Leaf Arrangement Examples

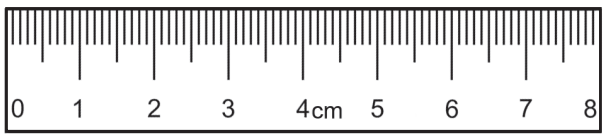
Alternate *Opposite* *Whorled*

Leaf Type Examples

Entire Leaf *Serrated Leaf*

Finely-Divided Leaves:

Branch-Divided *Feather-Divided*



IF YOU FIND A SUSPICIOUS AQUATIC PLANT

mark the location with a weighted buoy and carefully collect a specimen for confirmed identification. **Do not attempt to remove the entire plant!** Place the specimen in a container of water and store in a cool place. Contact Lake Stewards of Maine at **stewards@lakestewardsme.org** or **207-783-7733** or for further instruction.

Additional information is available at **LakeStewardsOfMaine.org**.

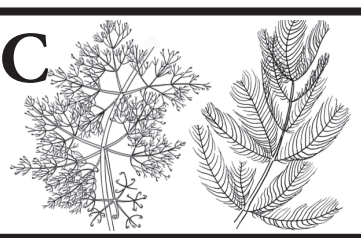
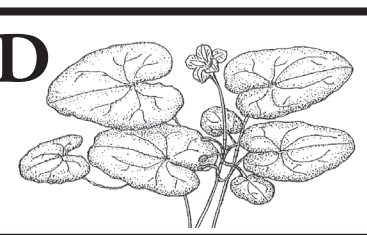
LAKE STEWARDS OF MAINE
Volunteer Lake Monitoring Program

Quick Key

to Ruling Out Maine's Most Unwanted Aquatic Invasive Plants

- Brittle Naiad
- Brazilian Waterweed
- Curly Leaf Pondweed
- European Frogbit
- Eurasian Watermilfoil
- Fanwort
- Giant Salvinia
- Hydrilla
- Parrot Feather
- Starry Stonewort
- Swollen Bladderwort
- Variable Watermilfoil
- Water Chestnut
- Water Soldier
- Yellow Floating Heart

STEP ONE: Select the category that best describes your plant.

A	B	C	D	E
				
Plants with blade- or strap-shaped leaves arranged on submersed stems *Five of the fifteen invasive aquatic plants are found in this category.*	**Plants with blade-shaped leaves in a basal rosette** *One of the fifteen invasive aquatic plants are found in this category.*	**Plants with finely-divided leaves arranged on submersed stems** *Five of the fifteen invasive aquatic plants are found in this category.*	**Plants with primary leaves floating; leaves not ribbon-like** *Four of the fifteen invasive aquatic plants are found in this category.*	**Everything Else** If your plant does **not** fit categories A, B, C, or D, rule out all invaders listed above. *That WAS quick, wasn't it?*

STEP TWO: If your plant fits into category A, B, C, or D, it *may* be an invasive aquatic plant. Continue on to the section that corresponds to your selected category.

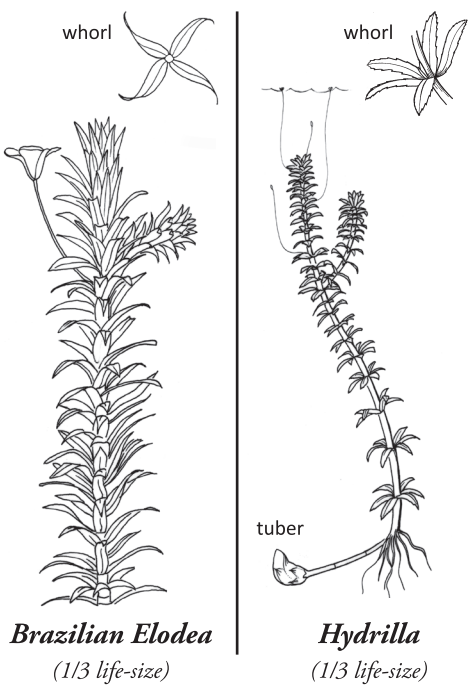
A Plants with blade- or strap-shaped leaves arranged on submersed stems

Read the numbered descriptions below, and follow additional guidance where indicated.
If no descriptions match your plant, rule out the following four depicted invaders.

