Invasive aquatic plants threaten our natural resources, displace native plants, wildlife & impede recreational activities. Educated and concerned volunteers LIKE YOU can help by keeping an eye out for these aquatic invasive plant species, reporting your observations, and being responsible stewards of our natural resources. Learn more at www.sleoinvasive.org

Safety First

1. Always travel in pairs, use the buddy system & inform someone of your travel plans
2. Always have a first aid kit nearby
3. Wear your life jacket when on the water
4. Bring a means of communications with you, ie. cell phone or two-way radios
5. Place emergency contact numbers into your phones address book
6. Drink plenty of water on hot days and bring snacks & pace yourself

Steps You Can Take to Stop the Spread Of Invasive Species

Choose Native Plants

Collect a Specimen/ Take a photo

- Get a close-up photo
- Put a specimen in a container and label it with date/location/contact info
- Email photo(s) to rwilliams@tnc.org or call 315-387-3600 x 7725 for drop off location(s) near you

Clean Your Shoes & Hiking Gear
A Steward’s Dichotomous Key For Aquatic Hitchhikers

Differentiating invasive and native aquatic plants with confidence

*Created by: Sean A. Regalado – Adirondack Watershed Institute*

1a The plant has bladders........................................Bladderwort

1b The plant has no bladders........................................2

2a The plant is whorled...............................................3

2b The plant is opposite...............................................9

2c The plant is alternate............................................10

2d The plant forms a rosette........................................11

3a The leaves are simple.............................................4

3b The leaves are complex..........................................6

4a The whorl has exactly three simple leaves............................Elodea

4b The whorl has four or more simple leaves...............................5

5a The simple leaves have toothed margins and midribs. Four to eight leaves per whorl...............................Hydrilla (invasive)

5b The simple leaves are not toothed. Often only four per whorl
........................................................................Brazilian Elodea (invasive)

6a Each leaf is complex with many “leaflets” growing only from a midrib.........................................................(Milfoils) 7

6b Each leaf is complex with each leaflet leaf NOT growing from a midrib.........................................................Other

Crow and Hellquist 1982

Milfoil

Hydrilla

Brazilian Elodea
7a The tips of the complex leaves appear clipped, leaflets are 12 or more in number, leaves collapse upon the stem when out of water, and whorls are >1” apart. Milfoil, Eurasian (invasive)

7b The tips are rounded and the leaves remain bushy out of water, and whorls are <1” apart.

8a Stem robust, thick, and dark red and whorls slightly offset, whorls may contain 4-6 feathery leaves. Milfoil, variable (invasive)

8b Stem not robust, thick, or dark red. Often perfectly whorled with bright green leaflets. Milfoil, native

9a Leaves are complex with many forked leaflets attached by a petiole to the stem. Fanwort

9b Leaves are simple. Other

10a Leaves are generally ½ inch wide and 2-3 inches long with numberless small teeth along the margin of the leaf. Curly leaf pondweed (invasive)

10b Leaves without numberless small teeth along the margin of the leaf. Pondweed, native

11a Leaves are triangle shaped, clearly dentate with airbladders on stem, and may have a hard nut with four ½ inch barbed spines. Water chestnut (invasive)

11b Leaves are heart shaped with the venation on the underside of the leaf following the margin of the leaf in a parallel heart shape. European frogbit (invasive)
# Glossary of Dichotomous Key Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Alternate</td>
<td>Pertaining to an arrangement of leaves where only one leaf is born at each level of the stem.</td>
</tr>
<tr>
<td>Complex</td>
<td>A leaf that is divided by either many leaflets or is extremely sinuous.</td>
</tr>
<tr>
<td>Bladder</td>
<td>In terms of aquatic plants, this is the carnivorous sack of bladderworts that captures micro invertebrates and other small organisms. Bladders range in size from 0.2 mm to 1.2 cm.</td>
</tr>
<tr>
<td>Dentate</td>
<td>Pertaining to a leaf with a triangular, tooth like edge.</td>
</tr>
<tr>
<td>Leaflet</td>
<td>A small leaf like part of a true leaf.</td>
</tr>
<tr>
<td>Margin</td>
<td>The edge of a leaf.</td>
</tr>
<tr>
<td>Opposite</td>
<td>Pertaining to leaves occurring two at a node on opposite sides of the stem.</td>
</tr>
<tr>
<td>Petiole</td>
<td>The stalk of a leaf.</td>
</tr>
<tr>
<td>Rossette</td>
<td>The arrangement of leaves in a dense, radiating cluster forming the base of the majority of plant mass.</td>
</tr>
<tr>
<td>Simple</td>
<td>Pertaining to a leaf that is not divided.</td>
</tr>
<tr>
<td>Whorled</td>
<td>Pertaining to leaves arranged in a circle at one level of the stem.</td>
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</table>

