoil

Myriophyllum spicatum

Eurasian Milfoil is an aggressive exotic plant that is common in the alkaline waters of western Massachusetts and is occasionally found in eastern waterbodies. Eurasian Milfoil spreads rapidly via fragmentation and can form dense monocultures in the waterbody.



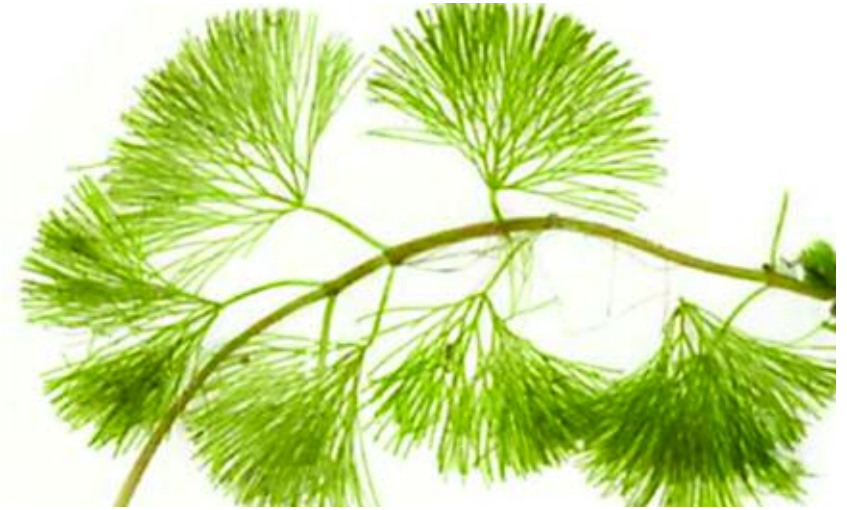
Key Identifying Features

The olive green feathered leaves are less than 2" long with leaf tips that appear blunt. Leaves occasionally have a reddish tint. Leaves are arranged in whorls of four (occasionally 3-6) around the stem and the whorls are spaced approximately 3/8" apart. The stems are red/brown or white/pink in color and reach 20 feet. Reddish flowers form during July and August in whorls of four on an 8" emergent bract (protruding above the water surface).

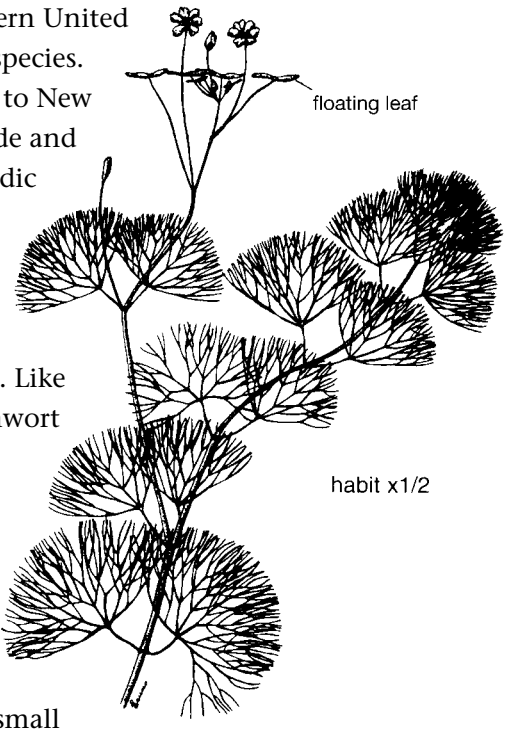
ESTABLISHED

Fanwort

Cabomba caroliniana



Fanwort is native to the southern United States and is a very persistent species. Fanwort was likely introduced to New England via the aquarium trade and has been established in the acidic waterbodies of Massachusetts for over fifty years. The species is a popular aquarium plant due to its decorative bright green fan-shaped leaves. Like many other exotic species, Fanwort can re-grow from fragments.