1) Lance- or blade-shaped leaves (1-3 cm long) arranged along stems in whorls of three or more leaves

Cut stem (with a sharp knife or scissors) in several locations and **carefully count the number of leaves per whorl**. If you find one or more whorls consisting of MORE THAN THREE LEAVES

SUSPECT
BRAZILIAN ELODEA
***OR* HYDRILLA**



Brazilian Elodea *(1/3 life-size)*

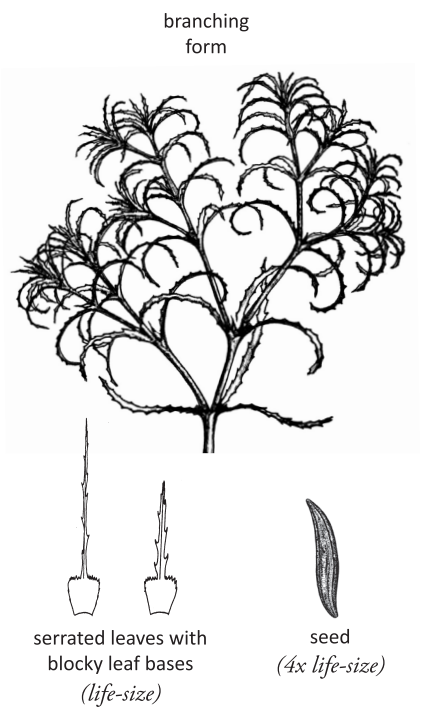
Hydrilla *(1/3 life-size)*

If ALL whorls consist of three leaves only, rule out these two invaders.

2) Slender, pointed, blade-shaped leaves (1-3 cm long) arranged variably along stem, often forming clusters at tip

Examine several leaves using magnification, or naked eye. If you see serrations along leaf edge

SUSPECT
BRITTLE NAIAD



Brittle Naiad *(1/3 life-size)*

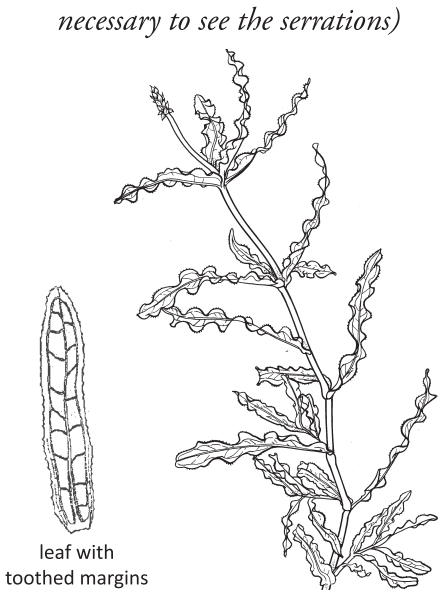
If plant is not as described above, rule out this invader.

3) Strap-shaped leaves (2-8 cm long; 5-12 mm wide) are alternately arranged along the stem; plant has SUBMERSED LEAVES ONLY (no distinctly different floating leaves)

If leaves are distinctly wavy, like lasagna noodles, with fine serrations along the outer edges

SUSPECT
CURLY LEAF PONDWEED

(magnification may be necessary to see the serrations)



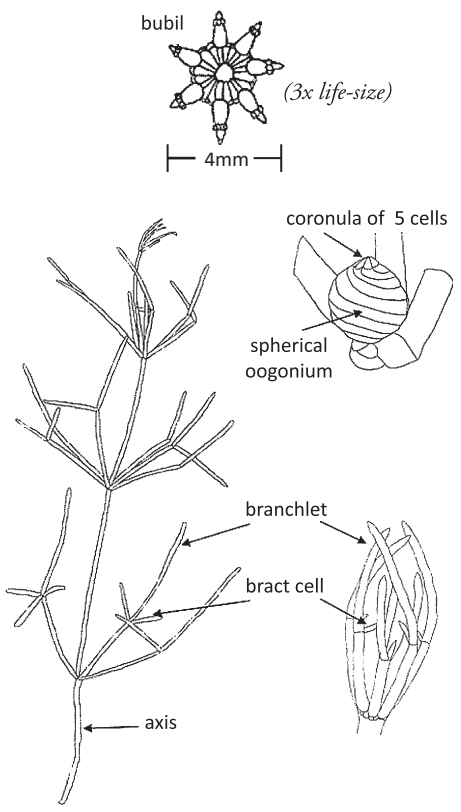
Curly Leaf Pondweed *(1/6 life-size)*

If plant is not as described above, rule out this invader.

