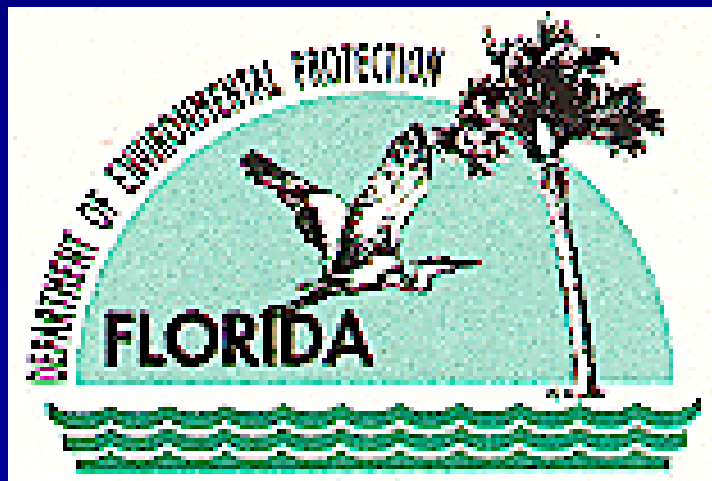


# Submersed Aquatic Plant ID

Nia Wellendorf, FDEP  
Standards and Assessment Section  
FAB Plant Workshop  
December 9, 2008



# Submersed Plants

- Coontail – style (dissected leaves)
- Hydrilla – style (simple small leaves)
- Broad-leaf
- Strap-leaf
- Bladderworts

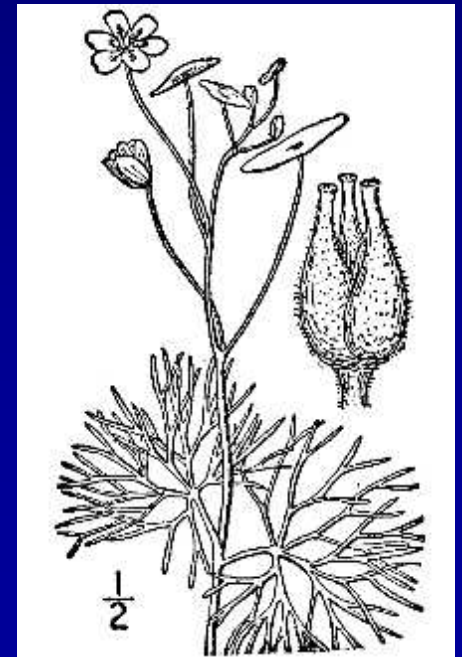
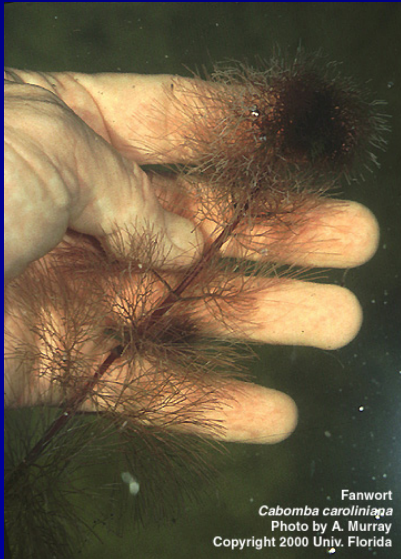
# Submersed Plants

- Whorled dissected leaves
  - *Cabomba, Ceratophyllum, Myriophyllum, Limnophila*
- Whorled simple leaves
  - *Hydrilla, Egeria, Elodea, Mayaca. Chara, Nitella*
- Opposite simple leaves
  - *Najas*
- Alternate simple leaves
  - *Potamogeton, Stuckenia*

# *Cabomba caroliniana*

## Fanwort

- Stems purplish, plant soft
- 2 types of leaves:
  - SUBMERSED: - very divided and fan-like
    - opposite or in whorls along stem
  - FLOATING: - small, diamond-shaped
- Flowers: - on stalks arising from stem tips
  - white, pink, purplish, ½" across





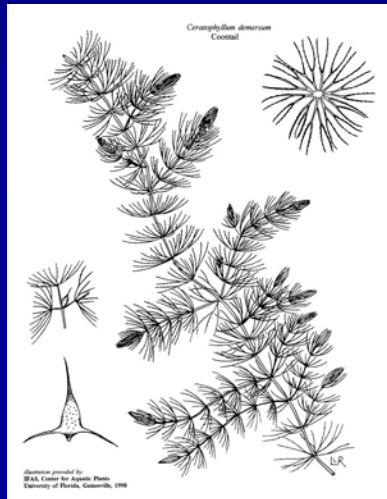
*Cabomba caroliniana*

Fanwort

# *Ceratophyllum demersum*

## Coontail

- Green stems, plant holds shape out of water
- Leaves: - dichotomously branched (tuning fork)
  - in whorls on stem
  - several teeth on midribs (rough feeling)
  - bright green to blackish color
- Flowers: - very small, at leaf base



# Native *Myriophyllum*s



- Reddish stems
- Rough stems
- Leaves in whorls of 3-6
- Includes *M. heterophyllum*, *M. laxum*, and *M. pinnatum*
- Leaves with 12-28, 8-10, and 11-21 divisions (cannot distinguish these 3 without fruiting tips)
- Fruiting tips with bracts of various sizes, stick up above water surface

*Myriophyllum heterophyllum*

# *Myriophyllum heterophyllum*

## Variable-leaf water milfoil

- Stem: long, submersed
- Leaves:
  - Deeply divided and feathery, 2" long
  - In whorls of 4 to 6 along stem
- Flower:
  - Very tiny, reddish
  - In whorls of 4-6 at emergent end of stem
  - Subtended by bright green leaf-like bracts
  - Bracts clearly visible in *M. heterophyllum*



