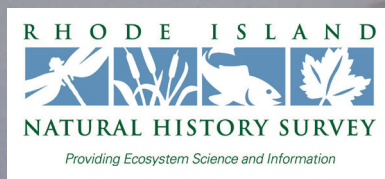


Guide to Non-Native Invasive Freshwater Aquatic Plants Found in Rhode Island and Neighboring States



Rhode Island Natural History Survey
URI Watershed Watch Program;
RI Dept. of Environmental Management;
Wood Pawcatuck Association
July 2011 3rd edition

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H.D. Leeson



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USDA.Gov

Text: Hope Leeson, Rhode Island Natural History Survey

Photos: as attributed

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Floating Leaved Species

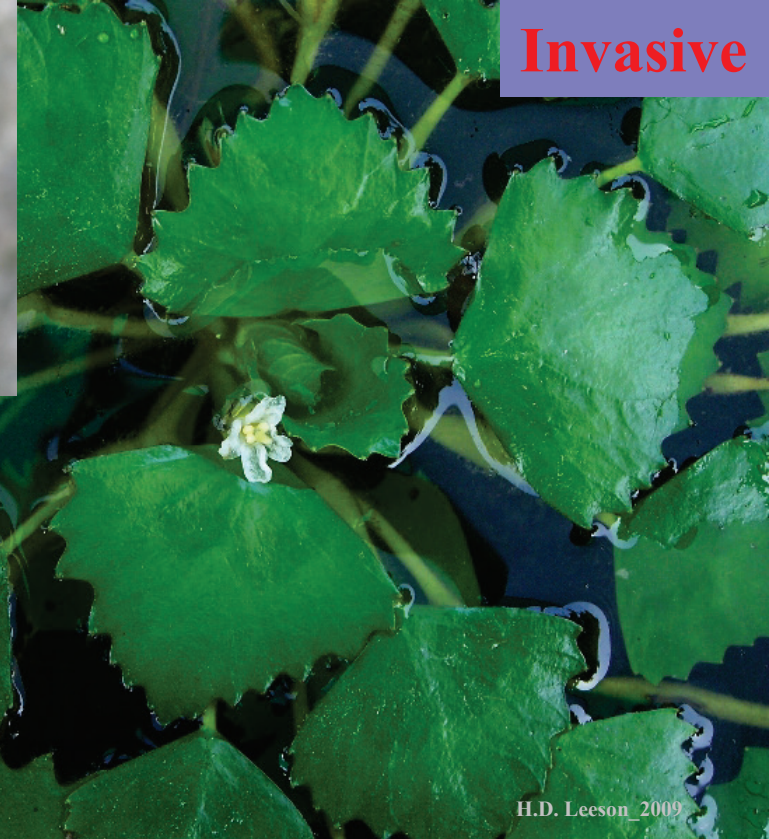
Water Chestnut

Trapa natans

Water chestnut Family (*Trapaceae*)



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- *Water chestnut is an aquatic plant with both floating and submerged leaves.
- *Floating leaves are triangular in shape, with sharply toothed leaf margins.
- *The leaf petiole (stem) is spongy and inflated.
- *Submerged leaf-like roots, arranged in pairs and whorls along the stem.
- * The flowers are white and about 1/3 of an inch across, and float on the surface.
- *The fruit is a hard nut, with four spines.

Invasive

Floating Leaved Species

Yellow Floating Heart

Nymphoides peltata

Buckbean Family (*Menyanthaceae*)



A Mrkvicka_2007



- *Floating leaves are heart-shaped and measure 5 to 15 cm (2-6 in.) long and wide.
- *Multiple branches arise from a main stem, each branch bearing 2 or more leaves.
- *Flowers are yellow with 5 petals, and measure about an inch in diameter.
- *Flowers are arranged in an umbel, with two small leaves lying opposite each other, located beneath the flower stems.
- *Tuberous roots are not present below the leaves.

Floating Leaved Species

European Frog's bit

Hydrocharis morsus-ranae

Frog's-bit Family (*Hydrocharitaceae*)



European frog-bit
Hydrocharis morsus-ranae
Photo by Mark Malchoff
Sea Grant - Lake Champlain



- *Frog's bit is usually free-floating with roots hanging down.
- *The floating leaves arise from the base, in a cluster at the top of the roots.
- *Leaves are heart-shaped, and 1 to 2 inches wide. The undersides are slightly spongy and reddish colored.
- *The flowers arise singly, on 3 to 4 inch stalks, with three white petals, and a yellow center. The petals are rounded and about $\frac{3}{4}$ of an inch long.