*The Dichotomous Key was created by:*

Sean A. Regalado  
Research Associate  
Adirondack Watershed Institute  
Paul Smith’s College  
sregalado@s.paulsmiths.edu
INVASIVE Hydrilla (*Hydrilla verticillate*)

Visible leaf serrations

Leaves whorled in bunches of 4-8 (most often 5) around stem

Photo credits: invasive.org: [https://www.invasive.org/browse/subthumb.cfm?sub=3028](https://www.invasive.org/browse/subthumb.cfm?sub=3028)

INVASIVE Brazilian waterweed (*Egeria densa*)

3-6 leaves less than 1in. whorled around stem
Finely serrated leaves
Smooth midrib on leaf underside
No tubers

Photo credit: invasive.org: [https://www.invasive.org/browse/subinfo.cfm?sub=3019](https://www.invasive.org/browse/subinfo.cfm?sub=3019)

NATIVE Look-a-Likes of Invasive Hydrilla & Brazilian Waterweed

Native Elodea (*Elodea spp.*)

Leaves are in whorls of 3 around stem and **do not** have serrations.

Invasive Fanwort (*Caamba caroliniana*)

Submerged fan-shaped leaves with tips that split like a “y” + a distinctive petiole that branches off the main stem = fanwort

Native Look-a-Likes of Invasive Fanwort

**Native Buttercup (*Ranunculus*)**: Submerged leaves are *alternately arranged* and attached by a *distinct petiole*.

**Native Water Marigold (*Megaladonta*)**: Submersed leaves *lack a petiole*, branched, arranged opposite around the stem.

**Native Bladderwort (*Utricularia*)**: Leaves are finely divided in a branching pattern along the main stem of the plant. Small round *bladders grow* along the branches of the leaves (used to capture & digest small aquatic organisms)

Leaves don’t look like a fan.
Invasive Water Milfoils Versus Native Water Milfoils

It is difficult to distinguish between native & invasive milfoil species as there are many different varieties of both. Below are some distinguishing features to look for.

(there are many more milfoil species than what is shown below, however, these are most common in our region).

Invasive Milfoil Varieties

<table>
<thead>
<tr>
<th>Leaves 3-6 leaflet pairs 10-24</th>
<th>Leaves 4-6 leaflet pairs 5-14</th>
<th>Leaves 4-6 leaflet pairs 5-14</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Terminal leader is often reddish-brown. Leaf tips are blunt.</strong></td>
<td><strong>Red leaves are common</strong></td>
<td><strong>Red stems are common</strong></td>
</tr>
</tbody>
</table>

Native Variety

<table>
<thead>
<tr>
<th>Leaves 4-5 leaflet pairs 5-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-14 leaflet pairs</td>
</tr>
</tbody>
</table>

Invasive Parrot Feather (Myriophyllum aquaticum)

| Leaves 4-6 leaflet pairs 5-14 |

Invasive Eurasian Water Milfoil

| 10-24 leaflet pairs |

Native Northern Water Milfoil

| 5-14 leaflet pairs |

Invasive Starry Stonewort (*Nitellopis obtusa*) (*a type of microalgae*)

A stem with 4-6 smooth branchlets that each have one or more short bracts stemming off it, giving an uneven forked appearance. *If branchlets go limp when squeezed, it’s N. Obtusa.*

Distinctive white star-shaped bulbils


**NATIVE Look-a-Likes for Invasive Starry Stonewort**

**Native *Chara spp.***

Has a skunky smell and feels rough

https://microscopesandmonsters.wordpress.com/tag/chara/

**Native *Nitella spp.***

Has no odor and feels smooth

https://lakestewardsofmaine.org/mciap/FieldGuide.pdf
INVASIVE Brittle (European) Naiad (*Najas minor*)
Leaves have 7-15 spines (visible without magnification). Leaves may appear to be opposite, in whorls, or in clumps.