# *Myriophyllum laxum*

## Loose water milfoil

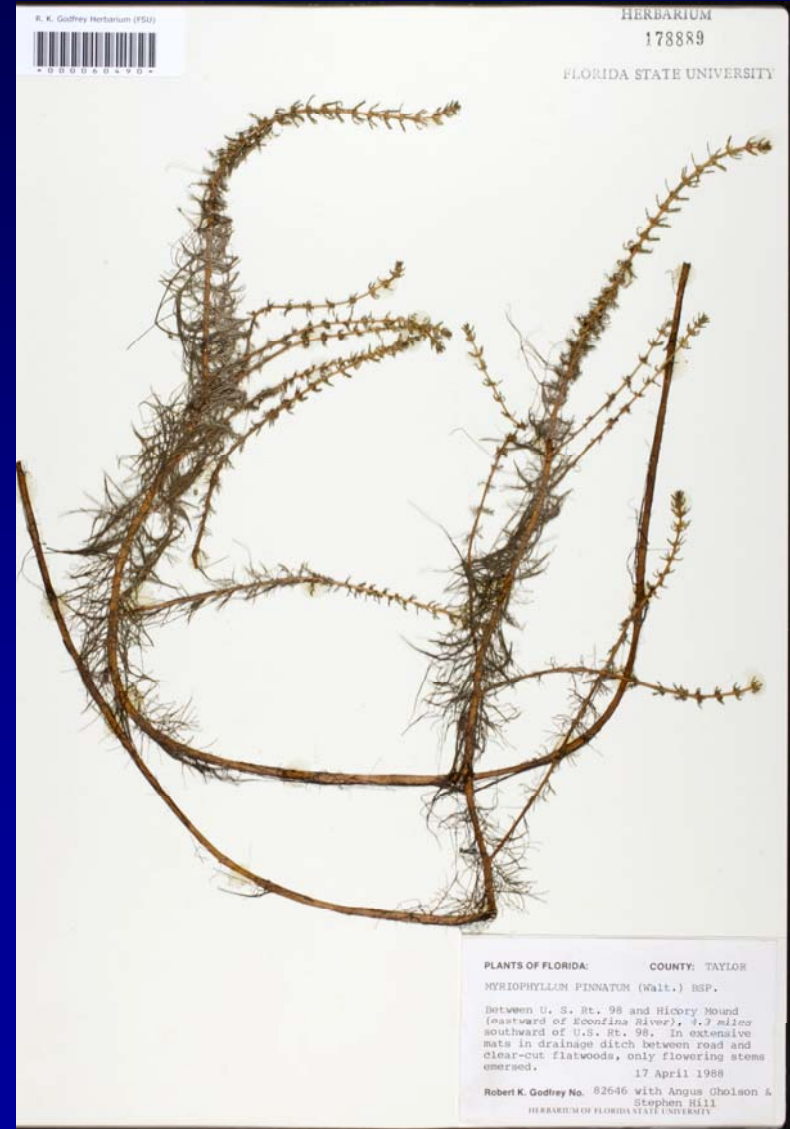
- Stems: - submersed, reddish, slender
- Leaves: - divided, very finely, feathery
  - in whorls of 4 to 5
- Flowers: - pink to reddish
- Bracts subtending flowers very short



# *Myriophyllum pinnatum*

## Cutleaf water milfoil

- Stems: - submersed, reddish, slender
- Leaves: - divided, very finely, feathery
  - in whorls of 4 to 5
- Flowers: - pink to reddish
- Bracts subtending flowers very short



# Native *Myriophyllum*

|               | <i>heterophyllum</i>           | <i>laxum</i>                            | <i>pinnatum</i>                |
|---------------|--------------------------------|-----------------------------------------|--------------------------------|
| leaves/whorl  | 4-6                            | 4-5                                     | 3-4                            |
| leaf segments | 12-28                          | 11-21                                   | 8-10                           |
| bract shape   | serrate, not dissected         | dissected to entire moving up stem      | dissected                      |
| bract size    | visible, longer than internode | barely visible, shorter than internodes | visible, longer than internode |

*M. heterophyllum*  
has more robust  
stems

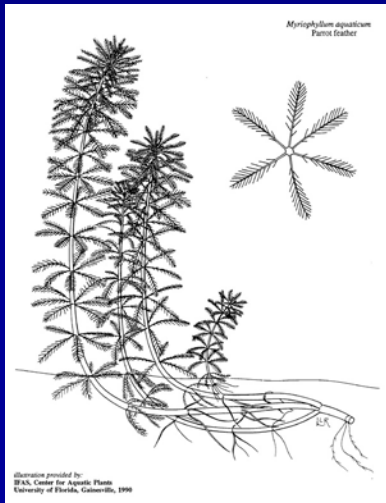


# *Myriophyllum aquaticum*

Parrot feather

**NON-NATIVE**

- Emersed plant
- Stems: - can be 5' long
  - trail along the ground or water surface
  - become erect and leafy at the ends
- Leaves: - oblong, deeply cut and feathery looking
  - bright blue-green
  - in whorls of 4 to 6

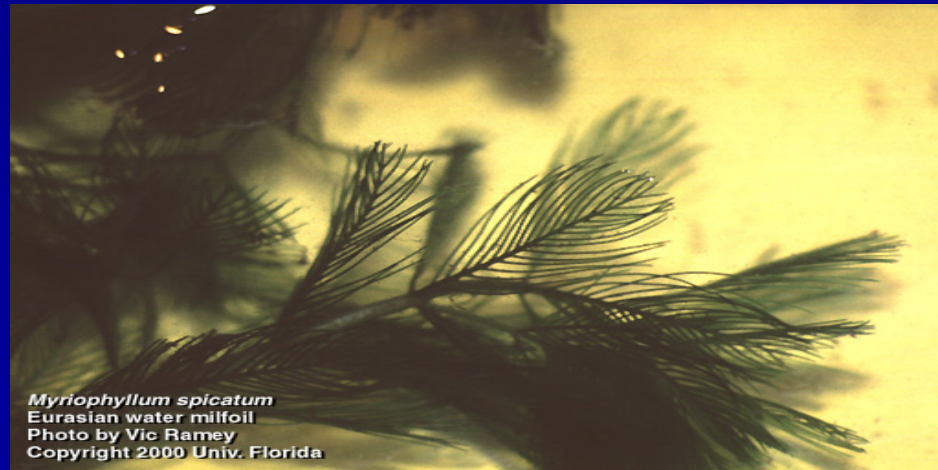
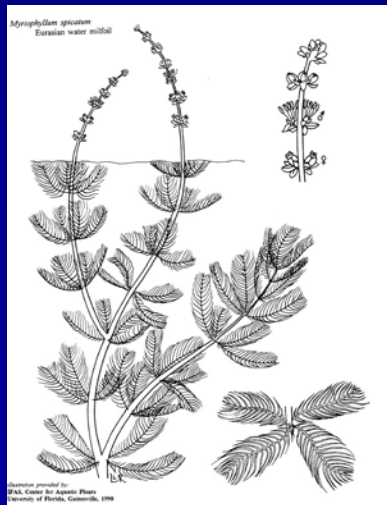


