Identifying Freshwater Aquatic Invasive Species in Rhode Island
Plant Communities

- Emergent plants
- Floating plants
- Littoral zone
- Submergent plants
- Photic zone
- Aphotic zone
Plant Structure

Leaf Arrangements
- Alternate
- Opposite
- Whorled

Finely-divided Leaf Patterns
- Fork-divided
- Branch-divided
- Feather-divided

Leaf Margins
- Entire
- Toothed or Serrate
- Pinnately Lobed
- Finely Divided

Leaf Shapes
- Triangular
- Heart
- Strap or Elongate
- Elliptical
- Oval
- Lance or Blade

Leaf Heterophylly
Some plants have two or more distinct leaf types. Mermaid weed (illustrated below) is a good example.

Submersed leaves are feather divided to pinnately lobed
Emergent leaves are blade shaped, and serrated to entire

Above images and text from the Maine Volunteer Lake Monitoring Program
Submergent Plants
Invasive Milfoil Species
(Myriophyllum sp.)

- Submergent species
- Leaves whorled around stem
- Leaves feather-divided
- Submergent and emergent portions

There are 3 Invasive Milfoil Species in RI
Variable Milfoil
(Myriophyllum heterophyllum)

- Densely packed whorls
- 4-6 leaves per whorl
- Stems often thick, robust and reddish
- Emergent flower spike
- Bracts are blade-shaped, serrated and much longer than the small white flowers
- Much larger and thicker than native milfoil species
Eurasian Milfoil
(Myriophyllum spicatum)

- Whorls of leaves openly spaced along stem; 1-3 cm in between
- 4 leaves per whorl
- Leaf tips are blunt
- Emergent flower spike
- Bracts have smooth margins
- Flowers larger than bract
Parrot Feather
(Myriophyllum aquaticum)

- Both submergent and emergent
- Emergent eaves bright green to blue-green; have waxy surface
- Submersed leaves often limp, brownish and deteriorating
- 4-6 leaves per whorl
- Small white flowers grow along stem; no flower spike or bracts
Native Look Alike
Low Watermilfoil
(Myriophyllum humile)

- Leaves closely spaced but scattered along stem (as opposed to whorled)
- Leaves and stems brown to red
- Does not form emergent spikes (flowers and fruits along the stem)
Native Look Alike
Mermaid Weed
(*Proserpinaca palustris*)

• Submergent and emergent leaves
• Submerged leaves alternate, feather divided, 5-10 cm long
• Emergent leaves blade-shaped and serrated
Native Look Alike
Coontail
(Ceratophyllum demersus)

- Not rooted
- Leaves are fork-divided, finely serrated and whorled around the stem
- Whorls closely-spaced at tip, giving the plant a raccoon tail appearance
- Stiff and coarse to the touch
- Will maintain shape out of water
Fanwort
(Cabomba caroliniana)

- Leaves opposite, branch-divided
- Leaves resemble fans
- Bright green color
- Small white flowers float on surface of water or are emergent
- Small elliptical floating leaves present when flowering
Native Look Alike
Water Marigold
(*Bidens beckii*)

- Submergent leaves are branch-divided and arranged in opposite pairs on stem.
- Each leaf divides 3 times at the stem, giving the appearance of a whorl of 6 smaller leaves.
- Emergent leaves are blade-shaped, serrated and surround yellow flowers.
- Often coarser and stiffer than fanwort.
Curly-leaf Pondweed
(*Potamogeton crispus*)

- Submerged leaves only
- Leaves green, translucent with reddish tinge
- Leaves are alternate and attached directly to stem
- Leaves strap-shaped, taper at base and have rounded tips
- Leaves finely serrated and have wavy margins
Native Look Alike
Clasping-leaf Pondweed
(Potamogeton perfoliatus)

There are 18 species of pondweed documented in Rhode Island. Most have both floating and submergent leaves. Curly-leaf pondweed is the only serrated pondweed in Rhode Island.

- Submerged leaves are alternate, oval to blade-shaped and entire
- Leaves much wider than curly-leaf pondweed
- Leaves clasp around entire base of stem
Spiny Naiad
*(Najas minor)*

- Long stems that branch profusely at top
- Leaves along stem may be opposite, whorled or alternate and form tufts toward the tip
- Leaves arch backward, are stiff and will maintain shape out of water
- Leaves are thin, strap-shaped, pointed and visibly serrated (7-15 spines on each side of the leaf)
Native Look Alike

Native Naiads

*(Najas flexilis & Najas gracillima)*

*Najas flexilis*
- Leaves arch backward, are stiff and will maintain shape out of water
- Very fine serrations are visible only with magnification (20-100 spines on each side of leaf)

*Najas gracillima*
- Leaves are slender (less than 0.2mm wide), flimsy and do not arch backward
- Leaves will not maintain shape out of water
- Fine serrations may be visible with a hand lens (13-17 spines on each side of leaf)

Pictures from University of Wisconsin- Stevens Point Freckmann Herbarium. Available at [http://wisplants.uwsp.edu/index.html](http://wisplants.uwsp.edu/index.html)
Brazilian Elodea
(*Egeria densa*)