Floating Leaved Species

Native look-alike

Little Floating Heart

Nymphoides cordata

Buckbean Family (*Menyanthaceae*)

Native



© 2004 Janet Novak



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***Floating leaves are deeply heart-shaped and measure 3 to 7 cm long and wide.**

***Stems are long and thin (1 mm wide) bearing 2 or more leaves with tuberous roots present below the leaves (form with flower).**

***Flowers are white with 5 petals, and measuring 2 -3 mm in diameter.**

Floating Leaved Species

American lotus
Nelumbo lutea

Lotus-lily Family (*Nelumbonaceae*)



Invasive

- *Floating leaves are round, with a stem located in the middle of the leaf. Leaves measure 30–70 cm.
- *Flowering stems rise as much as 1 meter above the surface of the water.
- *Flowers are pale yellow, measuring 15-25cm wide. Distinctive, flat-topped seed pods develop, and persist above the leaves until late fall.

Floating Leaved Species

Native look-alikes

Spatterdock

Nuphar species

White water-lily

Nymphaea odorata

Water-lily Family (*Nymphaeaceae*)



Spatterdock



White water -lily

Native

***For both species, the floating leaves are cleft, with stems joining the leaf-blade at the tip of the cleft. Leaves measure 10-30cm long.**

***For Spatterdock, the flower is yellow and raised above the surface of the water by 10-20cm. Once fertilized flowers fall into the water.**

***For White water-lily, the flowers are white with numerous petals, and float on the surface of the water. Following fertilization the flower is pulled beneath the surface of the water.**

Floating Leaved Species

Water-hyacinth

Eichhornia crassipes

Water-hyacinth Family (*Pontederiaceae*)



Forest Starr, 2007

- *Plants are usually floating, with hanging roots. Leaf blades are rounded with greatly inflated petioles. Leaves measure 4-12cm across.
- *Flowers are grouped in a tight panicle that rises above the floating leaves. Flowers are lavender in color, with a violet blotch with a yellow center located on the upper lip. Each blossom is 5-7cm wide.

Submergent Species with Thin, Feather-like Leaves

Parrot Feather
Myriophyllum aquaticum

Water-milfoil family (*Haloragaceae*)



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- *Feather-like leaves arranged on a stout stem in whorls of 4 to 6; blue-green in color.
- *Each leaf with 10 to 18 segments on each side.
- *Emergent (above water) leaves can be 1 to 1¼ inches long, with submersed leaves 2 inches long.
- *Emergent stem can extend as much as 1 foot above the surface of the water.
- *Flowers are 4-sided and indistinct, occurring in the axils of emergent bracts (and submergent leaves).

Submergent Species with Thin, Feather-like Leaves

Variable Milfoil

Myriophyllum heterophyllum

Water-milfoil family (*Haloragaceae*)



Two-leaf watermilfoil
Myriophyllum heterophyllum
Photo by A. Murray
Copyright 2002 Univ. Florida

- *Feather-like leaves arranged on a (stout) reddish stem (3 mm) in whorls of 5 to 6 (occasionally alternate lvs. present).
- *Leaves are closely packed along the stem.
- *The segments of each leaf are thin, and composed of 10 to 14 segments on each side.
- *Floral bracts (modified leaves) on emergent (above water) stems are whorled. Bract margins are wavy, or finely toothed.
- *Emergent stems extend 4 to 6 inches above the water surface.
- * Pink flowers are 4-sided occurring in the axils of the emergent bracts (bracts are 2 or 3x as long as the flower).

