


# Pawtuckaway Lake Aquatic Invasive Species Refresher

The following presentation was given by Amy Smagula from the NH Department of Environmental Services at the 2018 Weed Watcher Training Session.

It has been updated by PLIA to reflect the 2017 Pawtuckaway Lake milfoil status and been changed to be more specific about what to do if you see suspicious vegetation or animal life in or around the lake.



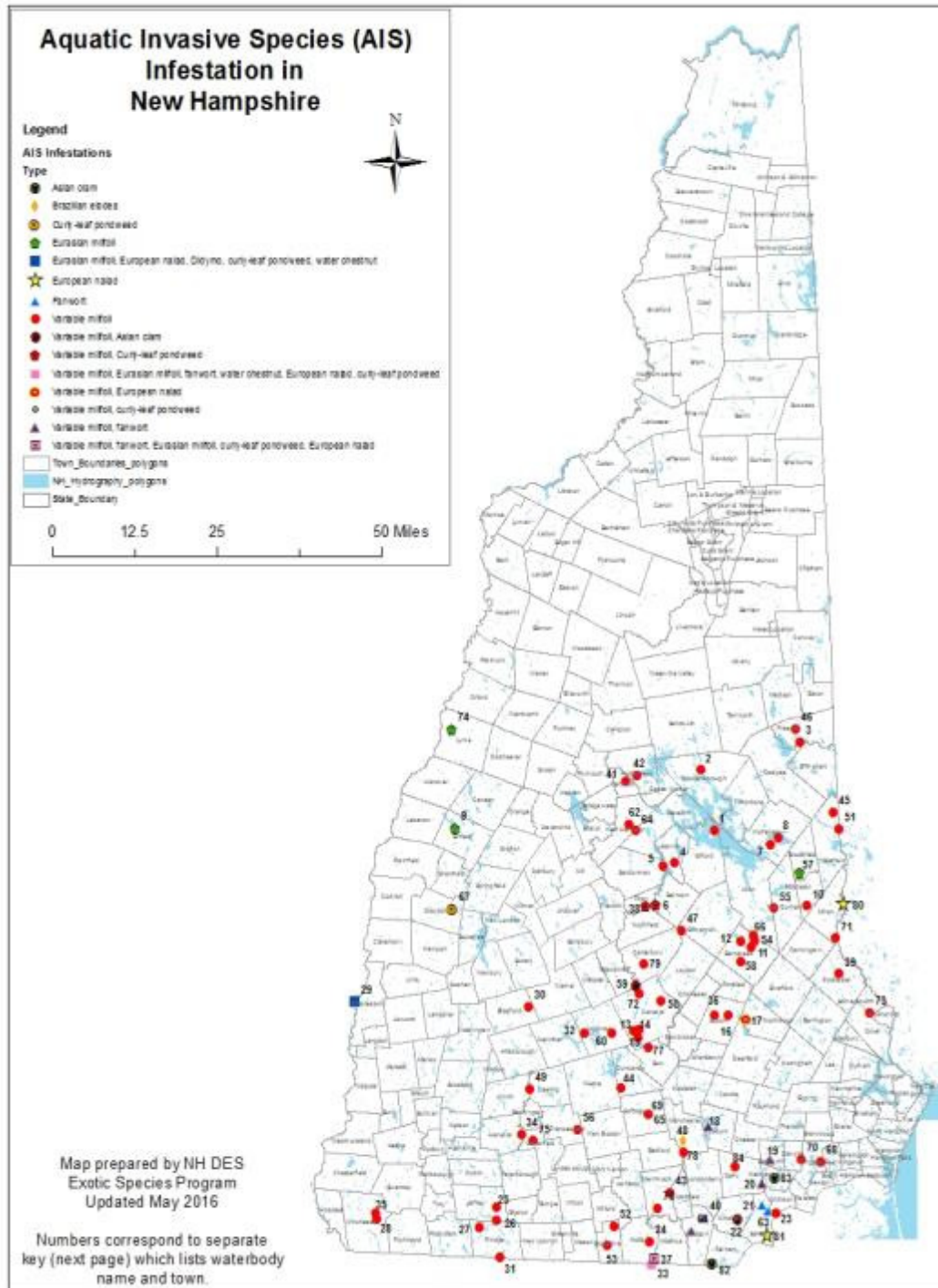
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# Overview