- Leaves densely whorled, blade-shaped and serrated
- 4-6 leaves per whorl
- Leaf length 1-3 cm
- Emergent white flowers
- More robust than native elodea
Native Look Alike
Native Elodeas
(Elodea canadensis & Elodea nuttallii)

Both species of native Elodea have whorls of 3 leaves. Leaves are finely serrated, visible only with significant magnification

*Elodea canadensis*
- Leaves are short, stout with blunt tips
- Leaves are stiff and maintain shape out of water

*Elodea nuttallii*
- Leaves are longer, slender with pointed tips
- Leaves are flimsy and do not maintain shape out of water

Pictures from University of Wisconsin- Stevens Point Freckmann Herbarium. Available at [http://wisplants.uwsp.edu/index.html](http://wisplants.uwsp.edu/index.html)
Mudmat
(Glossostigma cleistanthum)

- Low-growing, mat-forming
- Leaf pairs grow along underground rhizomes; resemble rabbit ears
- Leaves 1-4 cm long
- Visible as small green leaves along the bottom
- Common in shallow, muddy or sandy coves
Floating Plants
Water Chestnut
*(Trapa natans)*

- Floating and submergent leaves
- Floating leaves arranged in rosettes
- Leaves triangular and toothed
- Floating leaves attached to stem with spongy inflated leaf stems
- Submerged leaves fine and feather divided
- Fruit attached to underside of rosette
- Fruits are large and contain four barbs
Inflated Bladderwort  
(*Utricularia inflata*)

- Underwater portion not rooted; leaves are finely divided, branched, and contain “bladders”
- Flower stalk supported on floating, spoke-like wheel
- Yellow, snapdragon-like flowers
Native Look Alike
Floating bladderwort
(*Utricularia radiata*)

Similar to inflated bladderwort, but generally smaller

<table>
<thead>
<tr>
<th>Characteristic</th>
<th><em>U. inflata</em></th>
<th><em>U. radiata</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape of spokes</td>
<td>Tapers at both ends</td>
<td>Thick and cylindrical</td>
</tr>
<tr>
<td>Number of spokes</td>
<td>6-8</td>
<td>4-7</td>
</tr>
<tr>
<td>Length of spokes</td>
<td>3-8 cm</td>
<td>1-4 cm</td>
</tr>
<tr>
<td>Number of flowers</td>
<td>5-15 (usually 9-12)</td>
<td>3-4</td>
</tr>
</tbody>
</table>
Yellow Floating Heart
*(Nymphoides peltata)*

- Round to heart-shaped leaves with wavy margins
- Leaf notch extends from edge to stem
- Multiple leaves per stem
- Flowers emergent, bright yellow with fringed petals
- Form dense mats
Native Look Alike
Yellow lily
(*Nuphar variegata*)

- Oval to heart-shaped leaves with small leaf notch; leaves much larger than invasive
- One leaf per stem; stems are thick, Flowers are emergent, yellow and ball-shaped
Native Look Alike

Little floating heart

(Nymphoides cordata)

• Small heart-shaped leaves
• One leaf per stem
• Small white flowers
• Clumps of elongate green roots (resembling bunches of bananas) along the stem

Top picture: Maine Volunteer Lake Monitoring Program
Bottom picture: USDA Natural Resource Conservation Service Plants Database
American Lotus  
(*Nelumbo lutea*)

- Floating and emergent plant
- Round, blue-green leaves up to 2 ft in diameter
- Flat while floating and conical when emergent
- Lack the slit of native lilies
- Large white to yellow flowers
- Center of flower has cone-shaped seed pod, which remains after flower dies
Native Look Alike
White Water Lily
 (*Nymphaea odorata*)

- Round leaves with narrow leaf notch from edge to center (looks like someone took a piece of pie)
- Tops of leaves are bright green with waxy surface, undersides are reddish-purple
- Large flowers with numerous white petals and a cluster of yellow stamens
Water Hyacinth
(*Eichhornia crassipes*)

- Floating plant
- Leaves arranged in rosette
- Leaves are rounded to kidney-shaped, bright green with waxy surface
- Leaves supported by inflated leaf stems
- Purple flower spikes
Animals
Asian Clam
(*Corbicula fluminea*)

- Small; usually about the size of a penny up to the size of a quarter
- Thick concentric rings
- Yellow-green to brown in color
- Usually found in sand
- Look for shells of dead clams
Zebra Mussels
(Dreissena polymorpha)

- Yellow-brown D-shaped shell
- Very small (about the size of a fingernail)
- Alternating light and dark bands
- Found in dense clusters attached to any solid surface

NOT YET IN RHODE ISLAND!
As of December 2010

Top picture: USGS Bottom picture: Vermont Department of Environmental Conservation
Other Guides

• Connecticut’s Invasive Aquatic and Wetland Plants Identification Guide
  Put together by the CT Agricultural Experiment Station. Includes emergent plants. Great Pictures.

• Maine Field Guide to Invasive Aquatic Plants
  Put together by the Maine Center for Invasive Aquatic Plants/Maine Volunteer Lake Monitoring Program for their volunteers. Extremely comprehensive. Includes most native species as well. Available free online or hard copy can be purchased from website for $19.95