Key Identifying Features

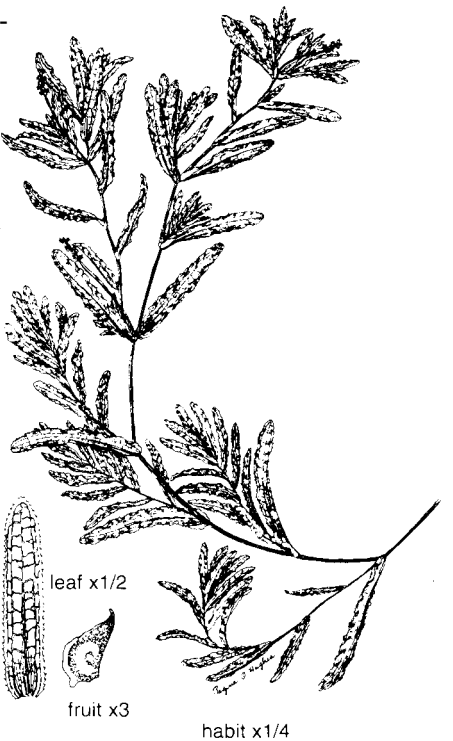
The bright green fan-shaped leaves are arranged in opposite pairs on the stem. In late summer the plant produces tiny white/cream flowers and small oval and diamond shaped floating leaves.

ESTABLISHED

Curly-leaved Pondweed

Potamogeton crispus

Although Massachusetts has numerous native pondweeds, *Potamogeton crispus* is the only non-native pondweed and was introduced to the U.S. in the 1800s. Curly-leaved Pondweed does not reproduce from fragments, instead, seeds are produced in late spring early/summer and by July, *P. crispus* has died back.



Key Identifying Features

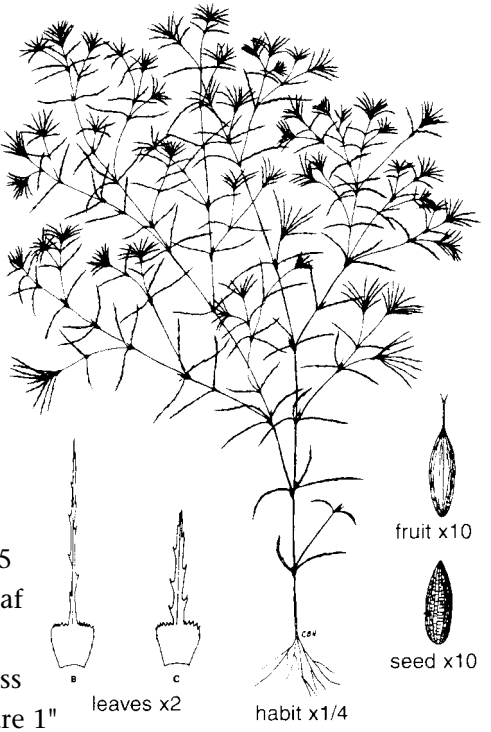
Curly-leaved Pondweed has 3" long undulating thin leaves that are arranged alternately along the stem. The leaves are rippled (curly) with visibly serrated leaf margins, and when the leaf is held up to a light there is a unique pattern and distinct midvein in the leaf.

ESTABLISHED

European Naiad

Najas minor

Although European Naiad is native to Europe, it is now naturalized in several western Massachusetts waterbodies. *N. minor* is a hardy species that often outcompetes native *Najas*, and the dense growth can crowd out native vegetation and impede swimming and boating.