- Status of infestations in NH
- Infestations near Pawtuckaway
- Milfoil in Pawtuckaway
- Invasive Plant Refresher
- Invasive Animal Refresher
- Key Weed Watcher Refresher Items

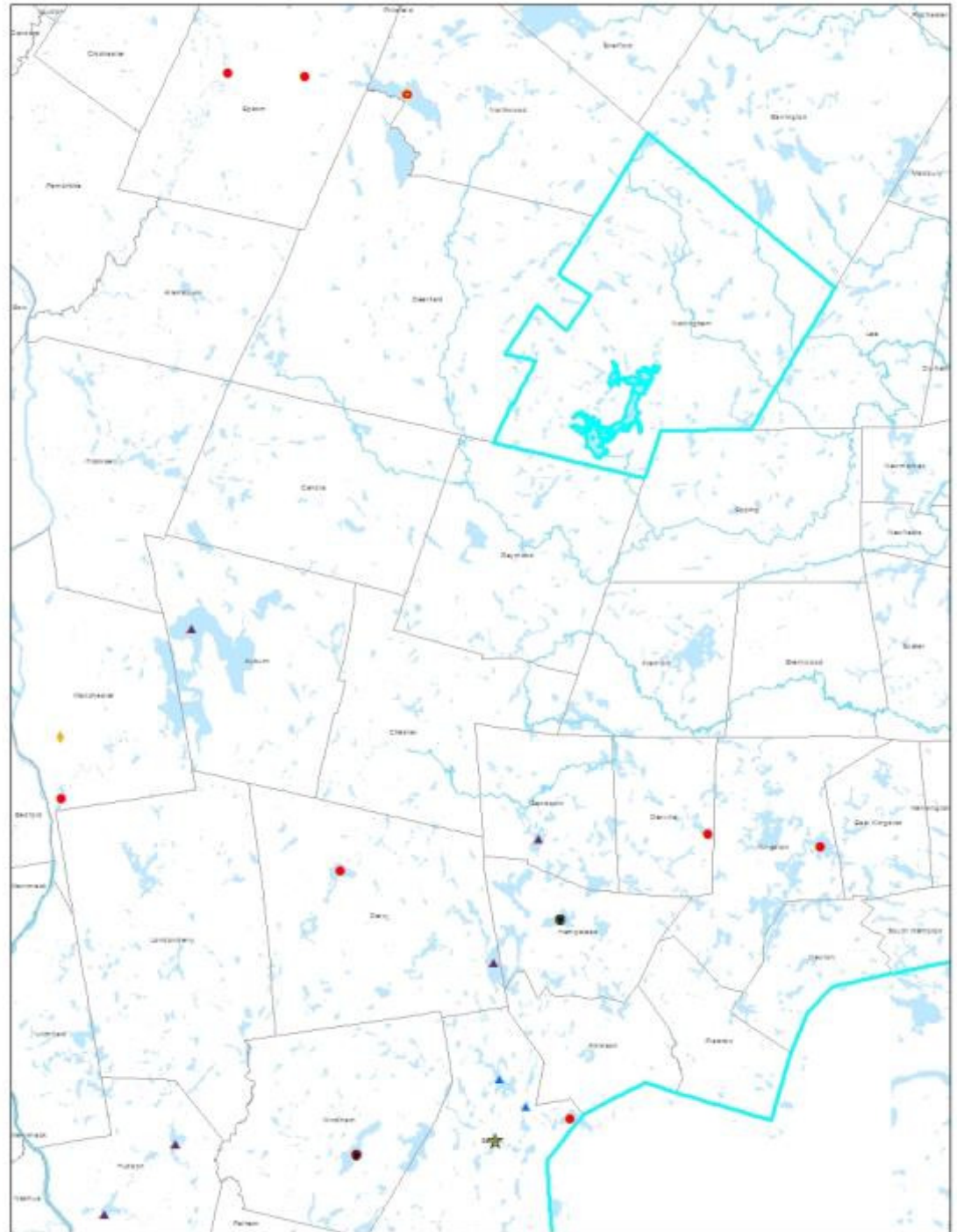
# Status of Infestations



- 70+ variable milfoil infestations
- 5 Eurasian water milfoil infestations
- 9 fanwort infestations
- 2 water chestnut infestations
- 1 Brazilian elodea infestation
- 8 water naiad infestations
- 3 curly-leaf pondweed infestations
- 45 mi reach of Didymo growth
- 4 Asian clam infestations
- >80 Chinese mystern snail infestations



- Red dots
  - *variable milfoil*
- Blue triangle with red outline
  - *variable milfoil+fanwort*
- Tan Mussel symbol
  - *Asian clam*
- Red mussel symbol
  - *Asian clam+variable milfoil*
- Gold diamond
  - *Brazilian elodea*
- Gold star
  - *European naiad*





# High Risk Species for Pawtuckaway Lake



- Based on water chemistry and geographic location

- Plants

- ✦ Variable milfoil
- ✦ Fanwort
- ✦ Water chestnut

- Animals

- ✦ Asian clam
- ✦ Spiny water flea
- ✦ Chinese mystery snail

# Milfoil in Pawtuckaway



- Found during summer of 2015
- Local volunteers stepped up monitoring/reporting
- DES diving in 2015 and 2016
- End of 2016 growing season no milfoil observed
- Survey work will continue in 2017
- Concerns from local lake residents about being able to spot growth of milfoil

# Milfoil Diver Work



DATE	CONTROL ACTION	AREA TREATED (ac) / GALLONS REMOVED (gal)	TARGET SPECIES	CONTRACTOR/ENTITY
8/26/2015	DIVING/HAND REMOVAL	1 HOUR, 25 GALLONS	VARIABLE MILFOIL	NH DES DIVERS
