

The Ecology of Aquatic Plants Workshop



Dr. Elizabeth Carroll
June 9, 2019
Lacawac Sanctuary

Overview

- What are aquatic plants?
- Benefits/Management
- Invasive aquatic plants in PA
- Citizen Science – Surveys!
- Resources in your binder
- Hands on IDs and sampling techniques

Aquatic plants or *macrophytes*

- Plants that have adapted to live in aquatic environments

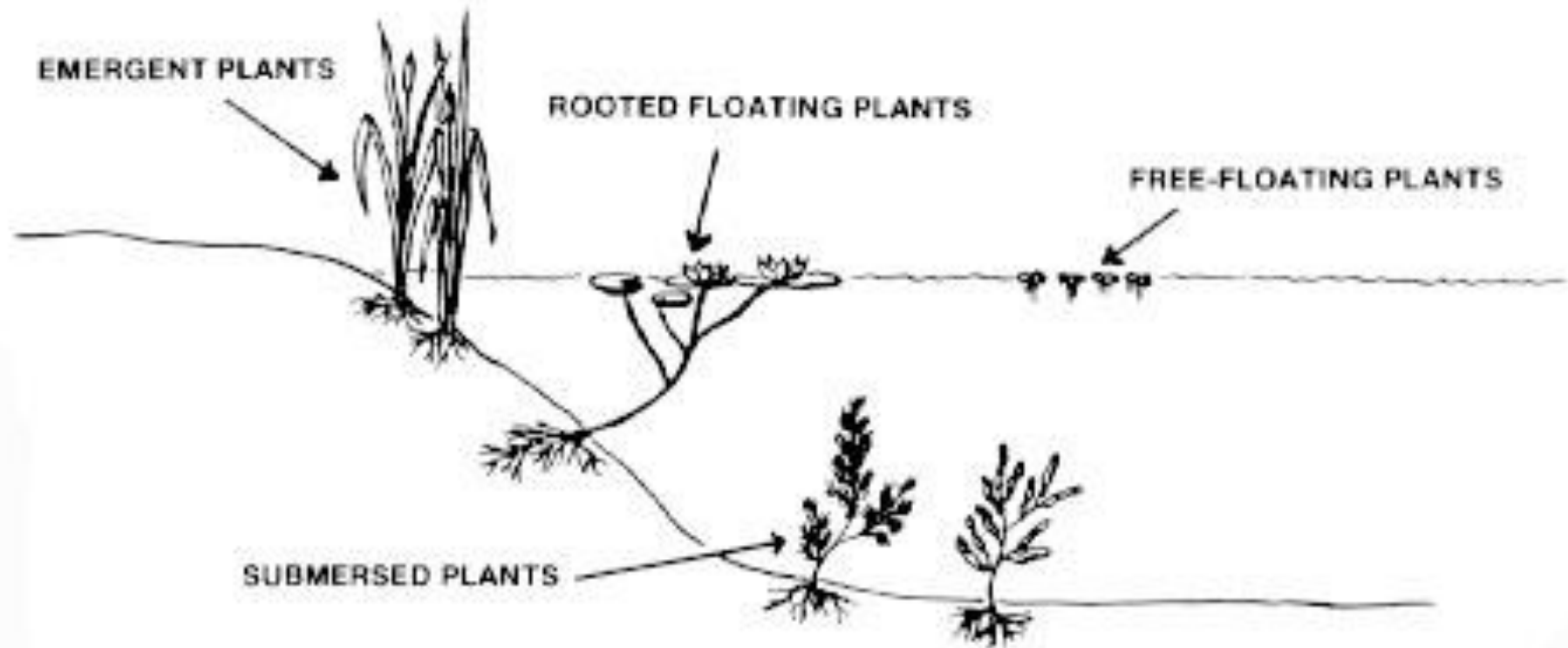


Aquatic plants are found in the littoral zone of lakes



- Near shore area where sunlight penetrates all the way to the sediment and allows aquatic plants to grow.

Types



Emergent



Plants roots and basal portions grow beneath the surface of shallow water but leaves and stems are primarily in the air.

