

Variable Milfoil: An Invasive Aquatic Plant

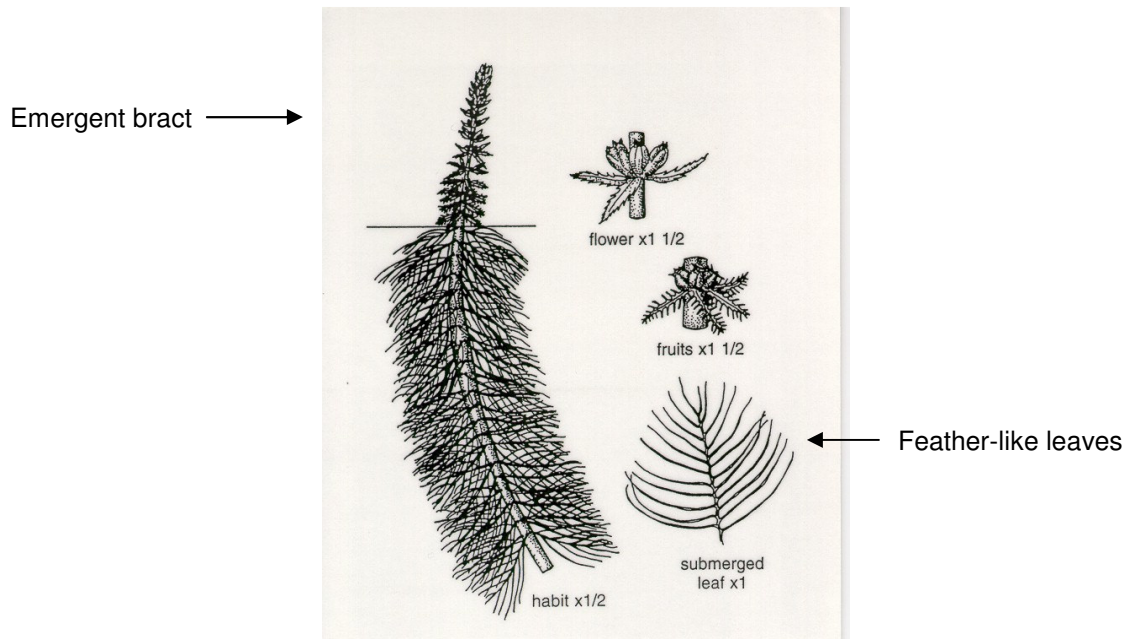
Myriophyllum heterophyllum



Description

- Variable Milfoil is an aquatic rooted, submerged non-native plant with a “raccoon-tail” or pipe cleaner appearance.
- Variable Milfoil can form dense mats at the water surface and can grow in the photic zone, in up to 10 feet of water.
- The delicate green underwater leaves are feather-like and average ½ to 2 inches across. Leaves are arranged around the stem in whorls of 4-6. The leaves have 6-12 segments.
- During late summer a 4-6 inch emergent bract develops, protruding above the water surface. The small bright green leaves on the bract are oval and are both serrated and non-serrated. (The lower female section of the bract has serrated leaves, and the upper male portion has smooth margins).
- The stems are thick, robust and usually red.

Variable Milfoil



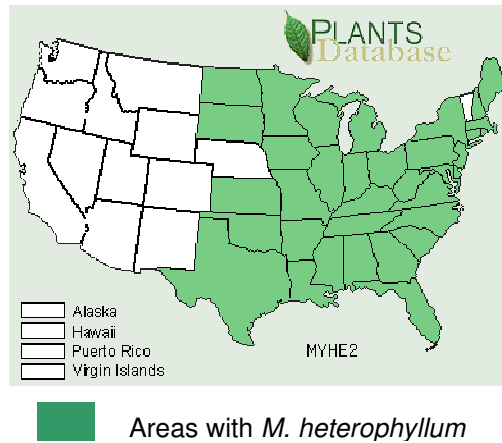
Habitat

Variable Milfoil is a hardy species that has established itself in a wide range of aquatic habitats.