# *Myriophyllum Spicatum*

Eurasian water milfoil

**NON-NATIVE**

- Submersed
- Stems: - branched, long, 6 to 9 feet long  
- dark green to grayish
- Leaves: - deeply divided, soft, feather-like, 2" long  
- arranged in whorls of 3 to 6 around stem
- Flowers: - very small, reddish, bracts tiny  
- on flower spike above water



*Myriophyllum spicatum*  
Eurasian water milfoil  
Photo by Vic Ramey  
Copyright 2000 Univ. Florida



*Myriophyllum spicatum*  
1996 David Sutton

# *Limnophila sessiliflora*

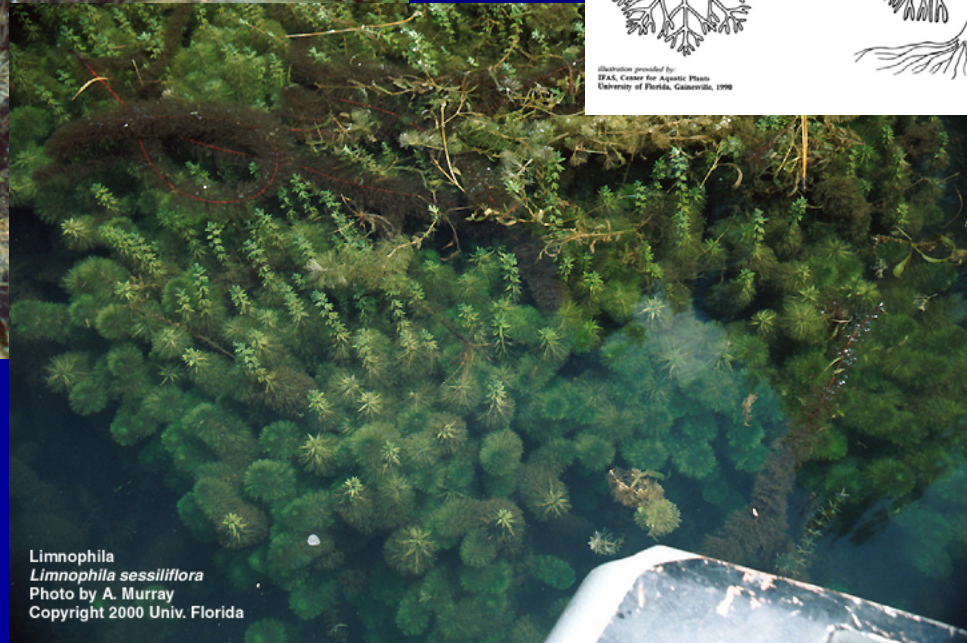
Limnophila

**NON-NATIVE**

- Rooted
- Stems: up to 12 feet long, with a few inches emerged
- 2 types of leaves:
  - SUBMERSED: - finely divided and feathery, 1” long
    - in whorls along stem
  - FLOATING: - more or less lance-shaped, in whorls
    - leaf margins appear to be torn irregularly
- Flowers: - single flower on emerged part of stem
  - blue, violet, pink or lavender

# *Limnophila sessiliflora*

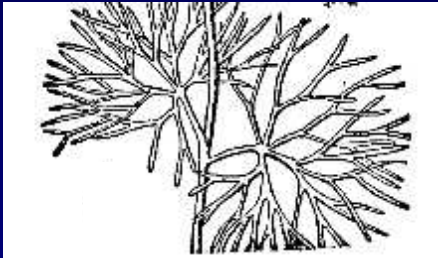
## NON-NATIVE



*Limnophila*  
*Limnophila sessiliflora*  
Photo by A. Murray  
Copyright 2000 Univ. Florida

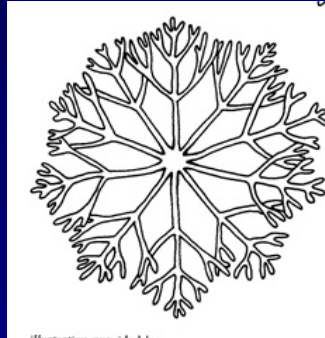
# Coontail-like (dissected lvs)

*Cabomba caroliniana*



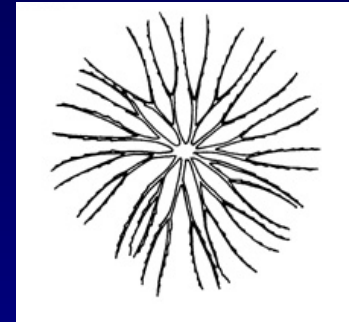
Opposite, palmately  
branched

*Limnophila  
sessiflora*



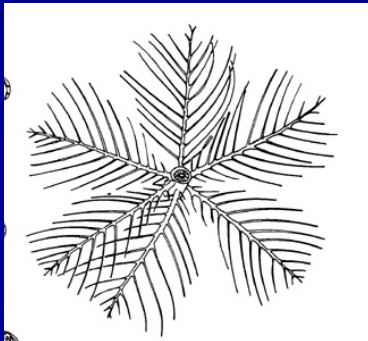
Whorled, tree branching

*Ceratophyllum  
demersum*



Whorled, forked

*Myriophyllum sp.*



Whorled, pinnately  
branched

NOTE: Some *Utricularia* species have coontail-like appearance in water. However, they will have bladders, are usually slimy and limp out of the water.