Submergent Species with Thin, Feather-like Leaves

Eurasian Water-milfoil
Myriophyllum spicatum

Water-milfoil family (*Haloragaceae*)



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Photo by:
Richard Old
www.xidservices.com

- *Feather-like leaves arranged on the stem in whorls of 3 to 5 (usually 4)
- *Each leaf with 12 to 20 segments on each side; leaf tips being blunt (as though cut across the tip).
- *Spacing between leaf whorls is ½ inch to 1¼ inch.
- *Stems branch near the water surface.
- *The emergent (above water) stem is thicker (2x) than the submergent stem, and often red in color.
- *Emergent stems extend 2 to 4 inches above the water surface, often bent and lying partially on the surface.
- *Flowers are red colored and 4-sided, occurring in the axils of the emergent bracts *Bracts are inconspicuous, and as long as the flower, longer toward the base of the emergent stem.

Submergent Species with Thin, Feather-like Leaves

Native look-alike

Lowly Water-Milfoil

Myriophyllum humile

Water-milfoil family (*Haloragaceae*)

Native



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***Feather-like leaves all submergent, primarily alternately arranged along the stem (some sub-opposite and whorled), composed of 6 to 10 segments.**

***Small indistinct pink flowers arranged in the axils of submerged leaves.**

***Plant has a terrestrial flowering form when accumulated on the shoreline.**

Submergent Species with Thin, Forked Leaves

Fanwort

Cabomba caroliniana

Water-shield family (*Cabombaceae*)



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H.D. Leeson_2008

- *Main leaves all submergent (leaves below flowers floating).
- *Submergent leaves are arranged in pairs (opposite) along stem, fan-like in shape, and measure about 5 cm across (1-2 in.).
- *Leaves forking toward tip.
- *Floating leaves (sometimes present) are 12 to 18 mm wide, and elliptic in shape.
- *Flowers are white (can also be pink or purple) with a yellow center, raised above the floating leaves.

Submergent Species with Thin, Forked Leaves

Native look-alike

Coontail

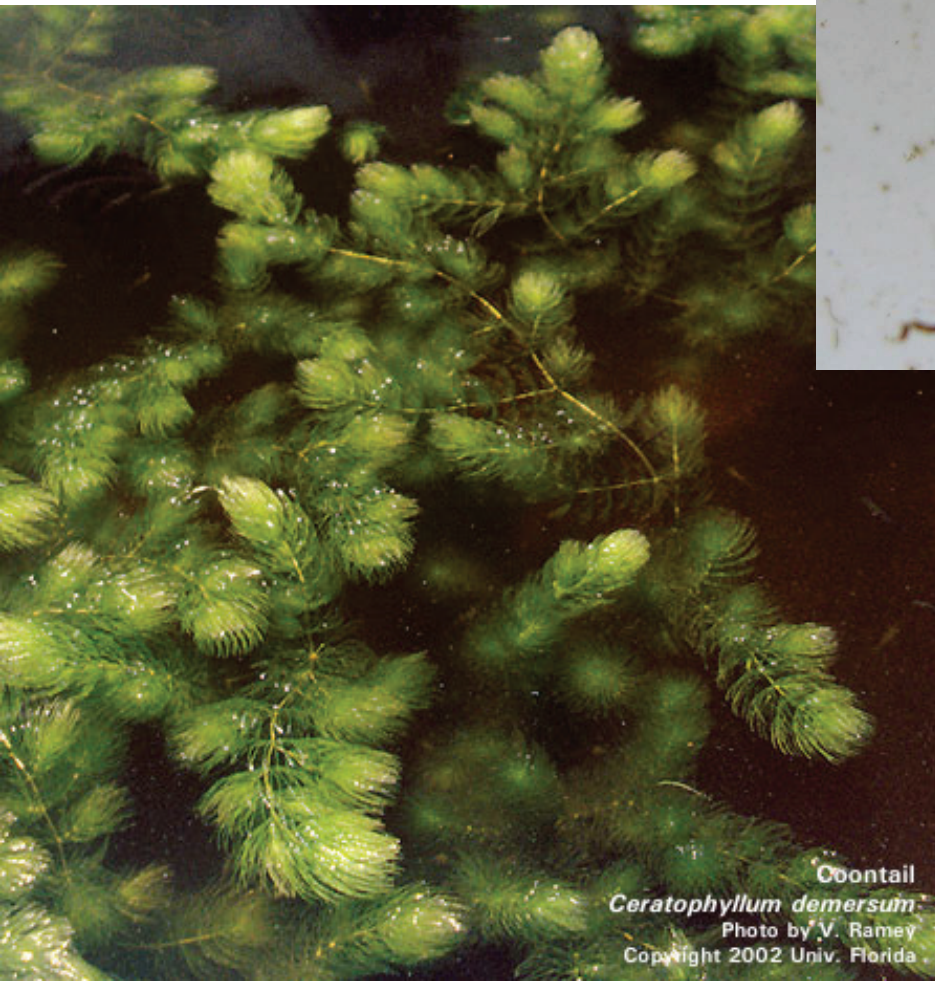
Ceratophyllum demersum

Hornwort family (*Ceratophyllaceae*)