- Over-winters in the frozen lakes of northern climates and can thrive in warm southern water bodies.
- Grows under a wide range of water chemistry conditions, can be found in acidic and calcium-rich lakes and can tolerate a wide range of temperatures.
- Prefers slow moving waters, including lakes and ponds, but occasionally can be found in rivers.
- Found state wide, but tends to prefer the acidic waters of eastern Massachusetts

Distribution Map

Myriophyllum heterophyllum



Reproduction

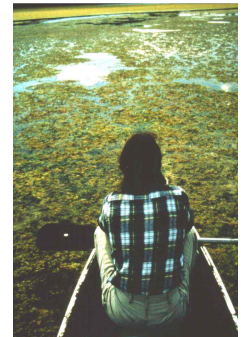
Variable Milfoil reproduces by both vegetative and sexual methods.

- Vegetatively, *M. heterophyllum* reproduces by fragmentation, rhizome division and asexually by budding.
- Although it is not as common, *M. heterophyllum* can re-grow from seeds remaining in lake or pond sediment.

Impacts and Threats Posed by Variable Milfoil

Variable Milfoil is a highly competitive plant that is capable of rapid growth and spread. Variable Milfoil can displace native species, reduce biodiversity, hamper recreational uses, reduce real estate, diminish aesthetic values and decrease water quality.

- Once established, Variable Milfoil can out-compete native vegetation. Species that depend on that native vegetation to survive are forced to relocate or perish, resulting in a loss of biodiversity.
- Variable Milfoil produces dense large mats of vegetation on the water surface, thus intercepting sunlight leading to the exclusion of other submerged plants.
- As Variable Milfoil plants die and sink to the lake bottom, sediment levels increase.
- Variable Milfoil greatly impedes boaters, fisherman, water skiers and swimmers, and these limitations on water use can negatively impact real estate values.
- When dense mats of Variable Milfoil decay, the available oxygen in the water is depleted. The resulting low oxygen conditions (anoxia) can lead to fish kills and harm other aquatic organisms.



Management Methods

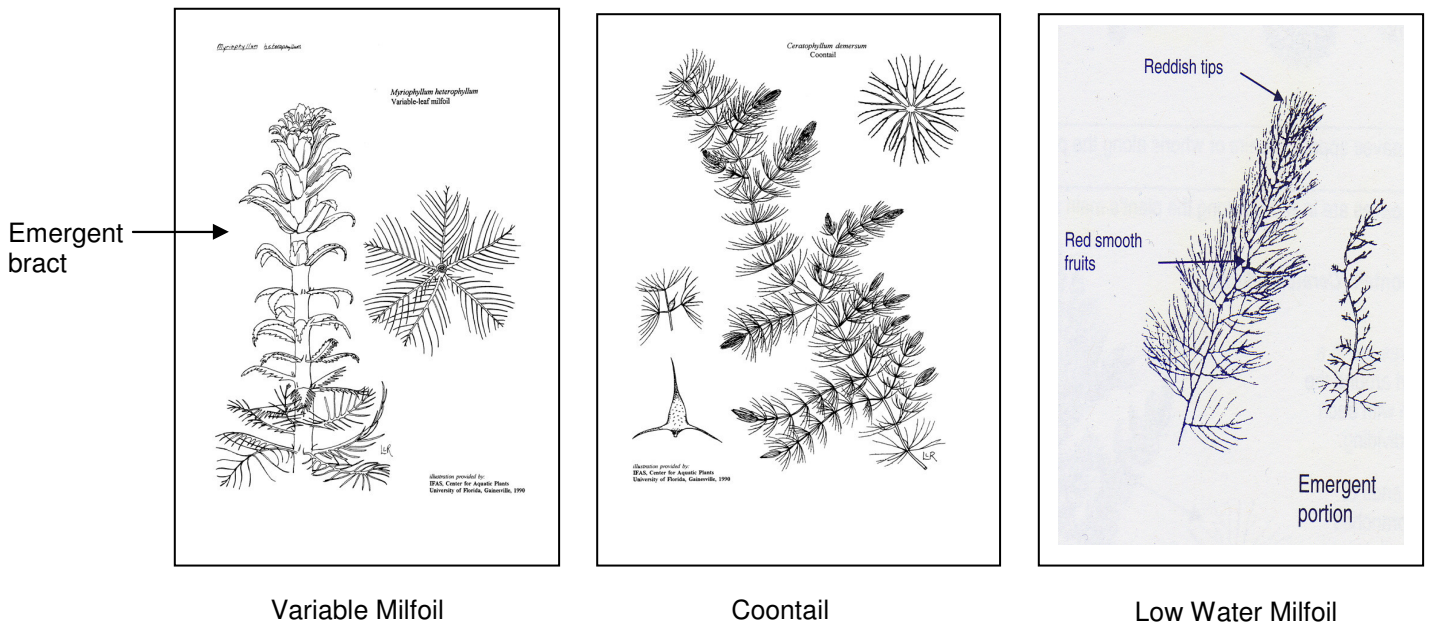
Management methods currently include mechanical removal, drawdowns, and herbicides. No known biological controls exist.