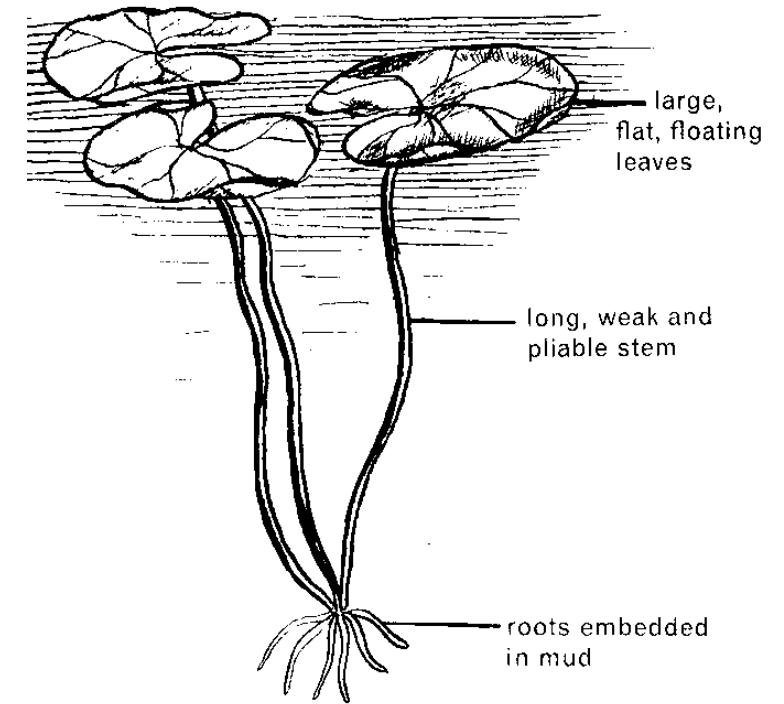
Examples include cattails, arrowhead, rushes, sedges, and many shoreline plants. *Depths -0.5m - 1.5m*

Image from University of Florida
Aquatic, Wetland and Invasive Plant Information Retrieval System

Floating-Leaf

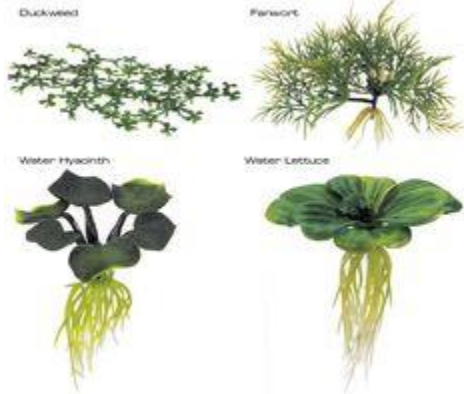
Plants whose leaves float on the water's surface but their roots are anchored in the substrate.

