Aquatic Invasive Species Monitoring

Volunteer Lake Monitoring Program
Indiana Clean Lakes Program
Indiana University
School of Public and Environmental Affairs
Sarah Powers
Indiana Clean Lakes Program

- Sponsored by Indiana Department of Environmental Management (IDEM)
- Administered through I.U. School of Public and Environmental Affairs (SPEA)
- Created in 1989
Why Survey Aquatic Plants

- Better understand lake ecology
- Invasive/ANS/AIS
Aquatic macrophytes positive attributes

- Increase lake productivity
- Provide fish habitat and other aquatic life habitat
- Protect shoreline from erosion
- Trap sediment
- Stabilize sediment
Why Survey Aquatic Plants

- Better understand lake ecology
- Aquatic nuisance species/Aquatic invasive species
What is an Aquatic Nuisance Species?

- Exotic species are plants and animals that have been introduced into habitats where they are not native and don’t belong.
- As native species grow and develop in their native habitat, there are limits that keep the populations in check.
- When a species leaves its native habitat, all the checks and balances are removed.
Why care about ANS?

- Economics – exotic species on land & water cost the U.S. ~$150 billion annually.
- Health – some ANS cause significant human health problems.
- Ecological – native flora, fauna, and communities are at risk.
- Recreational – boating, fishing, swimming, and flood control
Plant Identification

Materials adapted from King County Weed Watchers Program
Plant Categories

- Native
- Introduced
- Invasive (noxious)
Plant Naming

- On plant can have several **common names**. Common names are usually easier to remember and very from region to region. Multiple plants can have the same common name.

- **Latin Names** can change over time, but are scientifically assigned based on the taxonomy of a plant. Latin names are difficult to remember but are more reliable identifier when comparing with other regions.

**EXAMPLE:**
- Spatterdock = yellow pond lily = yellow water lily = *Nuphar lutea* = *Nuphar polysepala*
Useful plant concepts:

- Monocot
- Dicot
Important plant terms:
leaf arrangements

- opposite
- alternate
- whorled
- compound or divided
Aquatic Plant Community

Emergent

Floating

Submerged

Littoral Zone
<table>
<thead>
<tr>
<th>Watch List (not detected)</th>
<th>Watch List (detected)</th>
<th>Detected and Common</th>
</tr>
</thead>
<tbody>
<tr>
<td>European frogbit</td>
<td>Brazilian elodea</td>
<td>Cabomba (Fanwort)</td>
</tr>
<tr>
<td>Giant salvinia</td>
<td>Hydrilla</td>
<td>Common reed</td>
</tr>
<tr>
<td>Water hyacinth</td>
<td></td>
<td>Common waterweed</td>
</tr>
<tr>
<td>Water chestnut</td>
<td></td>
<td>Curly leaf pondweed</td>
</tr>
<tr>
<td>Parrot feather</td>
<td></td>
<td>Eurasian watermilfoil</td>
</tr>
<tr>
<td>Flowering rush</td>
<td></td>
<td>Purple loosestrife</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reed canary grass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yellow floating heart</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zebra mussels</td>
</tr>
<tr>
<td>Common Name</td>
<td>Latin Name</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------</td>
<td></td>
</tr>
<tr>
<td>Pickerelweed</td>
<td>Pontedaria cordata</td>
<td></td>
</tr>
<tr>
<td>Arrowhead</td>
<td>Sagittaria latifolia</td>
<td></td>
</tr>
<tr>
<td>Cattail</td>
<td>Typha sp.</td>
<td></td>
</tr>
<tr>
<td>Purple loosestrife</td>
<td>Lythrum salicaria</td>
<td></td>
</tr>
<tr>
<td>Swamp loosestrife</td>
<td>Secodon verticillatus</td>
<td></td>
</tr>
<tr>
<td>Smartweeds</td>
<td>Polygonum sp.</td>
<td></td>
</tr>
<tr>
<td>Common Reed</td>
<td>Phragmites communis (australis)</td>
<td></td>
</tr>
<tr>
<td>Reed Canary Grass</td>
<td>Phalaris arundinacea</td>
<td></td>
</tr>
<tr>
<td>Water hyacinth</td>
<td>Eichhornia sp.</td>
<td></td>
</tr>
<tr>
<td>Yellow flag iris</td>
<td>Iris pseudacorus</td>
<td></td>
</tr>
</tbody>
</table>
Pickerelweed (*Pontederia cordata*)

- Rounded lance shaped leaves that stick out of the water
- Purple flowers
- Forms dense mats
Arrowhead (*Sagittaria latifolia*)

- Arrow shaped leaf
- White flowers (July or August)

http://people.bridgewater.edu/~lhill/Monocotordicot.htm
Purple Loosestrife (*Lythrum salicaria*)

Key characteristics:
- Purple flowers
- Branched stems are square, can root at nodes
- Leaves opposite, lanceolate
- Up to 2.5 million tiny seeds/plant
Swamp Loosestrife (*Decodon verticillatus*)

- Shrubby
- Purple/pink flower above leaves on stem
Smartweeds (*Polygonum spp.*)

- Lance shaped leaves alternate
- Pinkish flowers
Common Reed
(*Phragmites australis*)

**Key characteristics:**
- Up to 12 foot tall grass
- Hollow woody stems
- Wide stiff leaves
- Large feathery flower head
  - Purplish when young,
  - Brown in seed
Reed Canary Grass (Phalaris arundinacea)