Native



H.D. Leeson_2009



Coontail
Ceratophyllum demersum
Photo by V. Ramey
Copyright 2002 Univ. Florida

- *Submergent leaves arranged in whorls of 5 to 12 along the stem.
- *Leaves forked toward tip, and widen toward the base. Leaf margins are sharply toothed.
- *Flowers are rare in this species.
- *Plant lacks roots. Stems are often anchored in sediment by pale modified leaves.

Submergent Species with Flat Leaves

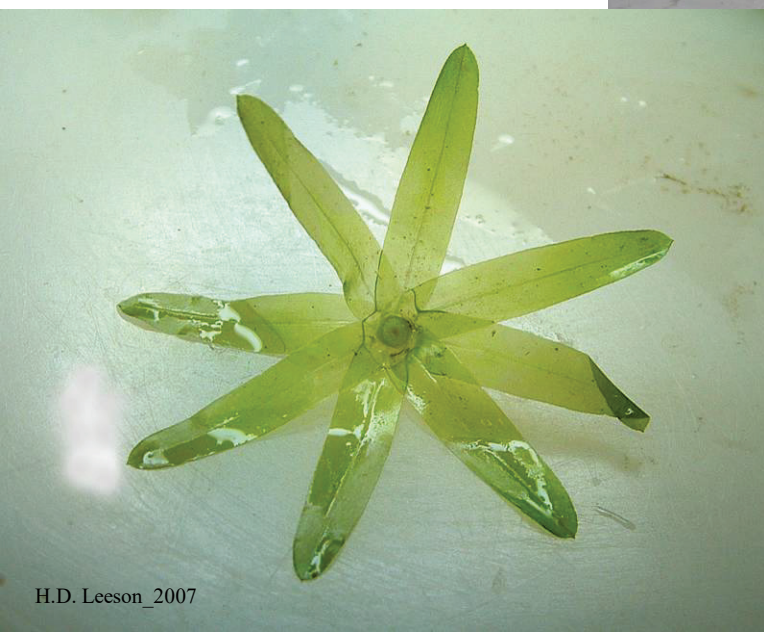
Brazilian Waterweed

Egeria Densa

Frog's-bit family (*Hydrocharitaceae*)



H.D. Leeson_2007



H.D. Leeson_2007

***Submerged leaves have narrow, flat blades that taper to a point, and turn down toward the tip. Leaf margins are finely toothed.**

***The leaves are arranged along the stem in whorls of 4 to 6 (sometimes 8, or even 2's & 3's near the base), and can be as large as 1 to 3 mm wide by 10 to 40 mm (0.4-1.5 in.) long.**

***The flowers are white, and are composed of 3 showy (9-11 mm long) petals, that are raised above the surface of the water, and are fragrant.**

Submergent Species with Flat Leaves

Hydrilla

Hydrilla verticillata

Frog's-bit family (*Hydrocharitaceae*)



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H.D. Leeson_2008

- *Grows beneath the surface of the water, on long flexible stems.
- *Flowers white, at water surface.
- *Leaves are in whorls of 4 – 6, and are visibly toothed along the margins.
- *Roots form small tubers that over-winter in bottom substrate.
- *Looks similar to Elodea and Egeria

Submergent Species with Flat Leaves

Native look-alike

Common Waterweed

Elodea Canadensis

Frog's-bit family (*Hydrocharitaceae*)



H.D. Leeson_2009



courtesy M Hassler, www.knoch1.de

- *Submerged leaves are arranged along the stem in pairs and whorls of 3 (rarely 4), and are bright green and firm in texture.
- *Leaves measure 1 to 5 (usually 2) mm wide, and 6 to 17 mm long.
- *Leaf blades overlap, and have a blunt tip. Leaf margins are smooth.
- *The lowest leaves are more rounded and lie opposite each other on the stem.