NATIVE Look-a-Likes for Invasive Brittle Naiad

**Native Thread-like naiad**  
(*Najas gracillima*)  
Slender, flimsy thread-like leaves that have 13-17 spines (*visible with hand lens*)

**Native Slender naiad**  
(*Najas flexilis*)  
Fine, stiff, slender leaves with 20-100 minute spines. When mature, leaves tend to arch backwards. (*Strong magnification needed*)
**Invasive Water Soldier** (*Stratiotes aloides*)

Floating sword shaped serrated leaves that from a rosette
*(looks similar to an aloe plant or the top of a pineapple)*

Left & Center Photo Credit: Jakob Katzenberger, Dietmar Zacharias, [pollinationsecology.org](http://www.pollinationsecology.org)

**Invasive Water Hyacinth** (*Eichhornia crassipes*)

Rounded floating leaves with thick, waxy, spongy petioles. Showy blue-purple flowers that grow on spikes. Each flower has six petals with the uppermost having a yellow patch.
Invasive European Water Chestnut (Trapa natans)
Triangular, tooted leaves that form a floating rosette connected to a submerged stem by inflated petioles. Sharp pointed nutlets develop mid summer and are attached to the rosette.

Invasive European frog-bit (Hydrocharis morsus-ranae)
Small (20-60mm), thick, waxy, heart shaped floating leaves with smooth edges and spongy, purplish-red undersides. Long, unbranched stems dangle from undersides of each floating leaf. Flowers are white with three petals and yellow centers that grow on spikes above water.
INVASIVE Curly-Leaf Pondweed Versus Native Look-a-Likes

Invasive Curly-Leaf Pondweed  
(Potamogeton crispus)

Native Clasping-Leaf Pondweed  
(Potamogeton perfoliatus)

Native Broadleaf Pondweed  
(Potamogeton amplifolius)

Native White-Stemmed Pondweed  
(Potamogeton praelongus)
Common Native Aquatic Plants

- **Common Duckweed** *(Lemna minor)*
- **Coontail** *(Ceratophyllum demersum)*
- **Eel grass** *(Zostera marina)*
- **Pickerel weed** *(Pontederia cordata)*
- **Slender pondweed** *(Potamogeton pusillus)*
- **Aquatic moss**

May be confused with Invasive Starry Stonewort
Common Native Aquatic Plants

Floating pondweed
(Potamogeton natans)

Long-leaved pondweed
(Potamogeton nodosus)

Water Shield
(Brasenia schreberi)

Waterlily
(Nymphaea odorata)

Yellow pond lily
(Nuphar variegata)

Arrow arum
(Peltandra virginica)
Invasive species means a species that is nonnative to the ecosystem under consideration, and whose introduction causes or is likely to cause harm to the environment, the economy, or the health of humans.

**What are PRISMs?**

Partnerships for Regional Invasive Species Management (PRISMs), comprising diverse stakeholder groups, were created to address threats posed by invasive species across New York State. PRISMs are key to New York’s integrated approach to invasive species management. Partners include federal and state agencies, resource managers, non-governmental organizations, industry, recreationists, and interested citizens. The New York State Department of Environmental Conservation provides financial support, via the Environmental Protection Fund, to the host organizations that coordinate each of the eight PRISMs, resulting in statewide coverage.

**What Do PRISMs Do?**

- Plan regional invasive species management activities
- Implement invasive species prevention programs
- Conduct surveillance and mapping of invasive species infestations
- Detect new infestations early and respond rapidly
- Implement control projects
- Implement habitat restoration and monitoring
- Educate stakeholders on invasive species and their impacts
- Coordinate PRISM partners
- Recruit and train volunteers
- Support research through citizen science in collaboration with the Invasive Species Research Institute [http://www.nyisri.org/](http://www.nyisri.org/)
- Act as regional communication hubs

If you are interested in helping NY “stop the invasion,” PRISMs are a great way to get involved by volunteering for monitoring, outreach, or management projects. All are welcome to participate in statewide PRISM monthly conference calls to hear excellent presentations. Learn of upcoming events and receive updates by joining a PRISM Listserv. Contact a PRISM leader for more information, or visit [WWW.NYIS.INFO](http://WWW.NYIS.INFO)

**STOP THE INVASION – PROTECT NEW YORK FROM INVASIVE SPECIES**