4) Slender branchlets, arranged in whorls along the stem, with conspicuous star-shaped bulbils

If star-shaped bulbils are present

SUSPECT
STARRY STONEWORT



Starry Stonewort *(1/2 life-size)*

If plant is not as described above, rule out this invader.

Images courtesy of G. E. Crow, C. Barre Hellquist, University of California Press, University of Florida, Mary Jane Beilby and Michelle T Casanova. Springer – Heidelberg, New York, Dordrecht, London, 2014, and LSM.

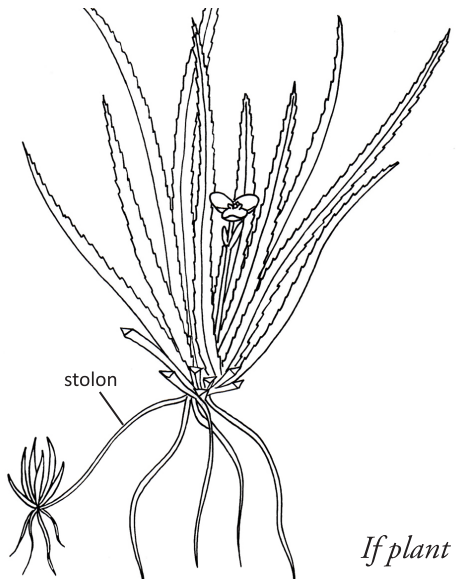
B Plants with blade-shaped leaves arranged in a basal rosette

Read the description below, and follow additional guidance where indicated.
If the description doesn't match your plant, rule out this depicted invader.

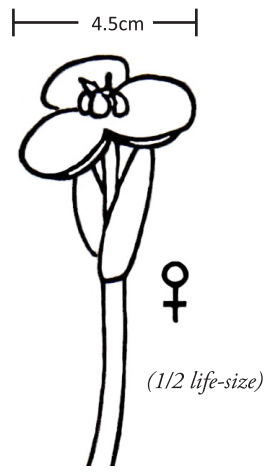
Plants with blade-shaped leaves arranged in a basal rosette

If leaves arranged in a basal rosette are stiff with conspicuous serrations resembling an aloe plant

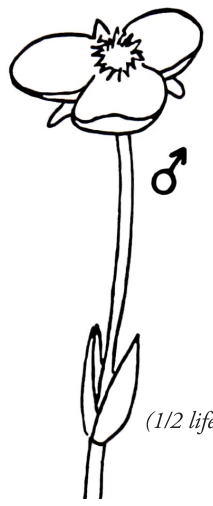
SUSPECT
WATER SOLDIER
(1/8 life-size)




close-up of leaf serrations



(1/2 life-size)



(1/2 life-size)

If plant is not as described here, rule out this invader.

C Plants with finely-divided leaves arranged on submersed stems

Read the numbered descriptions below, and follow additional guidance where indicated.
If no descriptions match your plant, rule out the following depicted invaders.

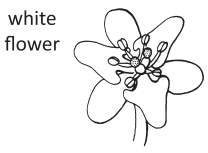
1) Leaves are fork- or branch-divided

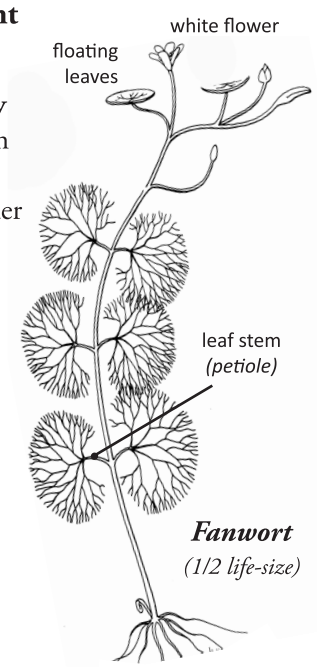
2) Leaves are feather-divided

1a) Bladders absent

If broadly-branching **leaves are oppositely arranged** on the stem and attached to the main stem by a slender leaf stem *(petiole)*