Submergent Species with Flat Leaves

Native look-alike

Free-flowered Water-weed

Elodea nuttallii

Frog's-bit family (*Hydrocharitaceae*)

Native



H.D. Leeson_2008



***Submerged leaves are arranged along the stem in whorls of 3 (rarely 4), and are light green, with a soft texture.**

***Leaves have narrow (0.3-1.75 mm wide) flat blades that taper to a point. Leaf margins are smooth.**

***Leaves are evenly spaced all along the stem.**

***Male flowers break loose and float to the surface, female flowers rise to the surface on long stalks.**

Submergent Species with Flat Leaves

Curly Pondweed *Potamogeton Crispus*

Pondweed family (*Potamogetonaceae*)



Korseby Online



Curly leaf pondweed
Potamogeton crispus
Vermont, USA
Photo by A. Bove
Copyright 2002 Ann Bove



- *The leaves are all submersed, and arranged alternately along the stem. Leaves are linear, measuring 4 to 10 mm wide and 3 to 9 cm long.
- *Stems are branching, and can be greater than 3 feet long.
- *Leaf margins are irregularly toothed, and wavy (looking like lasagna noodles when viewed from the side).
- *Flowers emerge on stalks in late spring and early summer. When fruits mature, plants die back, forming winter buds that begin to grow again in late summer and early fall.
- *Winter leaves look very similar, only thinner in texture and smaller in size.

Submergent Species with Thin Forked Leaves

European Water-nymph *Najas minor*

Water-nymph family (*Najadaceae*)



Source: Barry Hellquist



Maryland DNR

Invasive

- *Submergent leaves arranged in pairs (opposite) or clusters of small narrow leaves.
- *Leaf surface is smooth, but margins have 7-15 teeth, visible with the naked eye (or 10x hand lens).
- *Leaves are 0.5 to 3.5 cm long by 0.3 to 1.2 mm wide.
- *Leaves are stiff and curve downward. Plant holds its shape out of water.
- *Leaf base is expanded, and square looking. Teeth extend along the margins.

Submergent Species with Thin Forked Leaves

Native look-alike

Northern Water-nymph

Najas flexilis

Water-nymph family (*Najadaceae*)



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*Submergent leaves arranged in pairs (opposite) or clusters of small narrow leaves.

*Leaf surface is smooth, with very finely toothed margins (visible with a microscope), composed of 35 to 80 teeth.

*Leaves are 1 to 4 centimeters long by 0.2 to 0.6 millimeters wide.

*Leaves are flexible, and spread out to the sides, or grow upward as the plant ages.

*Leaf base tapers gradually, with finely toothed shoulders.

Submergent Species with Forked Stems and Bladders

Inflated Bladderwort

Utricularia inflata

Bladderwort family (*Lentibulariaceae*)



RIDEM, 2010

Characteristic	<i>U. inflata</i>	<i>U. radiata</i>
Shape of spokes	Tapers at both ends	Thick and cylindrical
Number of spokes	6-8	4-7
Length of spokes	3-8 cm	1-4 cm
Number of flowers	5-15 (usually 9-12)	3-4

- *Plant has finely dissected leaf-like branches, with bladders.
- *Submergent branches alternate along the main stem. Branches are closely packed, giving the plant a bushy appearance under water.
- *Inflated branches in a whorl of 4 to 10 leaves, hold the flowering stalk above the water.
- *The floating leaves are widest toward the tip, measuring 3 to 8 (commonly 5) centimeters long.
- *Finely dissected branches are located along the outer margins of the floating leaves.
- *3 to 14 flowers are borne above each inflated spoke. They are yellow and irregularly shaped. The lower lip measuring 10 to 15 millimeters and being unlobed (rounded).