Depths 0.5 m - 3 m



FLOATING LEAVES OF WATER-LILY

Free Floating

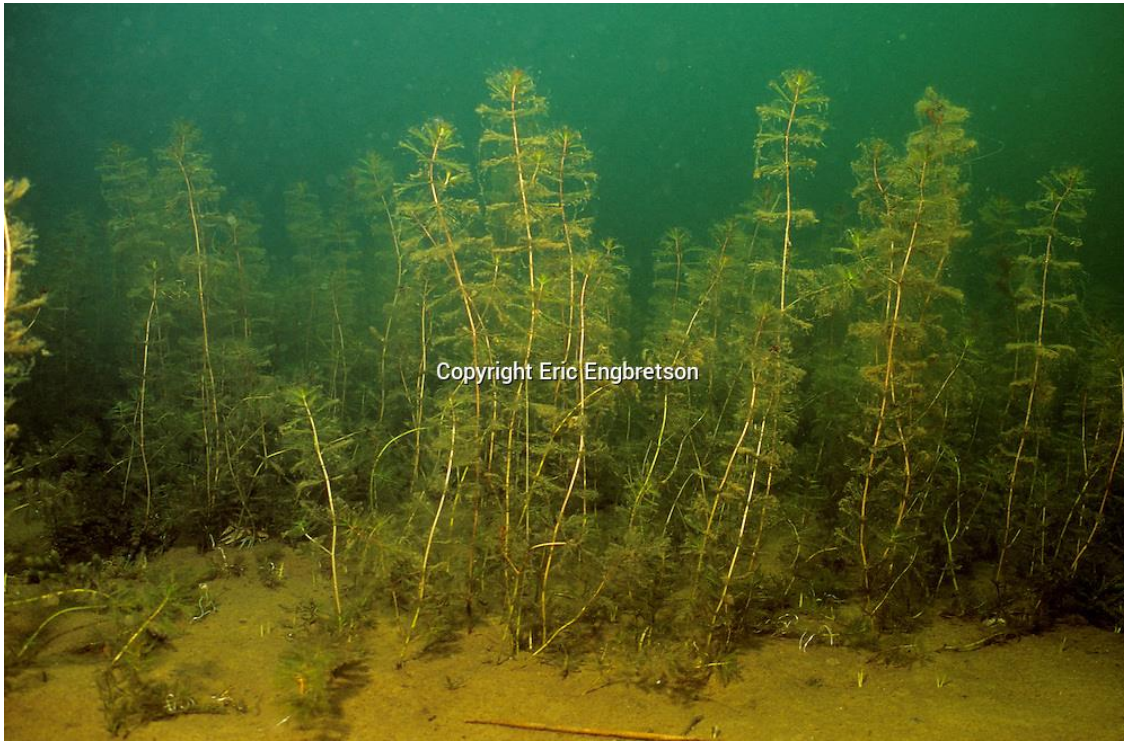


Plants that float with most of their body above the water's surface. Roots, if present, hang free in the water. *Depths variable but restricted to nonturbulent, protected areas.*

Water Hyacinth
Image from Univ. of Florida



Submersed



Eurasian watermilfoil



Hydrilla

Plants that spend their entire life cycle, with the possible exception of flowering, beneath the surface of the water. *Depths to 10 m*

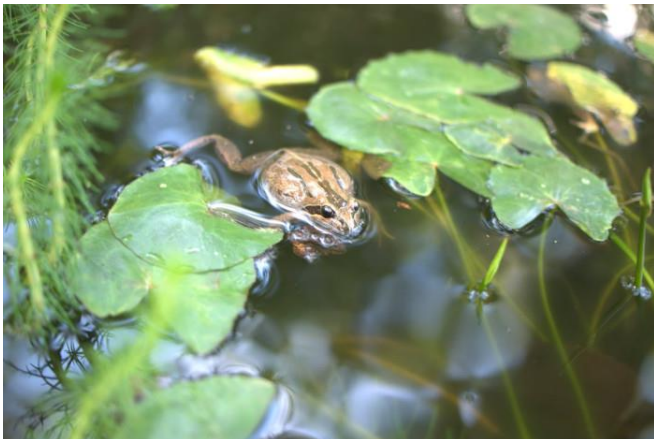
Benefits of Aquatic Plants

1. Provide habitat and protection for:

- waterfowl
- **fish**
- frogs, salamanders and turtles
- insects and other microscopic organisms

2. Important Nursery area for young fish, frogs, and salamanders

- Cover from predators
- Food supply



(RI Department of
Environmental Management
2014)

Benefits of Aquatic Plants

3. Act as food sources for:

- Mammals (otter, beaver, muskrat, moose)
- Birds (geese, ducks, songbirds)
- **Fish**
- Turtles
- **Invertebrates (such as insects)**

4. Competes with algae

- Compete for nutrients and sunlight
- Limit algae growth



Benefits of macrophytes

5. Help recycle oxygen and carbon dioxide (CO₂):

- Take up CO₂ and releasing oxygen in the water
- Vital for fish survival
- Maintaining a healthy pH level

6. Prevent shoreline erosion

- Buffer destructive wave action that could lead to erosion.

7. Help improve water clarity

- Aquatic plants may act as filters to trap particles and absorb the organic particles in tea-colored (tannic or humic) water.



© Tim Carruthers

Non-native/Invasive species in PA

- ***Introduced species*** -- A species living outside of its natural geographic range. Can be deliberately or accidentally introduced or brought into the new ecosystem. Also called *exotic, non-native, nuisance or invasive species*.
- ***Invasive*** -- Spreading or taking over. Invasive species often take over or dominate a habitat.
- ***Native*** -- An animal or plant originating in a region or geographic range. For example, brook trout are native to Pennsylvania

Non-native/Invasive species in PA

- Impede recreation
 - Reduce aesthetic quality of lake -
 - Tangle around outboard motors -
 - Obstruct access to boat ramps/ boat lanes -
 - Infest swimming areas -
 - Snag fishing lines -
 - Generate poor conditions for fish -
 - Reduce visibility in the water