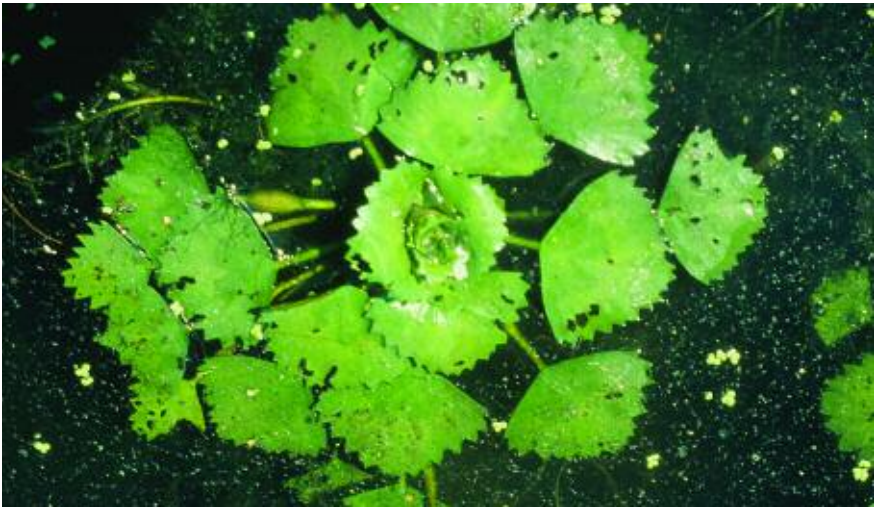
Key Identifying Features

Unlike the other three native Bushy Pondweed species in Massachusetts, *N. minor* has 6-15 deep teeth (serrations) on the leaf margins, a distinctly lobed leaf base, and the tip of the leaf is less tapered. The lime green leaves are 1" long, brittle and re-curved, giving the plant a bushy appearance.

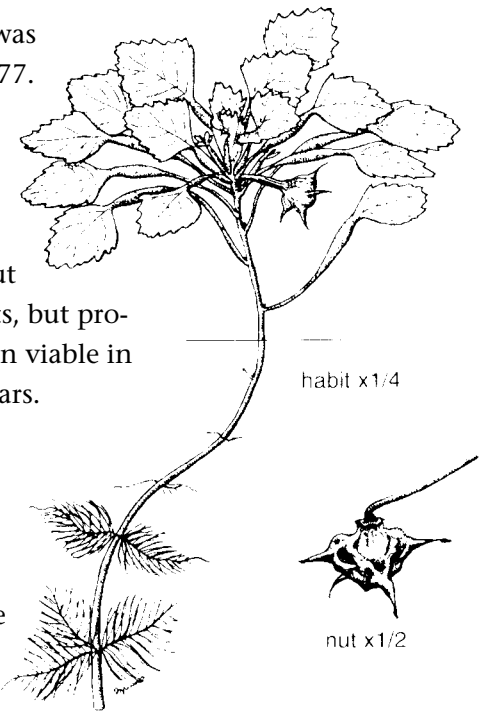
ESTABLISHED

Water Chestnut

Trapa natans



Native to Eurasia, this species was intentionally introduced in 1877. Since its introduction it has become a nuisance in the Concord and Charles river systems and continues to spread across the state. Water Chestnut does not spread from fragments, but produces nuts that sink and remain viable in the sediment for over seven years.



Key Identifying Features

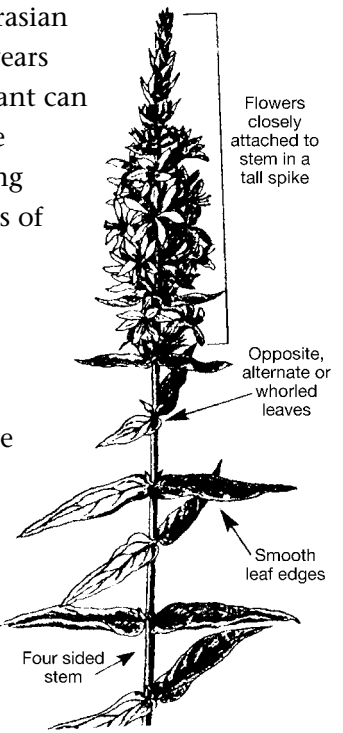
The floating diamond shaped leaves have deep leaf margins and form rosettes. The upper side of the leaf is shiny and the underside is covered with fine hairs. Submerged leaves are feather-like and whorled around the stem. A 1" fruit (chestnut) with four shard barbs may be attached. When present, flowers are white with four petals.