- Although harvesting can greatly reduce the Variable Milfoil biomass in a water body, harvesting also causes fragmentation, and fragments are capable of producing new plants. Some fragments may drift down stream or attach to boats and wildlife and create new infestations elsewhere.
- Drawdowns can be an effective mode of Variable Milfoil control if the drawdown is extensive enough to prevent re-growth from seeds. Drawdowns may impact fish, aquatic organisms, reptiles, amphibians and downstream conditions.
- Several herbicides have been used to control Variable Milfoil, including Diquat and 2,4-D.
- Benthic barriers may be used in small areas including swimming beaches, boating lanes and around docks. The barriers restrict light and upward growth but can have a negative impact on benthic organisms, and need to be properly anchored and maintained.

Other Information

- Variable Milfoil is on the Massachusetts Prohibited Plant List (as of January 1, 2006)
- Variable Milfoil is occasionally sold in pet stores as Red Foxtail.
- Informational web sites:
 - <http://aquat1.ifas.ufl.edu/welcome.html> (Center for Aquatic Invasive Species, Florida)
 - www.ProtectYourWaters.net (Aquatic Nuisance Species national web site)
 - <http://www.state.me.us/dep/blwq/topic/invasive.htm> (Maine DEP web site)
- Variable Milfoil is often confused with the native Coontail (*Ceratophyllum*), Low Water Milfoil (*Myriophyllum humile*), and endangered Farwell's Milfoil (*Myriophyllum farwellii*).
 - The leaves of Coontail are branched (the stem continues to fork and split) where as Variable Milfoil has leaves that are feathered (like a bird feather).
 - Although both the native Low Water Milfoil and exotic Variable Milfoil have feathered leaves, the native Low Water Milfoil has very limp leaves that are alternate, not whorled. Low Water Milfoil does *not* form a stiff emergent bract with variable-type leaves, instead it develops a delicate emergent portion and smooth fruits at the leaf axils.
 - Farwell's Milfoil looks similar to Low Water Milfoil, but under close inspection, the fruits have ridges and bumps (not smooth).

Variable Milfoil compared to native Coontail and Low Water Milfoil



References:

- 1) Literature sources:
 - <http://www.mass.gov/dcr/waterSupply/lakepond/geir.htm> (Generic Environmental Impact Report)
 - www.rook.org/earl/bwca/nature/aquatics/myriophyllumhet.html
 - <http://www.wapms.org/plants/milfoil.html> (Western Aquatic Plant Managers Society)
- 2) Photographs were obtained from:
 - Unknown (cover photo)
 - <http://www.state.me.us/dep/blwq/topic/invasive.htm> (guy in canoe, Maine DEP)
 - <http://www.state.me.us/dep/blwq/doclake/varldr2.jpg> (first line drawing of Variable Milfoil)
 - A Guide to Aquatic Plants in Massachusetts (line drawings of Coontail and Low Water Milfoil)
- 3) The distribution map was taken from:
 - http://plants.usda.gov/cgi_bin/topics.cgi (USDA Plant Data Base)

For more information please contact:

D.C.R. Office of Water Resources, Lakes and Ponds Program
 Michelle Robinson at: michelle.robinson@state.ma.us
 Or visit the Lakes and Ponds web site at: www.mass.gov/lakesandponds
 Prepared by Michelle Robinson: November 2002