Invasive

Submergent Species with Forked Stems and Bladders

Native look-alike

Floating Bladderwort

Utricularia radiata

Bladderwort family (*Lentibulariaceae*)



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Native

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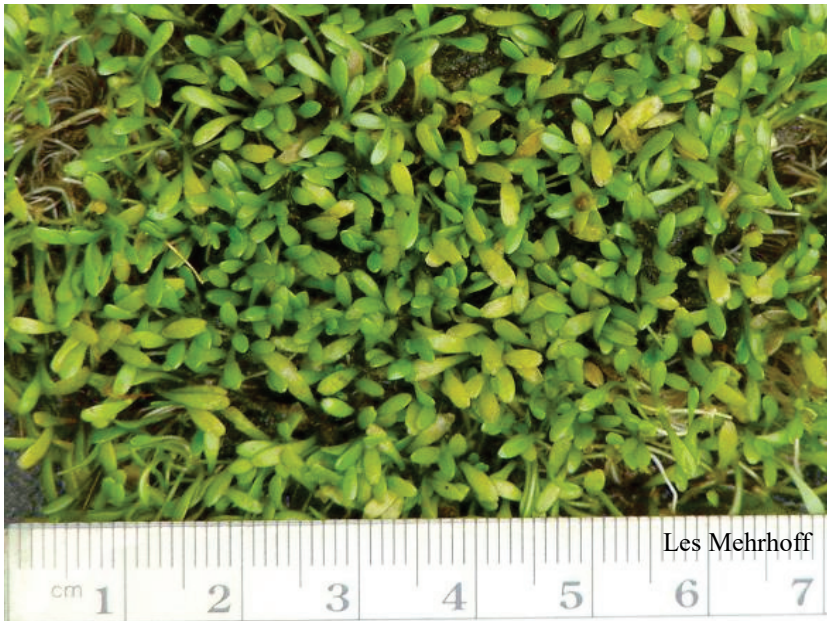
- *Plant has finely dissected leaf-like branches, with bladders.
- *Submergent branches alternate along the main stem, with branches becoming finely dissected toward the tips.
- *Inflated branches in a whorl of 4 to 7 leaves, hold the flowering stalk above the water.
- *The floating leaves are widest at the middle, measuring 1 to 4 centimeters long.
- *Finely dissected branches are located along the outer margins of the floating leaves.
- *1 to 4 flowers are borne above each inflated spoke. They are yellow and irregularly shaped. The lower lip measures 8 to 10 millimeters and is shallowly, 3-lobed.

Submergent Species

Mud-mat

Glossostigma cleistanthum

Lopseed family (*Phrymaceae*)



Invasive

***Plants are rhizomatous, forming mats at the edge of ponds with sandy substrates. Plants can be emersed or submersed, in water as deep as 4 meters.**

***Spatulate leaves are 1-3 cm long.**

***Flowers are white and tiny. When plants are emersed (out of the water) they produce small, open-pollinated flowers on stems as long as the leaves. When submersed, flowers are self pollinated and on stems shorter than the leaves.**

Submergent Species

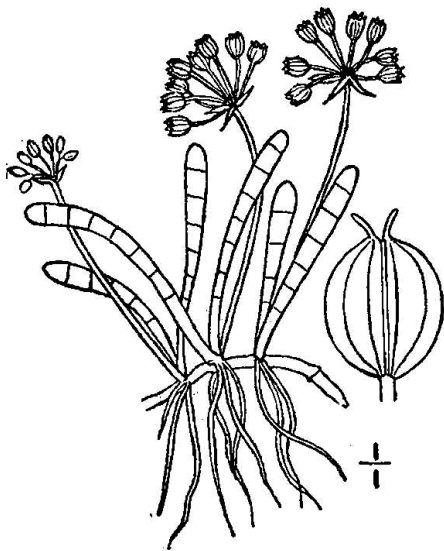
Native look-alike

State Endangered

Lilaeopsis

Lilaeopsis chinensis

Carrot family (*Apiaceae*)



Native

*Plants are rhizomatous, forming mats at the edge of brackish tidal rivers. Plants can be emersed (under water) or submersed.

*Spatulate leaves are 1-3 cm long.

*Flowers are numerous and whiteish green, rising from a single location on the flowering stalk.

Emergent Species

Reed Canary-grass

Phalaris arundinacea

Grass family (*Poaceae*)



H.D. Leeson_2007

Invasive

- *A tall, robust grass with blue-green stems, growing as tall as 6.5 feet, from creeping rhizomes (underground stems).
- *Leaf blades are flat and 10 to 20 millimeters wide.
- *The terminal panicle is large, measuring 7 to 25 centimeters. When in flower, the panicle is open. Plants growing in full sunlight are often reddish in color.
- *When in fruit the panicle is more tightly closed.