# *Hydrilla verticillata*

## NON-NATIVE

- Rooted
- Stems: slender, branched and up to 25 feet long. Often grows to water surface and shades out others.
- Leaves: - small, strap-like and pointed
  - in whorls of 4 to 8
  - saw-toothed leaf margins
  - 1 or more sharp teeth along leaf mid-rib
- Flowers: - only female in Florida
  - tiny, white on long stalks
- Turions: - greenish bud-like at leaf axils
- Tubers: - potato-like attached at the roots

# *Hydrilla verticillata*

## NON-NATIVE

*Hydrilla verticillata*

Photo by Shirley Denton



Hydrilla  
*Hydrilla verticillata*  
Photo by Vic Ramey  
Copyright 2000 Univ. Florida

# ***Hydrilla verticillata***



**Can be smaller, lack teeth, and have a bright green “aquarium” appearance after herbicide treatment.**

# *Egeria densa*

Brazilian waterweed

**NON-NATIVE**

- Rooted, submersed plants
- Stems: - Slender, usually a foot or two long
  - Does not branch as prolifically as hydrilla
- Leaves: - strap-shaped
  - whorls of 3 to 6
  - toothed leaf margins
  - smooth midrib
- Flowers: - short stalks 1" above water
  - 3 white petals
  - $\frac{3}{4}$ " across



# *Egeria densa*

## NON-NATIVE



*Egeria densa*  
1996 Kerry Dressler



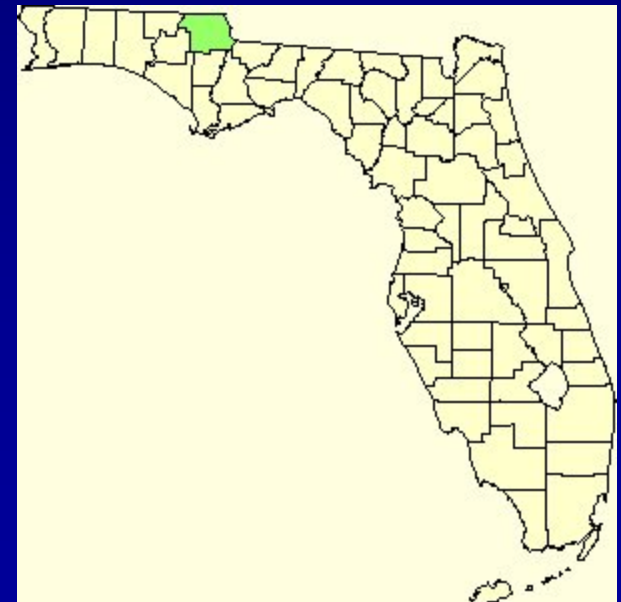
Brazilian waterweed  
*Egeria densa*  
Photo by W.T. Haller  
2003 Center for Aquatic and Invasive Plants

# *Elodea Canadensis*

## Canadian waterweed



- Rare in Florida
- Leaves in whorls of 3
- Plant smooth to the touch
- No teeth on midrib, teeth on leaf edges barely visible



# *Mayaca fluviatilis*

## Bog moss

- **Stems:** - several feet long
  - whitish-green, flexible
- **Leaves:** - emergent are mossy
  - submersed are thread-like
  - densely arranged in spirals on stem

**Flowers:** - solitary, on stalks 2" long

- small, 3 petals
- whitish to pink



*Mayaca fluviatilis*  
Photo by Vic Ramey  
Copyright 1998 University of Florida

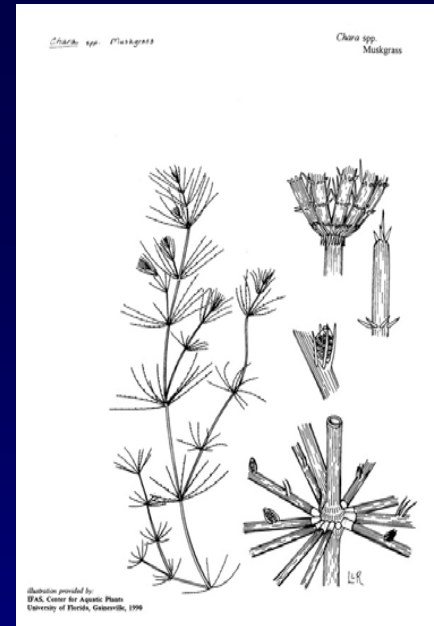


*Mayaca fluviatilis*  
1996 Kerry Dressler

# *Chara* sp.

## Muskgrass

- Ponds, lakes and ditches
- Macro-alga = NO TRUE LEAVES
- Branches and branchlets:
  - Made of single column shaped cells
  - Spiny cells + calcium deposit (rough feeling)
  - In whorls
- Garlic-y odor



# Nitella sp.

- Green macro-alga = NO TRUE LEAVES
- Branches and Branchlets:
  - Smooth translucent stems
  - No smell
  - In whorls, at regular intervals along the main branches
  - Sporangia: reproductive part at the end of branches

*Nitella* sp. Stone wort

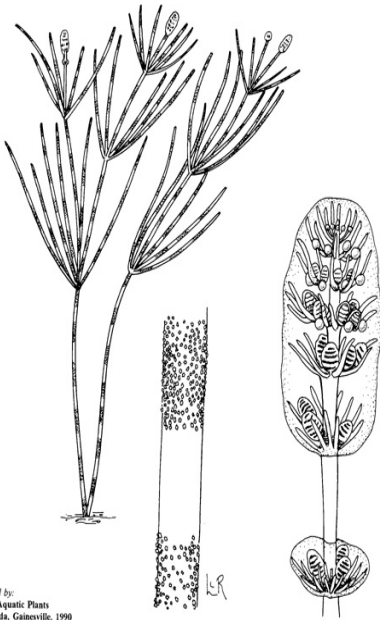


Illustration provided by:  
IFAS, Center for Aquatic Plants  
University of Florida, Gainesville, 1990