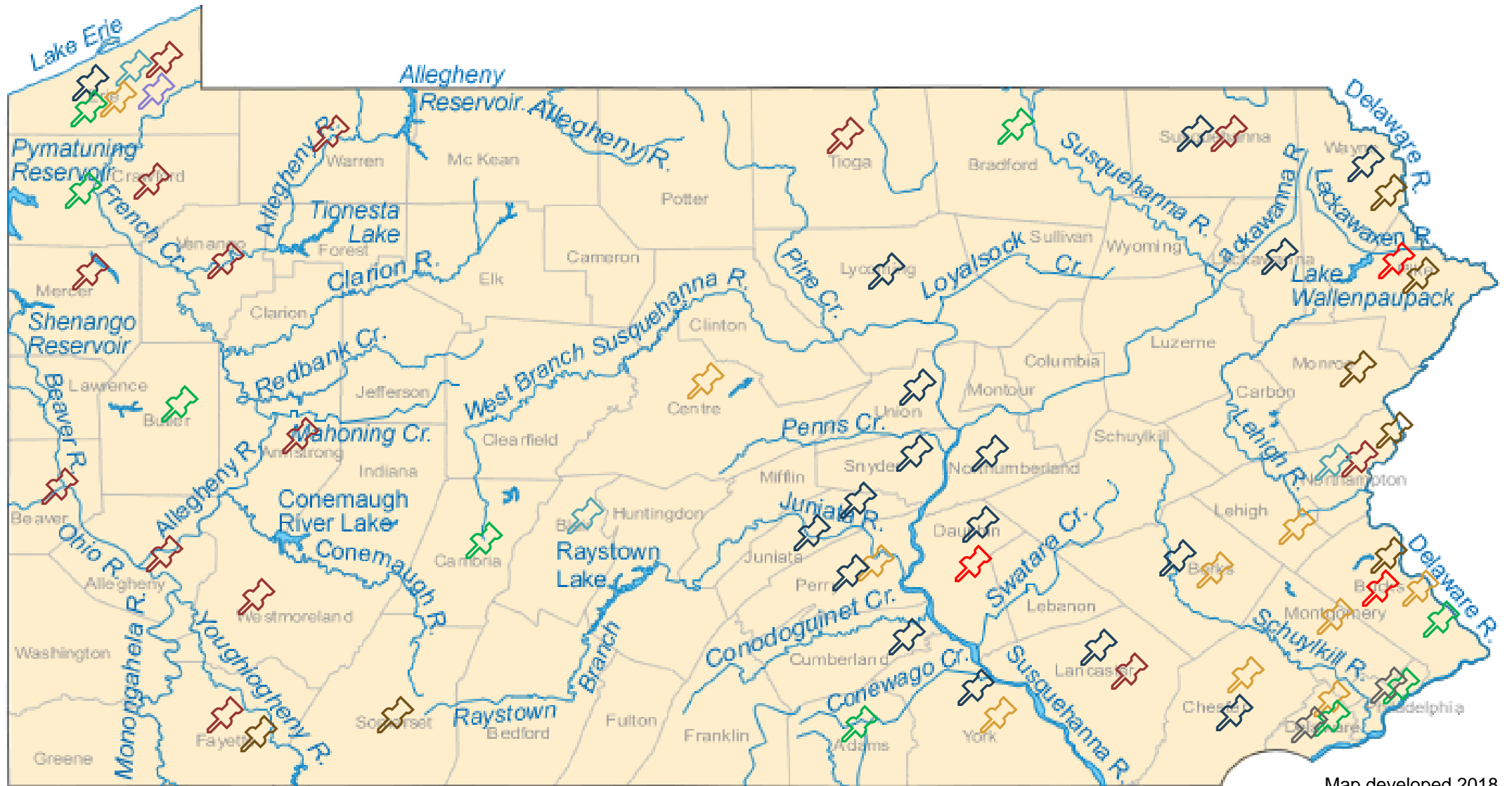


Non-native/Invasive species in PA

- Limit ecological function of a lake
 - Out-compete beneficial native plants - Decrease biodiversity - Reduce water quality - Decompose slowly and reduce O₂
- Cause economic harm
 - Devalue waterfront property - Require substantial funds to manage - Diminish recreational tourism and revenues












© Princeton hydro



Map developed 2018

© geology.com

0 50 KM 50 Miles

-  Zebra mussels
-  Red-eared slider
-  Hydrilla
-  Quagga mussels
-  Rusty Crayfish
-  Northern snakehead
-  Round goby
-  Didymo
-  Waterchestnut