- Grows 2-9 feet tall
- Blades flat and rough on both sides, alternate
- hairless

http://www.illinoiswildflowers.info
Water hyacinth (*Eichhornia sp.*)

- Thick glossy leaf
- Rounded and leathery
- Flowers very showy on a spike

http://www.illinoiswildflowers.info
Yellow flag iris (*Iris pseudacorus*)

Key characteristics:
- Large yellow flower May-July, can have 2-3 on one stem
- Distinguishing ridge in the center of the leaf
- The base of the plant is fan shaped
- Only iris that will grow in wetlands

http://gardencoachpictures.wordpress.com/2011/04/04/yellow-flag-iris/
## Floating

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Latin Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giant salvinia</td>
<td><em>Salvinia molesta</em></td>
</tr>
<tr>
<td>Spatterdock, Yellow pond lily</td>
<td><em>Nuphar lutea</em></td>
</tr>
<tr>
<td>American lotus</td>
<td><em>Nelumbo lutea</em></td>
</tr>
<tr>
<td>European Frogbit</td>
<td><em>Hydrocharis morsus-ranae</em></td>
</tr>
<tr>
<td>Parrotfeather</td>
<td><em>Myriophyllum aquaticum</em></td>
</tr>
<tr>
<td>Yellow Floating Heart</td>
<td><em>Nymphoides peltata</em></td>
</tr>
</tbody>
</table>
Giant salvinia (*Salvinia molesta*)

- Small free floating in clusters
- Oblong leaves
- Leaf may fold forming chains
Spatterdock, Yellow pond lily
(Nuphar lutea)

**Key characteristics:**
- very large heart-shaped leaves
- ball-shaped yellow flowers
- stems rigid enough to hold leaves out of water when water level drops
American Lotus (*Nelumbo lutea*)

- floating perennial
- flowers white
- round leaves
European Frogbit
(Hydrocharis morsus-ranae)

- 1-2 inch wide heart shaped leaves
- Free floating
- Single white flower
Parrotfeather
(Myriophyllum aquaticum)

- emergent up to 1 ft. above water
- leaves in whorls around stem
- leaves feathery like milfoil
- dense mat of brownish rhizomes
Yellow Floating Heart (*Nymphoides peltata*)

**Key characteristics:**
- small yellow flowers with distinctive fringes
- 2 to 5 flowers per stalk
- heart-shaped or round leaves, wavy margins, often purplish underneath
<table>
<thead>
<tr>
<th>Common name</th>
<th>Latin name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fanwort</td>
<td><em>Cabomba caroliniana</em></td>
</tr>
<tr>
<td>Coontail</td>
<td><em>Ceratophyllum demersum</em></td>
</tr>
<tr>
<td>Brazilian elodea</td>
<td><em>Egeria densa</em></td>
</tr>
<tr>
<td>American waterweed</td>
<td><em>Elodea canadensis</em></td>
</tr>
<tr>
<td>Hydrilla</td>
<td><em>Hydrilla verticilata</em></td>
</tr>
<tr>
<td>Native watermilfoils</td>
<td><em>Myriophyllum spp.</em></td>
</tr>
<tr>
<td>Eurasian watermilfoil</td>
<td><em>Myriophyllum spicatum</em></td>
</tr>
<tr>
<td>Curly leaf pondweed –</td>
<td><em>Potamogeton crispus</em></td>
</tr>
<tr>
<td>Common bladderwort</td>
<td><em>Utricularia vulgaris</em></td>
</tr>
<tr>
<td>Native pondweeds</td>
<td><em>Potamogeton</em></td>
</tr>
</tbody>
</table>
Fanwort (*Cabomba caroliniana*)

- submerged leaves opposite, fan-shaped
- small white flowers borne above the water
- plant can look cylindrical underwater
Coontail
*(Ceratophyllum demersum)*

- leaves narrow, forked and whorled on the stem
- inconspicuous flowers
- plant is stiff and holds its shape out of water
Brazilian elodea (*Egeria densa*)

- smooth leaf edges
- leaves in whorls of 4 (up to 6)
- relatively showy flower
- grows in up to 20 feet of water
American waterweed
(*Elodea canadensis*)

leaves linear, whorled in 3s (sometimes 2-4) on the stem
Brazilian elodea vs. our native American waterweed *Elodea canadensis*

Brazilian elodea has 4 leaflets and leaf margin is toothed.

Native has 3 leaflets and is usually smaller.
Hydrilla (Hydrilla verticillata)
Eurasian watermilfoil
(Myriophyllum spicatum)

- 14 or more leaflet pairs
- leaves whorled
- leaves collapse against stem when pulled from water
- flower spike held above water
Curly leaf Pondweed
(*Potamogeton crispus*)

- leaves distinctly wavy and stiff
- olive green
Common bladderwort 
(*Utricularia vulgaris*)

- branched leaves
- conspicuous bulbous bladders green when young and turn black further down the stem
- carnivorous plant
- small yellow snapdragon-like flower is held above the water
Submerged pondweeds  
(*Potamogeton spp.*)

- many species
- leaves **alternate**, grass-like
- oval, always have at least one mid-vein
- stems branched, flexible, up to 3m long
One is native, two are dangerous invasive - can you tell the difference?