# *Najas guadalupensis*

## Southern naiad

- **Stems:** - submersed, very long
  - slender, very branched
- **Leaves:** - arranged opposite or whorls of 3
  - very narrow (~2 mm wide), 1 inch long
  - small teeth on leaf margins
- **Flowers:** - very small on axils
  - inconspicuous





**Note reddish color and no teeth on leaves**

# *Najas marina*

## Spiny naiad

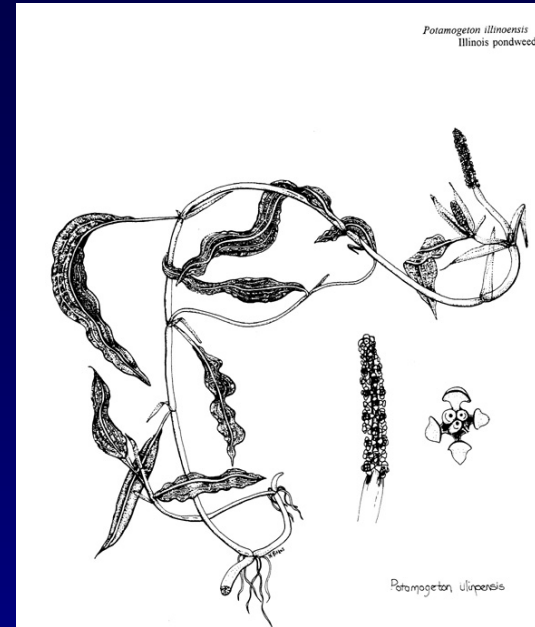
- **Stems:** - brittle up to about 0.5 m long
  - often branched toward the upward portion
  - conspicuous, brownish, prickly teeth at internodes.
- **Leaves:** - opposite or sometimes in whorls of three
  - triangular teeth along the leaf margins
  - prickles along the midrib on the underside
- **Flowers:** - solitary in the leaf axils
- **Plants:** dioecious with the male and female flowers on separate individuals.



# *Potamogeton illinoensis*

## Illinois Pondweed

- Submersed
- Leaves:
  - Alternately arranged
  - Floating and submersed lvs same
    - Elliptic in shape
    - Much longer than wide (8" long)
    - On long petioles
    - Pointed tips and bases
- Flower: - greenish on spike  
-1 to 3" long



# *Potamogeton diversifolius*

*Waterthread pondweed*

- Small plant
- Leaves alternate, 2 styles
  - Small elliptic floating
  - Thin threadlike submersed
- Fruits on tight spike
- Grows in shallow calm waters



*Potamogeton diversifolius*

Photo by Ann Murray  
Copyright 1998 University of Florida

# *Stuckenia pectinata*

(*Potamogeton pectinatus*)

Sago pondweed

- Submersed plant with no floating leaves
- Arise from thick matted rhizomes with terminal tuberos bulbs
- Stems: - branched
  - long and slender
- Leaf blades: - alternate
  - filiform, margins entire
  - 8 cm long, 1 mm wide
  - originated at the apex of the sheath
  - stipules like sheaths 2-5 cm long around stem



Photo by Jess Van Dyke  
Copyright 1998 Florida Department of Environmental Protection

# *Potamogeton pusillus*

## Small pondweed

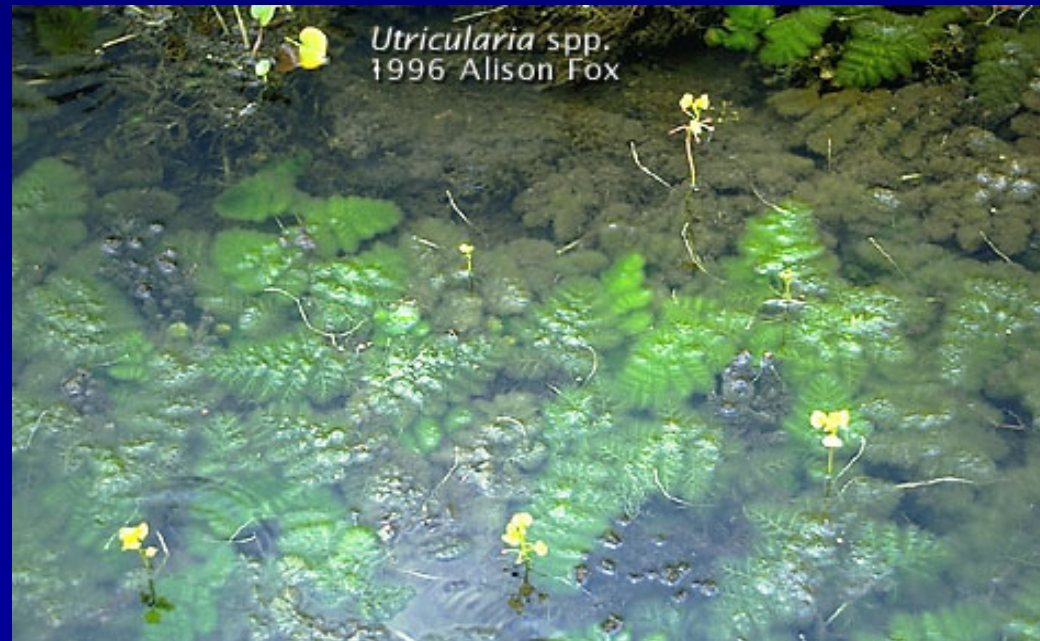
- **Leaves:** - Submersed, alternate
  - linear leaves, 2-7 cm long, 0.5-2 mm wide
  - pointed/rounded tips and 3 veins.
  - stipules free from leaf base, appear to stick out in leaf axils
- **Stem:** - Slender and profusely branched
  - with small paired yellowish glands at leaf base
- **Flower:** - in 1-4 whorls on spikes measuring 3-15 mm long;
  - spikes not always above the water;
  - on stalks to 5 cm long, often curved at the base.