ESTABLISHED

Purple Loosestrife

Lythrum salicaria

Purple Loosestrife is a hardy aggressive Eurasian wetland species that was introduced 200 years ago. It spreads rapidly from seed – each plant can produce 1-3 million seeds annually. Purple Loosetrife drives out native species resulting in a loss of biodiversity. In addition, stands of Purple Loosestrife often do not provide an ideal source of food or nesting areas for wildlife.



Key Identifying Features

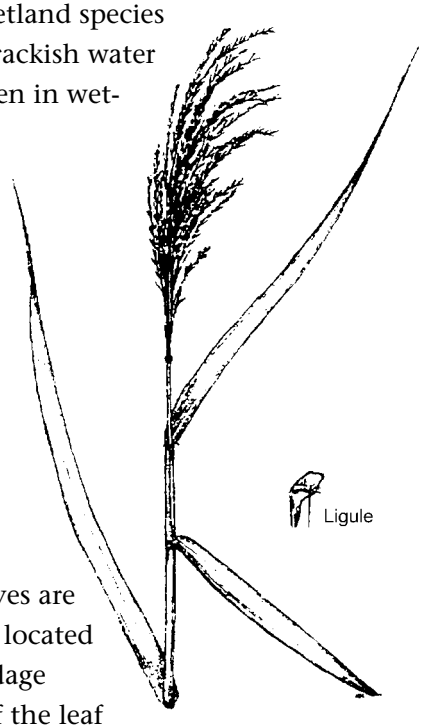
Leaves are four inches long, covered in fine hairs and are lance-shaped with a heart-shaped base. Leaves are arranged in opposite pairs and the pairs are located at 90-degree angles to each other along a rigid square (distinctly four-sided) stem. Purple Loosestrife grows over 4' tall, and in late summer produces a vibrant display of showy purple/pink flowers on a 6" spike.

ESTABLISHED

Common Reed

Phragmites australis

The Common Reed is aggressive wetland species that is able to invade freshwater, brackish water and saline marshes, and is often seen in wetlands and roadside ditches. *Phragmites* can form very dense impenetrable stands that may exclude native vegetation and not provide ideal shelter or food for wildlife. As *Phragmites* spreads rapidly and fills in wetlands, water flow and flood retention may be decreased.