Identifying aquatic plants

- Main structures to examine:
 - Leaves
 - Flowers
 - Fruit/Seeds
 - Stems/Roots

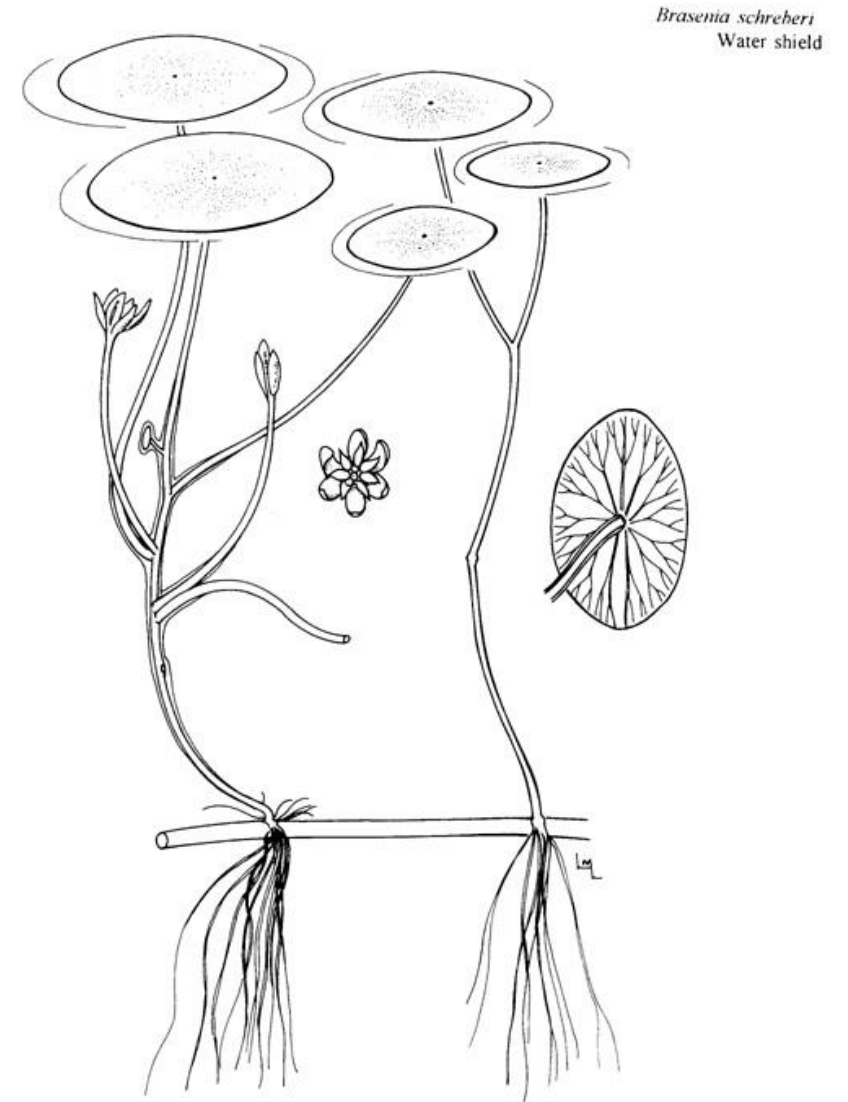
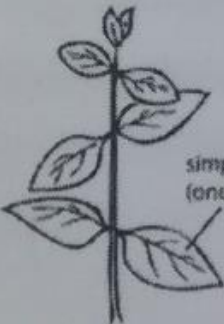


illustration provided by:
IFAS, Center for Aquatic Plants
University of Florida, Gainesville, 1990

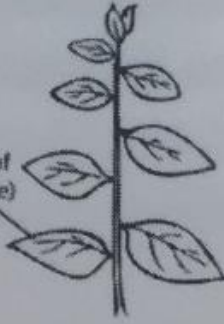
Brasenia schreberi

LEAF ARRANGEMENTS



opposite

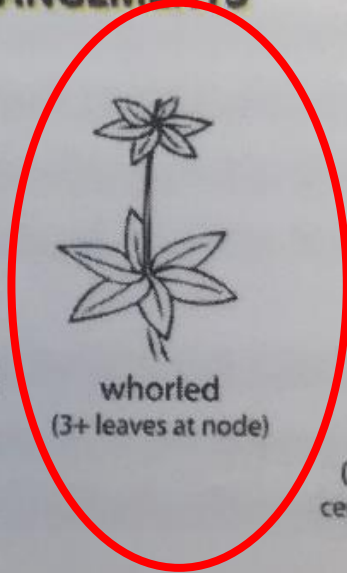
simple leaf
(one blade)



alternate



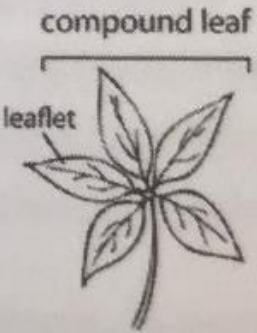
alternate spiral



whorled
(3+ leaves at node)



rosette
(leaves radiate from center close to ground)