H.D. Leeson_2007

Emergent Species

Common Reed

Phragmites australis

Grass Family (*Poaceae*)

Invasive



- *A large perennial grass that can grow as tall as 13 feet growing colonially.
- *Leaves are flat and wide (2 to 3 cm), and blue-green in color.
- *Leaves and flowering stems persist into the next growing season.
- *The inflorescence is a dense, multi-branched panicle (plume) that is purple in flower, becoming tan with maturity.

Emergent Species

Yellow Iris

Iris pseudacorus

Iris Family (*Iridaceae*)



Courtesy Missouri Plants



***A perennial flower that grows colonially along pond and stream margins.**

***Leaves blades are flat with parallel veins (1.5-2cm wide)**

***Leaves and seed pods persist through the winter.**

***The inflorescence is yellow.**

***Seed pods are 6 chambered.**

Emergent Species

Purple Loosestrife

Lythrum salicaria

Loosestrife Family (*Lythraceae*)



- *A flowering perennial herb that can grow up to 5 feet in height.
- *The stems are 4 to 6 sided, and usually hairy, especially near the top of the plant.
- *Leaves are arranged in pairs along the stem, as well as in whorls of 3.
- *Leaf bases can be heart shaped or rounded, and attach directly to the stem without a petiole.
- *Flowers are magenta with 5 to 7 (usually 6) petals. Flowers are arranged in whorled clusters (each flower measuring 7 to 12mm) along a terminal spike.



Emergent Species

Forget-me-not

Myosotis scorpiodes

Borage family (*Boraginaceae*)



Tim McDowell 2004



H.D. Leeson, 2007

***A flowering perennial herb, with creeping (stoloniferous) rooted stems. Stems above the soil and water surface are angular, growing as tall as 24 in.**

***Leaves are coarsely hairy, measuring 2.5 to 8 cm long and 7 to 20 mm wide, and attaching directly to the stem in an alternate arrangement.**

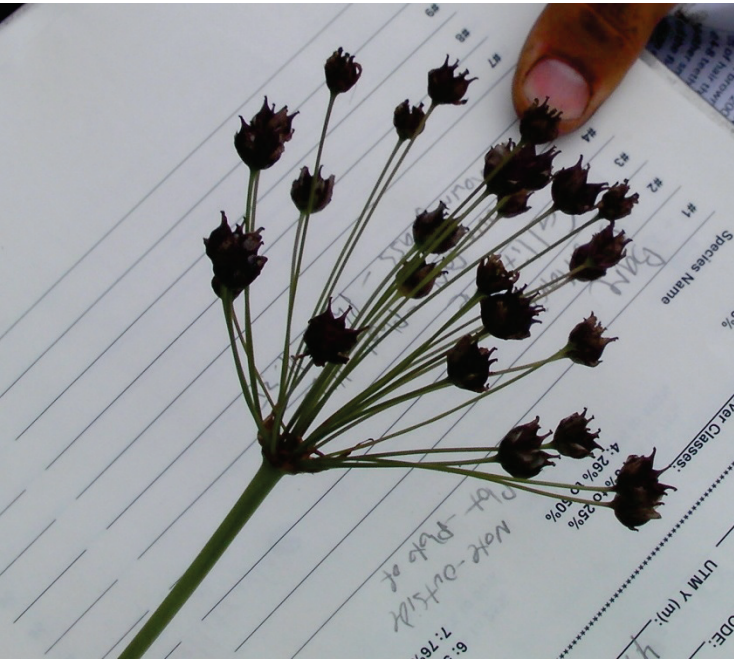
***Flowers are 5 lobed, with a tubular base. Flowers measure 5 to 10 mm across, with yellow centers (sometimes pink or white).**

Emergent Species

Flowering rush

Butomus umbellatus

Flowering rush family (*Butomaceae*)



- *A flowering grass-like plant, with long, thin basal leaves. Leaves and flowering stalk as tall as 1 meter.
- *Numerous flowers arising from a single point on a flowering scape 1 – 1.5+ meters tall.
- *Flowers are pink, with 6 petals; each measuring 2 – 2.5 cm across