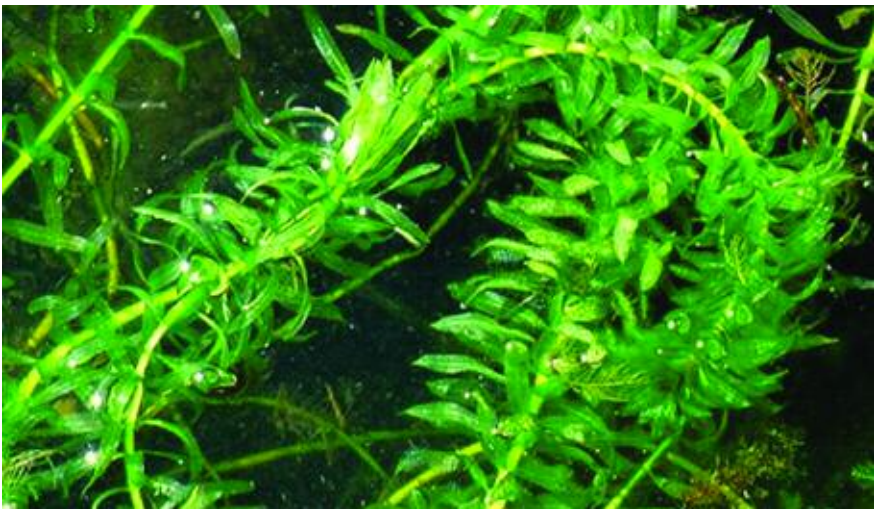


Key Identifying Features

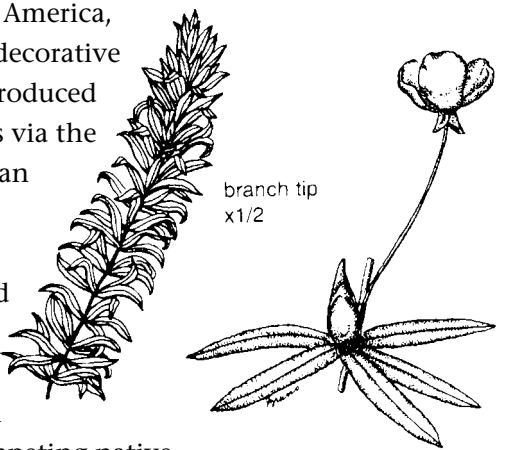
The leaves are green/gray in color, strap-like and taper to a point. Leaves are up to 2" wide and 24" long and are located alternately on the stem. An appendage (ligule) is present where the base of the leaf attaches to the stem.

South American Waterweed

Egeria densa



This species is native to South America, and due to its popularity as a decorative aquarium plant, was likely introduced to Massachusetts' water bodies via the aquarium trade. South American Waterweed is often sold in pet stores under the names *Anacharis*, Brazilian Waterweed and *Elodea*. South American Waterweed spreads very rapidly by fragmentation and can grow to over 30' long, out-competing native species for light, space and nutrients.



Key Identifying Features:

This plant is easily confused with native waterweed, *Elodea*, and Hydrilla. Unlike Hydrilla and *Elodea*, which have short leaves, South American Waterweed is very robust and has 1" long leaves in closely spaced whorls of 3-6 around the stem. Serrations on leaf margins may or may not be visible. Flowers, if present, are white and 1" wide.

THREAT **Currently only a few known infestations in MA**

Hydrilla

Hydrilla verticillata

Hydrilla is an extremely aggressive and hardy species that poses a serious threat to Massachusetts waterbodies. Hydrilla branches profusely at the surface and can grow an inch a day. Hydrilla spreads rapidly by fragmentation and production of turions and tubers.

Key Identifying Features

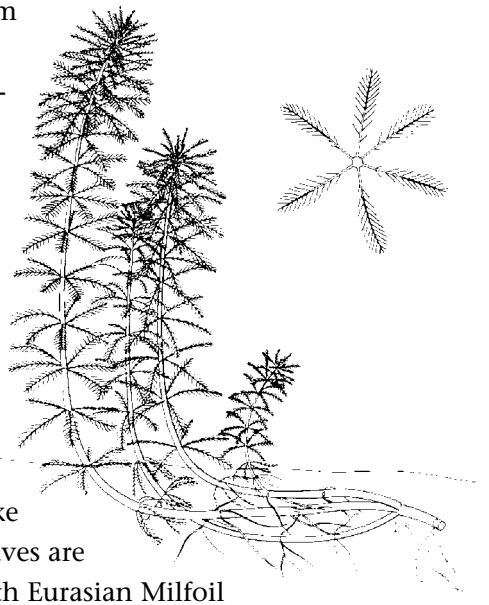
The green leaves are 5/8" long, strap shaped with pointed tips and a distinct midrib. The leaves are arranged in whorls of 4-8 and are attached directly to the stem. The leaf margins have distinct saw-toothed edges that are visible to the naked eye and rough to the touch. This species is often confused with native Common Waterweed (*Elodea sp*). *Elodea* leaves are in whorls of 3 compared to 4-6 on Hydrilla.

THREAT **Currently one infestation each in CT, MA and ME**

Parrot Feather

Myriophyllum aquaticum

Parrot Feather is common in the aquarium/water garden trade and can tolerate the harsh conditions of New England's winters. Once established, *M. aquaticum* can form dense mats on the water's surface that may restrict light to the complete exclusion of other plants, hampering recreational activities.