9/11/2015	DIVING/HAND REMOVAL	1 HOUR, 1 GALLON	VARIABLE MILFOIL	NH DES DIVERS
6/24/2016	DIVING/HAND REMOVAL	1.5 HOURS, 30 GALLONS	VARIABLE MILFOIL	NH DES DIVERS
6/29/2016	DIVING/HAND REMOVAL	2 HOURS, 20 GALLONS	VARIABLE MILFOIL	NH DES DIVERS
7/14/2016	DIVING/HAND REMOVAL	1.5 HOURS, 10 GALLONS	VARIABLE MILFOIL	NH DES DIVERS
8/5/2016	DIVING/HAND REMOVAL	2 HOURS, 1 GALLON	VARIABLE MILFOIL	NH DES DIVERS
8/17/2016	DIVING/HAND REMOVAL	2.5 HOURS, 10 GALLONS	VARIABLE MILFOIL	NH DES DIVERS



# 2017 Milfoil Summary

- Dives conducted at least weekly from June to October
  - Pawtuckaway Lake Milfoil Team, 5 snorkelers and 2 scuba divers
  - Various areas of South Channel searched at least weekly
  - Fundy searched from Boat Launch to Black Marker once. Nothing found.
  - Cove between Cahill Point and Cove Road searched once. Nothing found.
- DES divers called 5 times to remove marked milfoil
  - Estimate less than 15 gallons of milfoil removed in 2017
  - Less than 30 plants total
  - Most plants less than 2 feet tall
  - Only 3 large plants found


# 2016/2017 Milfoil Map



## Legend

Blue 2016 Milfoil  
Red 2017 Milfoil

## Variable milfoil ID tips

An underwater photograph showing a dense thicket of milfoil plants. The plants have long, thin, feathery leaves and a central stem. A red callout box with a pointer indicates a specific part of the plant.

Think of a “squirrel’s tail” when you look at the stems of growth. You will often see the stem and then the fluffy tubular growth around it. There may be a single stem, or a few in a clump.