# *Utricularia foliosa*

## Flat-stem bladderwort

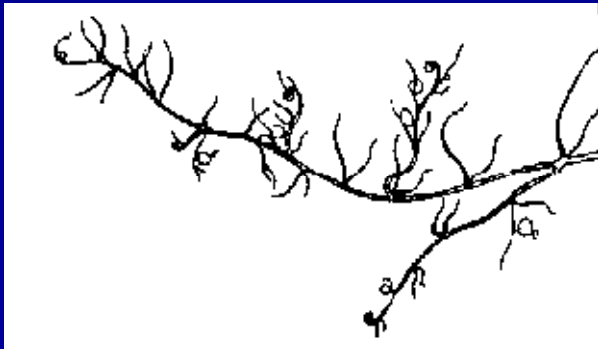
- Rootless, floating carnivorous plant
- Main stem: - Thick and flat
- Leaves: - 3-dimensional bushy leaves – fern-like
  - Upper lobes: bright green, few bladders
  - Lower lobes: pale green, full bladders
- Flowers: - bright yellow
  - on long emerged stalk
  - up to 20 flowers/stalk
  - distinct rounded lips



# *Utricularia gibba* (*U. biflora*)

## Humped bladderwort

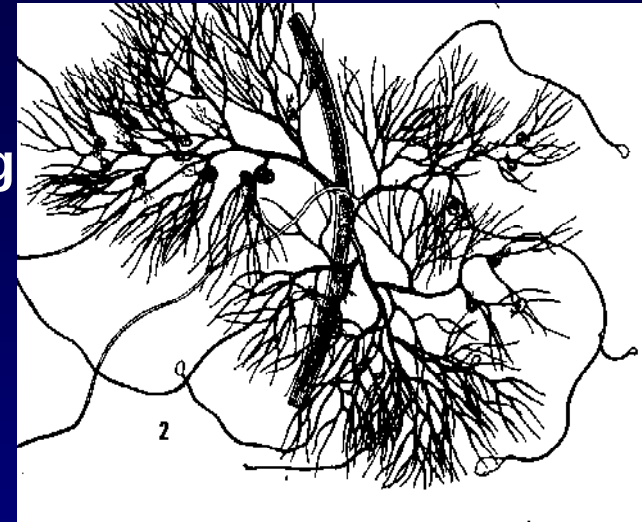
- Rootless, free floating
- Forms dense mat of tangled stems and branches
- Leaves: - alternate, usually forked only once if at all
- Flower stems:
  - slender
  - 1-3 yellow flowers
- Rounded spur under flower



# *Utricularia inflata*

## Big floating bladderwort

- Large (floats to 12 cm diameter), free floating
- Leaves: 2 types
  - Submersed: - alternate leaves
    - forked four to five times
    - contains bladderwort
  - Floats: inflated petioles
- Flowering: in groups of 4-12 on stalks 15 cm long
- *U. radiata* looks essentially the same, but smaller (floats to 5 cm diameter)



# *Utricularia floridana*

## Florida bladderwort

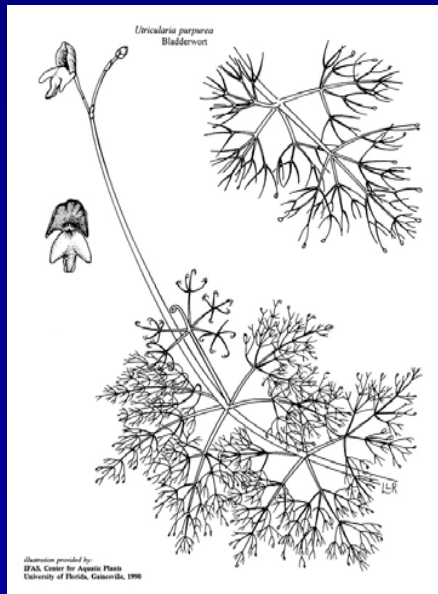
- “Rooted” but no true roots: this part tends to be whitish to light yellow
- Branches: 20-50mm across
  - Like foxtails
  - Leafy branches, bladder branches
- Flowering raceme arising from a leafless, flattened stem up to 1m long
- Flowers: Yellow emergent with red streak



# *Utricularia purpurea*

## Purple bladderwort

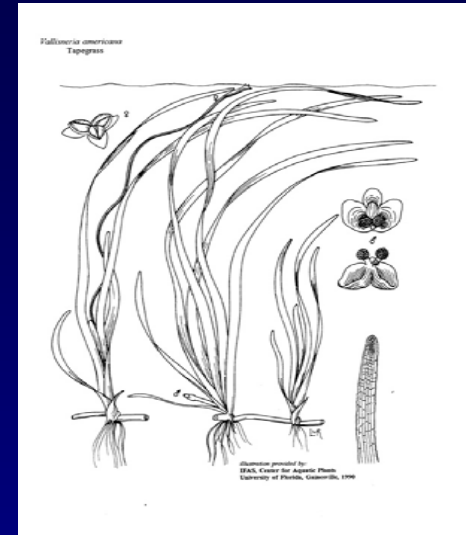
- No roots
- Free floating stems
- Leaves: - in whorls of 4 to 7 throughout entire plant  
- lacy looking, can appear as puffballs
- Bladders: - at tips of the leaves
- Inflorescence: - 1 to 4 purple flowers emergent on stalk



# *Vallisneria americana*

## Eelgrass

- **Leaves:** - Dark green, tape-like
  - 1-2 cm wide, variable
  - Raised spongy midsection
  - Rounded tips
- **Flowering:** - Floating, pistillated flower on curling stem
  - Submersed staminoid flower at base of plant
  - Flower: 3 sepals + 3 white petals
- **Fertilization:** stem of pistillated flower coils and submerges fruit
- **Fruit:** - slender, banana-like capsule with tiny seeds.



# *Vallisneria americana*

Eelgrass



Tape grass flower  
*Vallisneria americana*  
Photo by Vic Ramey  
Copyright 2001 Univ. Florida

# *Sagittaria kurziana*

## Strap-leaf Sagittaria

- Leaves: -  $\frac{3}{4}$ " wide
  - Sharp, pointed tips (Vallisneria = rounded)
  - 3 to 5 prominent ridges that run the entire length of the leaf
- Flowers: - Emerged/floating on branched stalks
  - 3 white petals



*Sagittaria kurziana*

Photo by Jess Van Dyke  
Copyright 1998 Florida Department of Environmental Protection

# *Vallisneria* vs. *Sagittaria kurziana*

Leaves: thick midsection

Leaf tips: rounded

leaf size varies for both!