Key Identifying Features

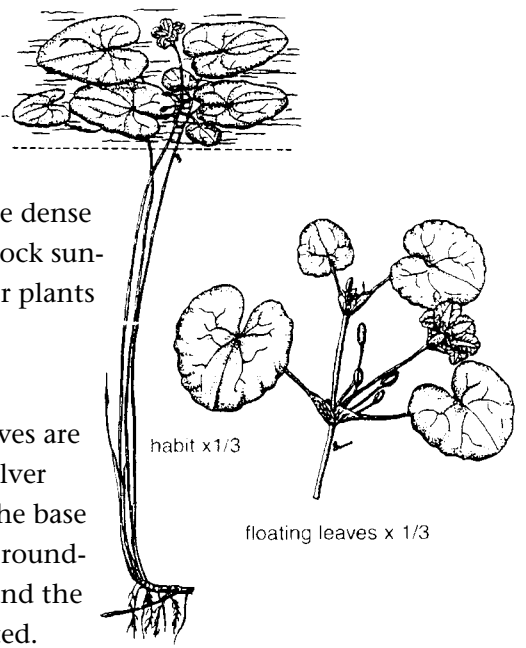
Emergent leaves are bright blue green, 1-2" long, rigid, deeply serrated and profuse. Leaves are in whorls of 4-6 around the stem and each leaf has 10-18 leaflets. Emergent leaves may protrude a foot above the surface, looking like miniature fir trees. Submerged leaves are reddish, and may be confused with Eurasian Milfoil leaves. Emergent woody stems can grow over 5', extending onto the shore. In the spring, pink/white flowers may develop.

THREAT **Currently only one infestation known in MA**

Yellow Floating Heart

Nymphoides peltata

Yellow Floating Heart is native to Eurasia but has been documented in Massachusetts waterbodies. The long stems can hinder recreational activities, and the dense mats of floating leaves can block sunlight to the exclusion of other plants and algae.



Key Identifying Features

Shiny heart-shaped green leaves are approximately the size of a silver dollar and have a deep V at the base of the leaf. The leaf lobes are rounded, the margins are rippled, and the underside is often purple tinted. Showy yellow flowers develop on a rigid stalk several inches above the water's surface. *N. peltata* may be confused with native Little Floating Heart (*N. cordata*), however, Little Floating Heart has white flowers and root bunches on the stem at the base of the leaves.

THREAT **Only a few known locations**

Zebra Mussel

Dreissena polymorpha

Zebra Mussels are fresh water mussels native to the Caspian and Black Seas. Zebra mussels can proliferate at an alarming rate, and clog intake pipes for factories, water treatment plants, boat motors, nuclear facilities, and power plant cooling systems, causing these systems to fail and resulting in millions of dollars of damage each year. Zebra Mussels out compete native bivalves for space, food and other resources. The sharp shells and can create a hazard for swimmers and beach visitors and may emit a foul odor as they decompose. Young Zebra Mussels (veligers) are free swimming microscopic larvae that can easily be transported unintentionally in cooling water, bait buckets, live well water and on other equipment that may have come in contact with infested water. Great care must be taken when leaving a lake known to be infested with Zebra Mussels. Always wash all equipment that may have come in contact with water.

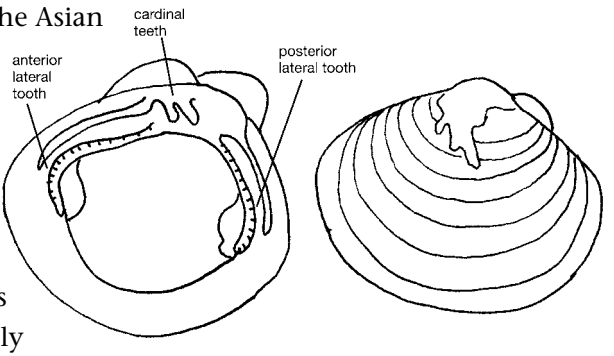
Key Identifying Features

Zebra Mussels are up to 2" in length. The D-shaped shells are yellowish-brown with alternating dark and light bands. Immediately report any suspected sighting to the Department of Conservation and Recreation.