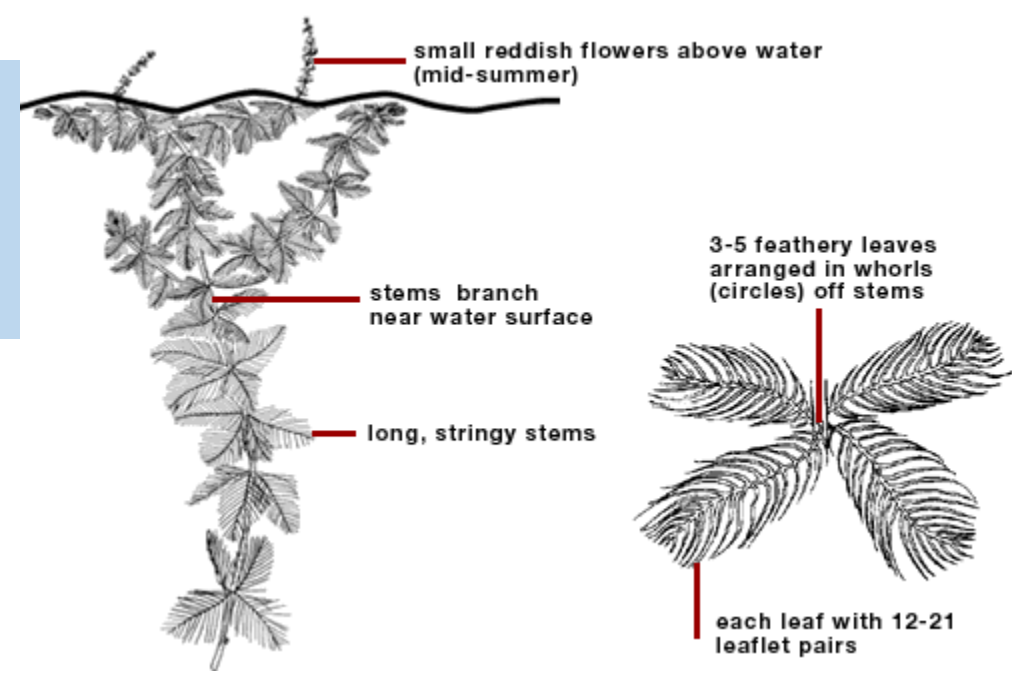


palmate

Six Key invasive species
to watch for in our
region

Eurasian watermilfoil

- Grows in dense mats
- Reproduces by fragmentation
- Plant fragments break off and float via water currents, allowing it to disperse long distances and hitchhike on boats, boat trailers, motors, and fishing equipment.
- Needs to be hand-pulled from the root for removal
- Counting leaflets can provide helpful identification clues.
- Many native look alike



Variable-leaf milfoil

- This extremely well-adapted plant can thrive in freshwater ponds, lakes, ditches, and other still or flowing aquatic systems, and even survives under ice.
- Reproduction is primarily through vegetative fragments
 - hitchhike on boats, trailers, and fishing equipment.