Flowers: spiral peduncle,  
single thick unit

5 distinct ridges

pointed

several white flowers  
on straight peduncle



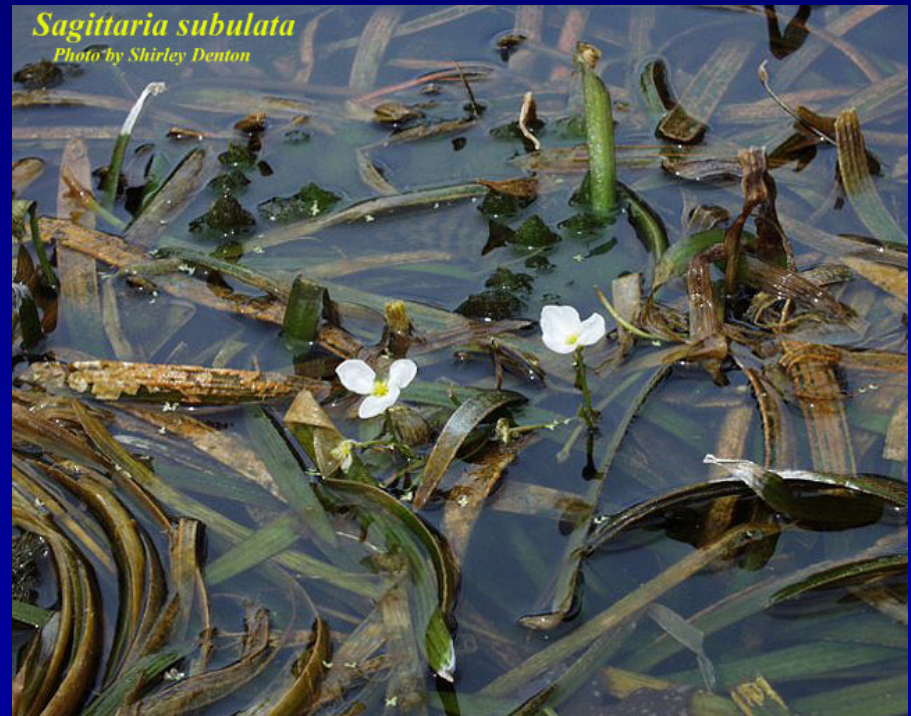
*Vallisneria americana*  
Photo by Shirley Denton



*Sagittaria kurziana*  
Photo by Jess Van Dyke  
Copyright 1998 Florida Department of Environmental Protection

# *Sagittaria* sp.

- Several species can have strap-like (phyllodial) leaves and small floating spatulate leaves
- Flowers on leafless emerged stalks, 3 white petals
  - Need flower stalk to key to species!
- Whitish roots and leaf bases



*Sagittaria isoetiformis*  
Photo by Shirley Denton



*S. isoetiformis* & *S. filiformis* -  
Small species that grow in  
shallow water.  
Most noticeable when flowering.

*S. filiformis* =  
*S. stagnorum* in G&W



*Sagittaria filiformis*  
Photo by Belinda Lambert

# *Eleocharis* spp.

## Spikerushes

- Leafless stems growing from node (ramet)
- When submersed, new ramets sprout from stem tips
- Usually *E. baldwinii* when submersed and flourishing, but not always!



# *Websteria confervoides*

## *Algal bulrush*

- Looks like *Eleocharis*
- Clumps of wispy leafless stems appear like puffballs in water.



# *Bacopa caroliniana*

## Lemon bacopa

- Common in fresh and brackish water
- Leaves: - succulent and thick
  - opposite and clasping stems
  - Lemony scent when crushed
  - almost round
- Flowers: - small and blue
  - 4 or 5 petals



# *Bacopa monnieri*

## Smooth water hyssop

- Common in fresh and brackish waters
- Leaves: - succulents and thick
  - oblanceolate
  - opposite, not clasping stems
- Flowers: - small and white
  - 4 or 5 petals



Smooth water hyssop  
*Bacopa monnieri*  
Photo by Vic Ramey  
Copyright 2000 Univ. Florida

# *Micranthemum umbrosum*

## Baby tears

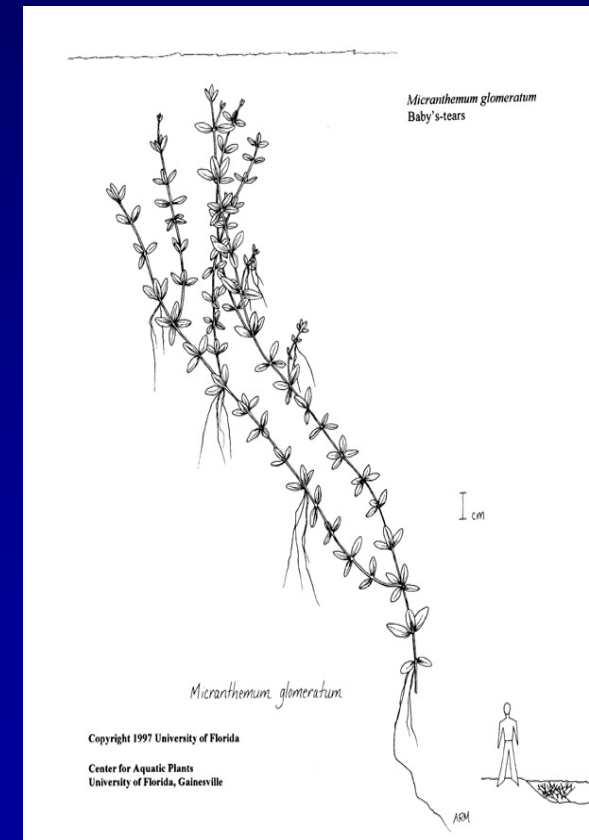
- Small, creeping, usually totally emersed
- Stems: - creeping, slender, 6 to 8" long
- Leaves: - small, light-green
  - round, opposite
- Flowers: - very tiny white or purplish
  - hard to find