SUSPECT
FANWORT



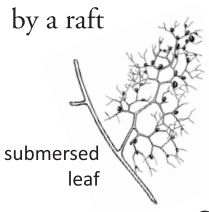


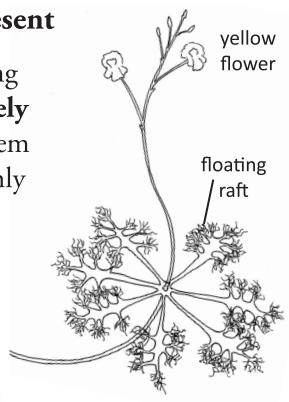
Fanwort
(1/2 life-size)

If plant is not as described above, rule out this invader.

1b) Bladders present

If broadly-branching **leaves are alternately arranged** on the stem with small, randomly scattered bladders and/or a yellow flower supported by a raft



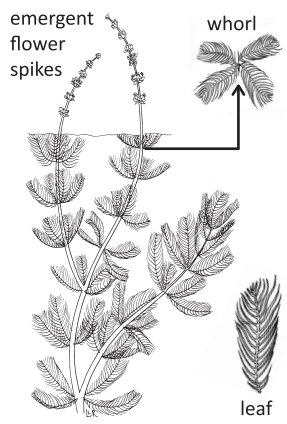


Swollen Bladderwort
(1/4 life-size)

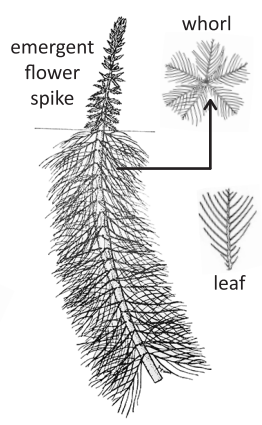
SUSPECT
SWOLLEN BLADDERWORT

Bladderworts may be difficult to identify without experience. Collect and submit a specimen as directed on the front side of this Quick Key.

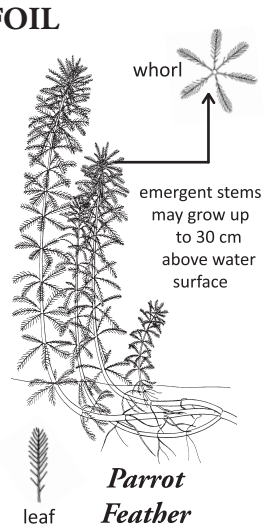
SUSPECT
INVASIVE WATER-MILFOIL



Eurasian Watermilfoil
(1/3 life-size)



Variable Watermilfoil
(1/3 life-size)



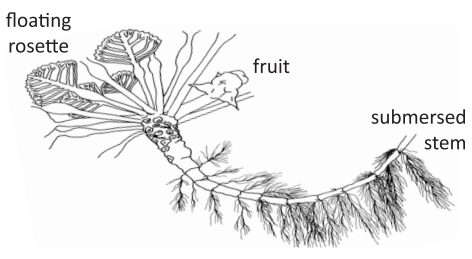
Parrot Feather
(1/3 life-size)

ALL milfoils are suspicious until proven otherwise.
Collect and submit a specimen as directed on the front side of this Quick Key.

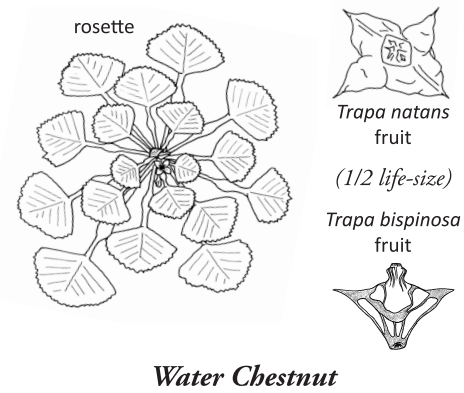
D Plants with primary leaves floating; leaves not ribbon-like

Read the numbered descriptions below, and follow additional guidance where indicated.
If no descriptions match your plant, rule out the following three depicted invaders.