Source: Roberta Hill, VLMP © 2007

Myriophyllum heterophyllum

Myriophyllum heterophyllum
Variable-leaf milfoil

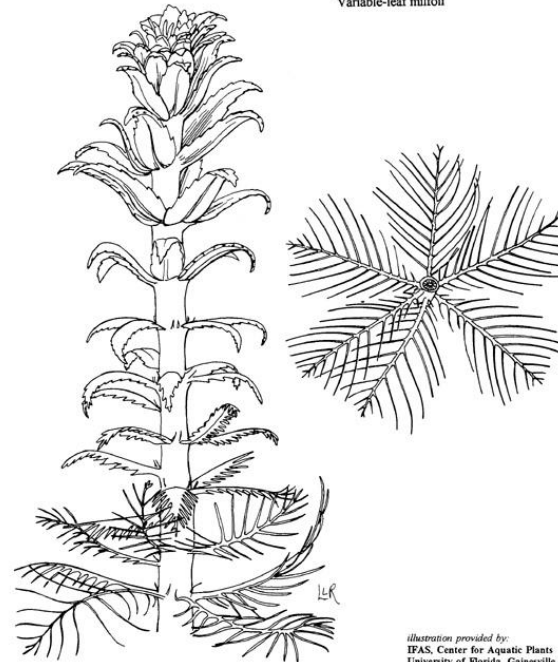


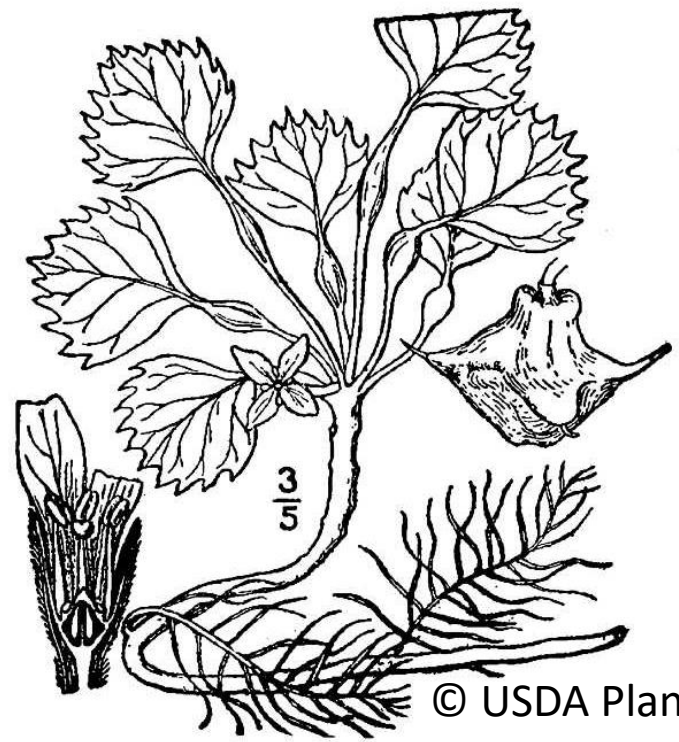
illustration provided by:
IPAS, Center for Aquatic Plants
University of Florida, Gainesville, 1990

Water chestnut

- Thorny black nutlets
- The nuts of water chestnut can remain viable in sediment for up to 12 years
- Water chestnut can choke out waterbodies
- Fast growing, floating aquatic plant
- Leaves have two distinct forms: floating and submersed
- Floating leaves are triangular and arranged in large floating rosettes



© USGS



© USDA Plants



Hydrilla

- Submerged aquatic perennial
- Spreads very fast
- Leaves are typically strap-like and pointed, with small sharp teeth on the edges
- Reproduces via fragmentation
- Produces tubers during late growing season
- Whorls of 3-8 leaves
- Small sharp teeth on leaf edges
- Grows in water up to 12 feet deep