# *Micranthemum glomeratum*

## Baby tears

- Small, creeping, usually totally emersed
- Stems: - creeping, slender, 6 to 8" long
- Leaves: - smaller than *M. umbrosum*
  - light-green
  - more lanceolate, opposite
- Flowers: - very tiny white or purplish
  - hard to find



# *Hygrophila polysperma*

East Indian hygrophila

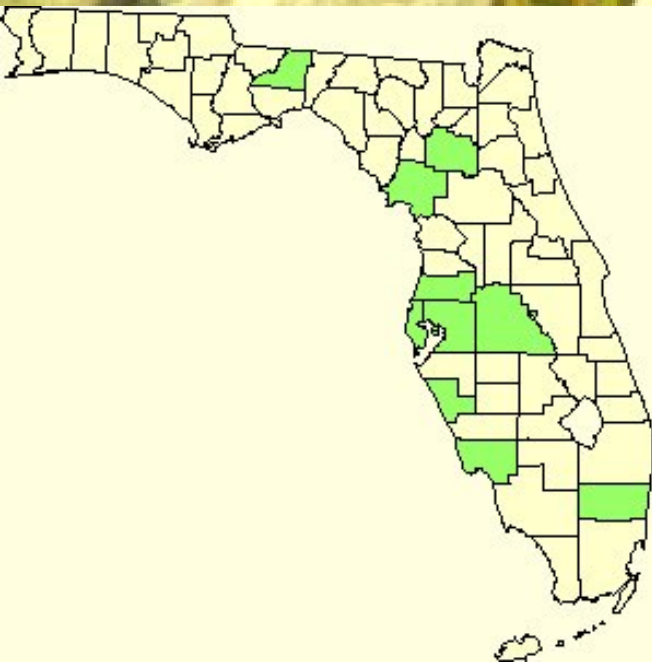
**NON-NATIVE**

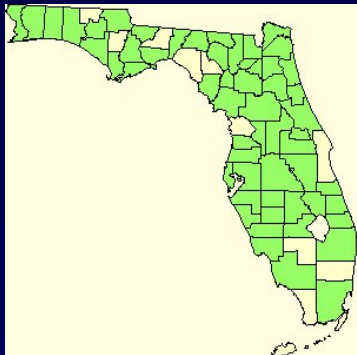
- Found in streams and slowly moving waters
- Submersed with few inches sometimes emerged
- Stems: - square
  - up to 6 feet long
- Leaves: - opposite, pointed
  - 1 ½" long, ½" wide
- Flowers: - at leaf axils
  - bluish-white to white
  - 2 lips



# *Hygrophila polysperma*

*Photo by Patricia Howell*





# *Proserpinaca palustris*

## Marsh mermaid-weed

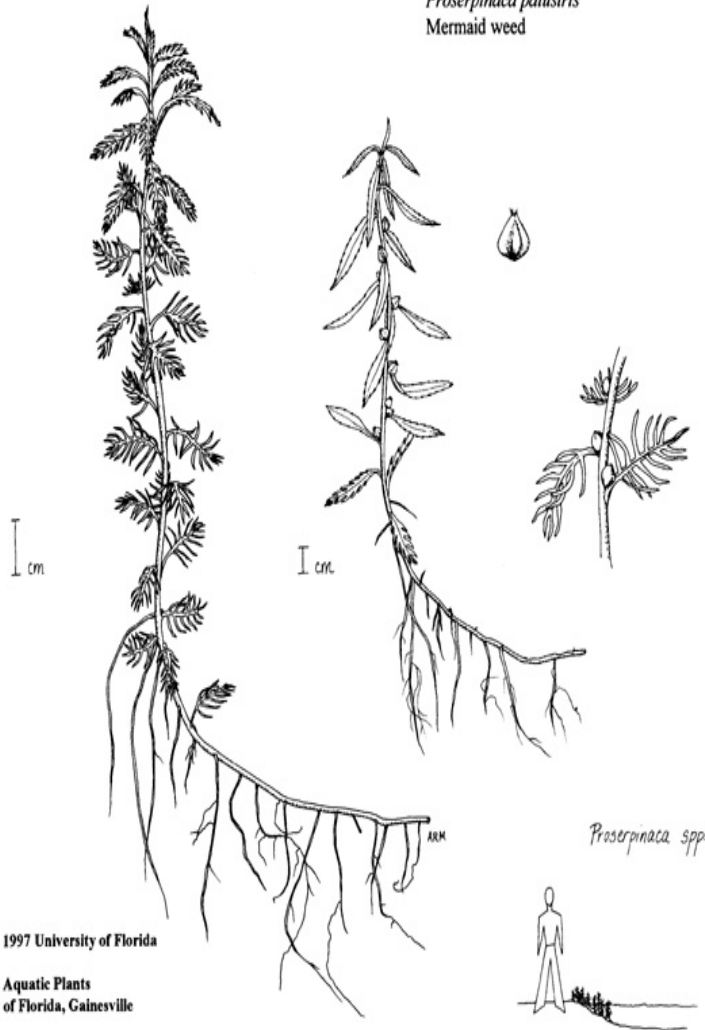
- Found in very calm waters, often shallow wetlands
- Leaves: - 5 to 10 cm long
  - alternate on the stem
- 2 types of leaves:
  - Submersed leaves feather-like, divided
  - Emergent leaves
    - associated with flowering and fruiting
    - blade-shaped and conspicuously serrated
- Flower: - reddish-purple (2 cm wide)
  - In leaf axils of the emergent leaves
  - Fruit is 3-sided nutlet

# *Proserpinaca palustris*

## Marsh mermaid-weed

*Proserpinaca pectinata*  
Mermaid weed

*Proserpinaca palustris*  
Mermaid weed



Copyright 1997 University of Florida

Center for Aquatic Plants  
University of Florida, Gainesville





**Thank you.**

**Questions?**