THREAT **Established in CT, NY and VT**

Asian Clam

Corbicula



The major impact of the Asian Clam in freshwater systems is biofouling of equipment. Power plants, boat motors, and water intake pipes are all places the Asian Clam prefers to settle, and eventually they cut off the flow of water through the structure. The Asian Clam can also out-compete native bivalves for resources. Juvenile forms of the Asian Clam are microscopic and can travel undetected in bilge water, bait water or on boat trailers. Care should be taken to remove and rinse all equipment when leaving a waterbody and before entering another.

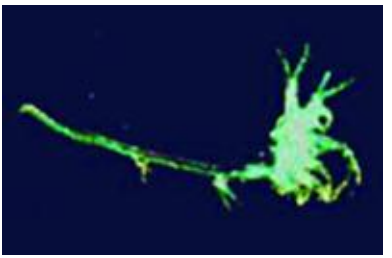
Key Identifying Features

The Asian Clam is usually less than 1.5" wide and is dark beige to brown color. The outside of the shell is lined with concentric elevated ridges. On the inside of the shell are 3 cardinal and 2 lateral teeth.

THREAT **Currently four known infestations in MA**

Spiny Water Flea

Bythotrephes cederstroemi



The Spiny Water Flea, a small planktivorous crustacean, averages about 0.1" to 0.2" in length, of which 70% is a long, sharp, barbed spine. Native to parts of Eurasia, it was first introduced into Lake Huron in 1984 via ballast water, and spread to all of the Great Lakes by 1987. Large numbers of these organisms form cotton-like mats that may foul fishing gear and boat motors and frequently impede recreational activities. Although the impacts of Spiny Water Flea infestations are not yet known, it is thought that they may outcompete small fish for food. Most aquatic predators avoid the Spiny Water Flea as they find the sharp barbed spines unpalatable.

Fish Hook Flea

Cercopagis pengoi

The Fish Hook Flea was first discovered in 1988 in Lake Ontario, and since its discovery, has spread to all the Great Lakes and New York. The Fish Hook Flea is smaller than the Spiny Water Flea. The tail has a hook and sharp barbs which are thought to deter predation.

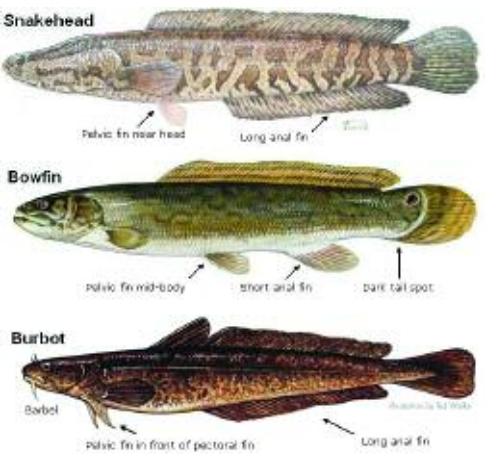
The Fish Hook Flea is parthenogenic (reproduces sexually or asexually) which gives it a competitive reproductive strategy. It is anticipated that the Fish Hook Flea will compete with juvenile fish for plankton. Mats of Fish Hook Fleas tangle fishing lines and impede recreational activities.

To prevent an infestation of water fleas, always rinse any equipment that may have come in contact with infested water. Dispose of live well, cooling and bait bucket water on dry land far from shore. Report any suspected infestation immediately to the Department of Conservation and Recreation.