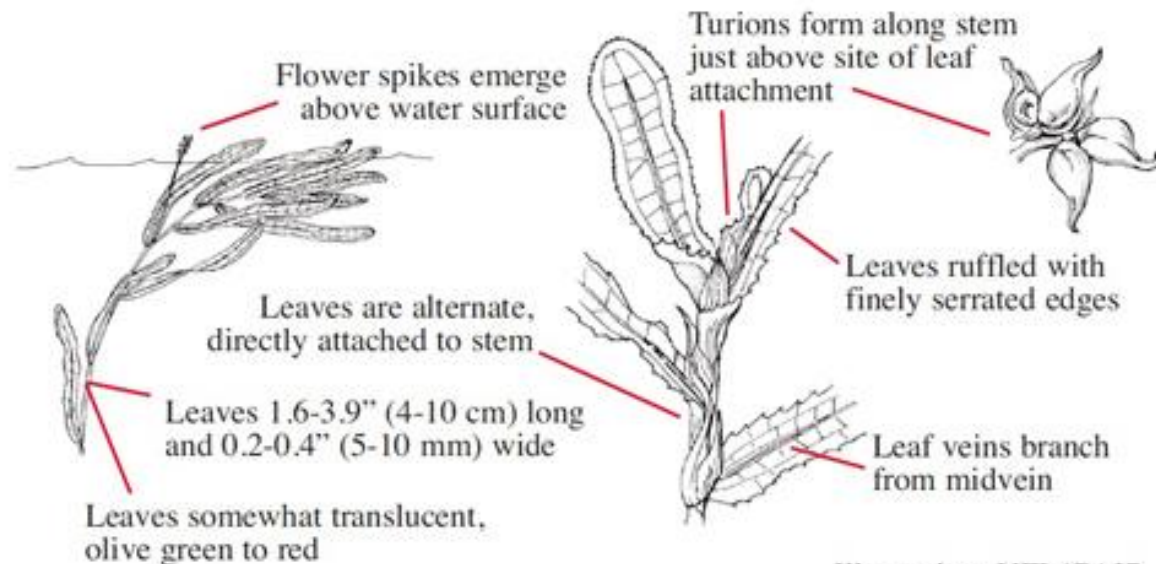
© PA Sea Grant



Stephen Ausmus, USDA, Encyclopedia of Life

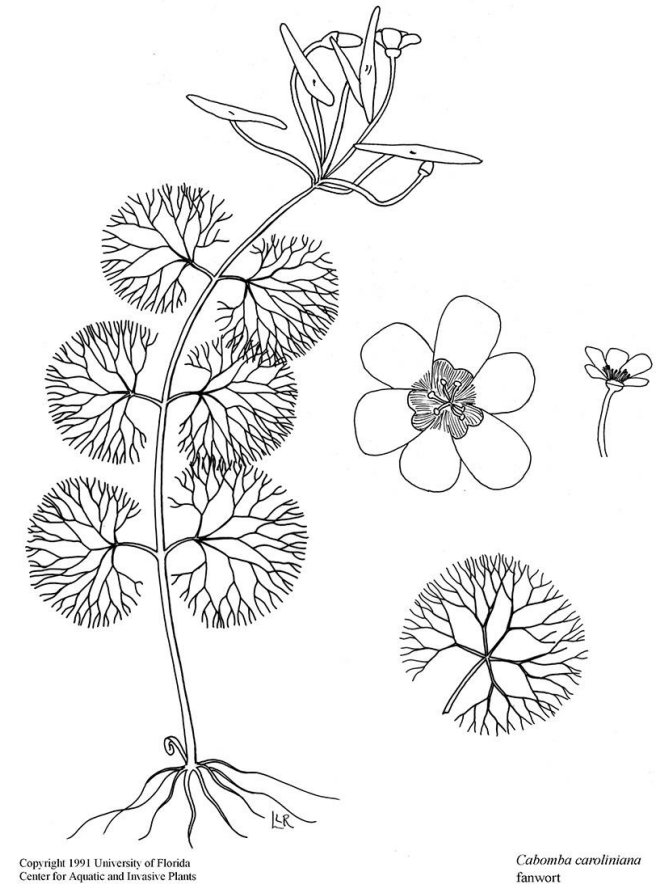
Curly-leaf pondweed

- Has only submerged leaves.
- Other pondweeds also lack the tiny but visible serrations along the edges of the leaves.
- Curly-leaf pondweed prefers soft substrates and shallow water depths in alkaline and high nutrient waters.



Fanwort

- Two types of leaves include submersed and floating.
- Submersed leaves are delicate, fan-shaped, and usually green in color.
- Finely divided and arranged in opposite pairs along the stem.
- Floating leaves, which are not always present, are narrow, small oval to diamond in shape, and arranged in an alternating pattern.
- Small white, pink, or purple flowers.



Citizen Science: Help us track aquatic plants and invasive species!



Lake Surveys

- Boat the perimeter of your lake (you may wish to split up the lake over several days or divide the shoreline among volunteers)



Lake Surveys

- Select a day when the water is relatively calm and ripples are low – this will make it easier to spot submerged plants.



Lake Surveys

- Slowly go around the perimeter of the lake and record the location of any submerged and emergent aquatic vegetation on a map of your lake.
- Datasheet in binder



Optional tools: Rake toss



Optional tools: View bucket or view scope

- Can be commercially purchased
- DIY version: Acrylic "wine bucket"
 - <https://www.partycity.com/clear-plastic-oval-ice-bucket-512273.html?cgid=tableware-serving-trays-platters-bowls>



Lake Surveys

- If you spot any potential invasive species notify PLEON of the location.
- Mail in sample

Mail in samples

Wrap plant sample in a damp paper towel and place in a ziplock bag.

Mail to:

Elizabeth Carroll

Attn: Aquatic Plant Program

Holy Family Hall

Holy Family University

9801 Frankford Avenue

Philadelphia, PA 19114

Prevention



stopaquatic hitchhikers.org



- Inspect and clean any visible aquatic plants, animals, mud, or debris from all equipment before leaving water access

What's on your bottom?



Invasive plants arrive on your watercraft.
Clean, Drain and Dry before launching.
takecaretahos.org

Take care.





- Drain water from bilge, livewell, motor and other water containing devices before leaving water access



- Dry for at least five days
OR
wipe with a towel before reuse



Picture Links

<https://fish.photoshelter.com/image/I0000Yi0pqab4hhk>

<https://www.rmbel.info/boats-impact-the-littoral-zone/>

<http://malleedesign.com.au/frogs-ponds-and-native-water-plants/>

<http://www.northquabbinphotography.com/northern-river-otters/m29dw675d5c37kaq660nm1nzdml5x1>

<https://www.princetonhydro.com/blog/tag/water-chestnut/>

<https://www.scottcountymn.gov/1473/Aquatic-Invasive-Plants>