1) Triangular, distinctly serrated floating leaves attached to leaf stems; leaf stems form 'floating rosette' attached to sediments by the main stem



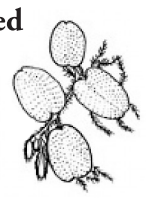
SUSPECT
WATER CHESTNUT

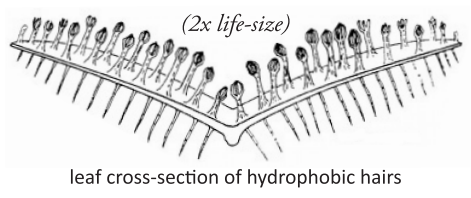


Water Chestnut
(1/6 life-size)

If plant is not as described above, rule out this invader.

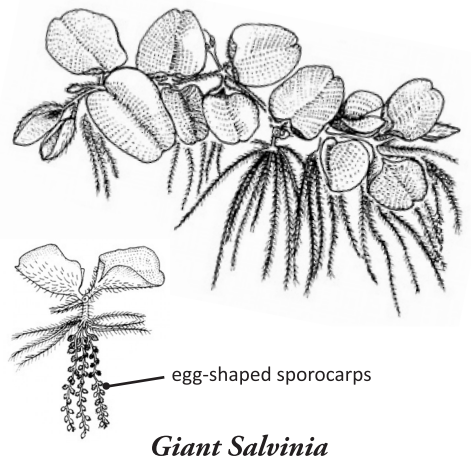
2) Floating leaves arranged in clumps are irregularly shaped, not rooted to the sediment, with a central groove and fine hairs





leaf cross-section of hydrophobic hairs

SUSPECT
GIANT SALVINIA



Giant Salvinia
(1/3 life-size)

If plant is not as described above, rule out this invader.

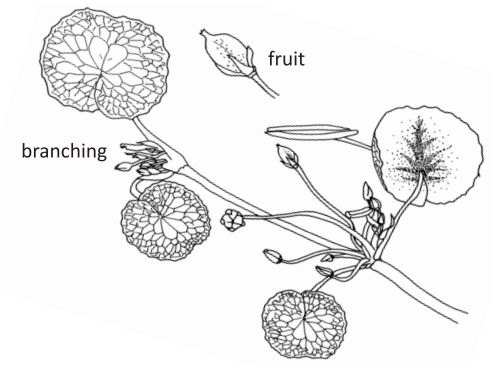
3) Floating leaves, attached to stems, are heart-shaped or round and notched on one side to the stem

3a) Plant IS ROOTED to the sediments

If there is branching along the main stem *(multiple side-stems connected to a single rooted stem)* **and/or** if the plant has showy, five-petaled yellow flowers


yellow flower

SUSPECT
YELLOW FLOATING HEART



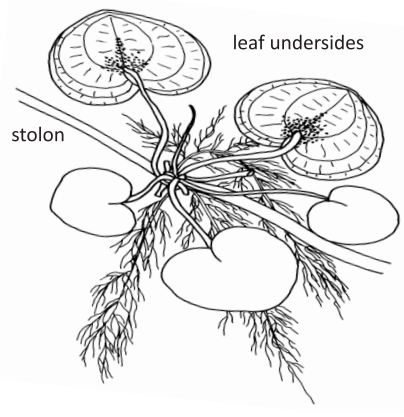
Yellow Floating Heart
(1/10 life-size)

If no branching or flowers are observed, err on the side of caution and collect a specimen for identification.

3b) Plant IS NOT ROOTED to the sediments

If leaf stems are joined in a clump, with some attached to other clumps by stem-like runners *(stolons)*

SUSPECT
EUROPEAN FROGBIT



European Frogbit
(1/3 life-size)

If plant is not as described above, rule out this invader.

Images courtesy of G. E. Crow, C. Barre Hellquist, University of California Press, University of Florida, Mary Jane Beilby and Michelle T Casanova. Springer – Heidelberg, New York, Dordrecht, London, 2014, and LSM.