Northern Snakehead Fish

Channa argus

The Northern Snakehead fish is native to China. Experts believe that the snakehead entered our waters through the aquarium and live fish food trade. The snakehead fish presents a considerable threat to lake ecosystems and native wildlife, and it is illegal to import or distribute this species. There have been two reports of adult snakeheads in MA, but there are currently no known breeding populations. If you catch a potential snakehead, do not release it: call DCR or DFG immediately. Snakeheads have elongated tan bodies with dark mottling. They can grow over 3 feet long and weigh up to 15 pounds. These voracious top level carnivores have large mouths lined with sharp canine teeth and feed on native fish, frogs and other aquatic wildlife. Snakehead fish are able to breathe air, and if they remain moist, can survive out of water for several days. Snakeheads have been reported to cross land by wiggling and/or by using their pectoral fins, although these attempts are often unsuccessful.



Key Identifying Features

Snakeheads are often confused with the native Bowfins and Burbots; however, Bowfins have a short anal fin and usually a dark tail spot and Burbots have a split dorsal fin and a barbel.

THREAT

Massachusetts Lake Contacts

Massachusetts Department of Conservation and Recreation

Lakes and Ponds Program website: www.mass.gov/lakesandponds
Jim Straub 617-626-1411

Massachusetts Department of Environmental Protection

Office of Watershed Management
617-767-2877 website: www.state.ma.us/dep/

Massachusetts Division of Fish and Game

Natural Heritage and Endangered Species Program
508-792-7270 ext 163 www.state.ma.us/dfwele/dpt_toc.html

North East Aquatic Nuisance Species Panel (NEANS)

http://www.northeastans.org/

Massachusetts Congress of Lakes and Ponds (COLAP)

508-429-5085 website: www.colap.com

Credits:

Text prepared by Michelle Robinson; Spiny Water Flea, Zebra Mussel and Asian Clam co-written by Michelle Robinson and Jim Straub.

Line drawings are from the Aquatic Vascular Plants of New England series with the exception of those noted below; photographs courtesy of the Florida Center for Aquatic & Invasive Species with the exception of those noted below:

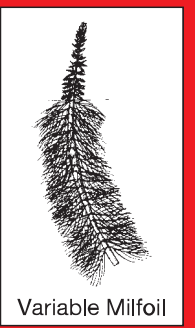
Variable Milfoil:	Maine DEP
Eurasian Milfoil:	Photo: Pennsylvania Dept. Conservation & Natural Resources
Fanwort:	Ben Keift (www.floron.nl)
S. American Waterweed:	Line drawing from the Center for Aquatic and Invasive Species; photo from The Nature Conservancy
Curly-leaved Pondweed:	Photo from Virginia Tech Weed Identification Guide
European Naiad:	Photo from USGS website
Water Chestnut:	Photo from Aquatic Vascular Plants of New England
Yellow Floating Heart:	Photo from Aquatic Vascular Plants of New England
Purple Loosestrife:	Photo from The Nature Conservancy
Hydrilla	Photo from The Nature Conservancy
Parrot Feather:	Line drawing from the Center for Aquatic and Invasive Species
Zebra Mussel:	Photo: Charles Ramcharan-Wisconsin Sea Grant
Spiny Water Flea:	U.S Fish and Wildlife Service
Fish Hook Flea:	Environmental Protection Agency website – Mirja Rosenburg
Asian Clam:	Photo: Noel M. Burkhead, U.S. Geological Survey Drawing: Michelle Robinson
Snakehead:	Photo: Susan Trammel (USGS); drawing of snakehead Susan Trammel (USGS); bowfin Duane Raver (West Virginia DNR); burbot Ted Walke (Michigan DNR)
Boat Check Image:	Redrawn from Iowa DNR

STOP

The Spread of…


Eurasian Milfoil


Fanwort


Variable Milfoil


Zebra Mussel

NUISANCE AQUATIC PLANTS AND ANIMALS

- Remove ALL plants and animals from boat, trailer, anchors, fishing gear and dive gear.
- Flush engines and dispose of bat, bilge water and bait bucket water on land away from shore.
- Never release any plant or animal into a body of water, unless it came out of that body of water.
- Dispose of all foreign matter far from water!

Protect the environment! Always check your boat, trailer and gear before entering and leaving a waterbody.