## Variable milfoil ID tips

New growth may be  
down low, close to the  
bottom.





Variable milfoil ID tips

Scattered single stems and small clumps, indicative of a spreading population.



## Variable milfoil ID tips

The plants often  
have bright green  
tips, or whole stems





# Don't be fooled by bladderwort!



Large bladderwort  
*Utricularia vulgaris*

*Bladderwort is a  
very common  
native plant, most  
often confused  
for variable  
milfoil.*

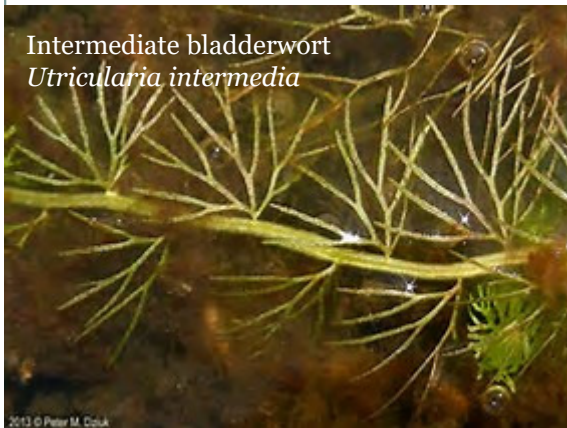


Intermediate bladderwort  
*Utricularia intermedia*



Large bladderwort  
*Utricularia vulgaris*

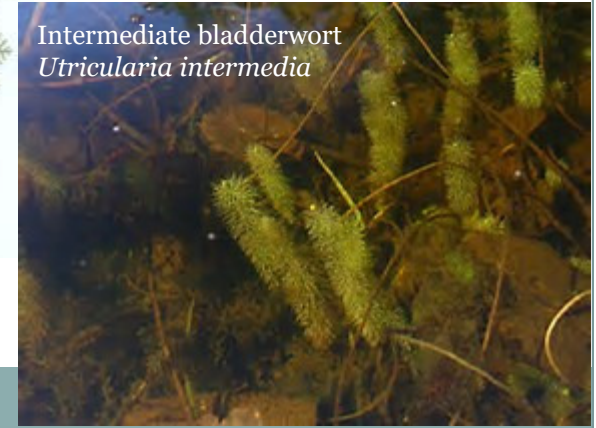
*You have all three of these  
in Pawtuckaway Lake!*



Intermediate bladderwort  
*Utricularia intermedia*



Whorled bladderwort  
*Utricularia purpurea*



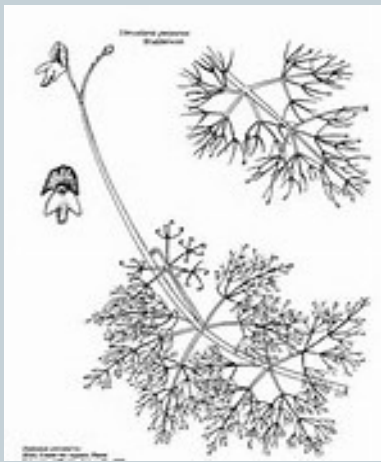
Intermediate bladderwort  
*Utricularia intermedia*

# To be sure, check the leaves!

- Bladderwort leaves are more branching or forking, and usually have green, black, or clear “bladders” on them. They alternate.
- Milfoil leaves look like a feather and have no bladders (but beware of the algae globs! Variable milfoil leaves are in whorls).
- *When in doubt, collect a voucher for DES.*



**Variable milfoil leaf whorl and single leaf. Note feather-like appearance.**



Whorled bladderwort leaves can whorl around the stem, but they are branching, not feather-like.



Large bladderwort leaf with black bladders. Notice it appears like a feather, but not a true feather. It is lacier and branching at the tip.



Large bladderwort leaf that lost bladders. Notice it appears like a feather, but not a true feather. It is lacier and branching at the tip.



Intermediate bladderwort leaves are alternate along stem. Bladders are on a separate stem.

# Plant and Animal Refresher

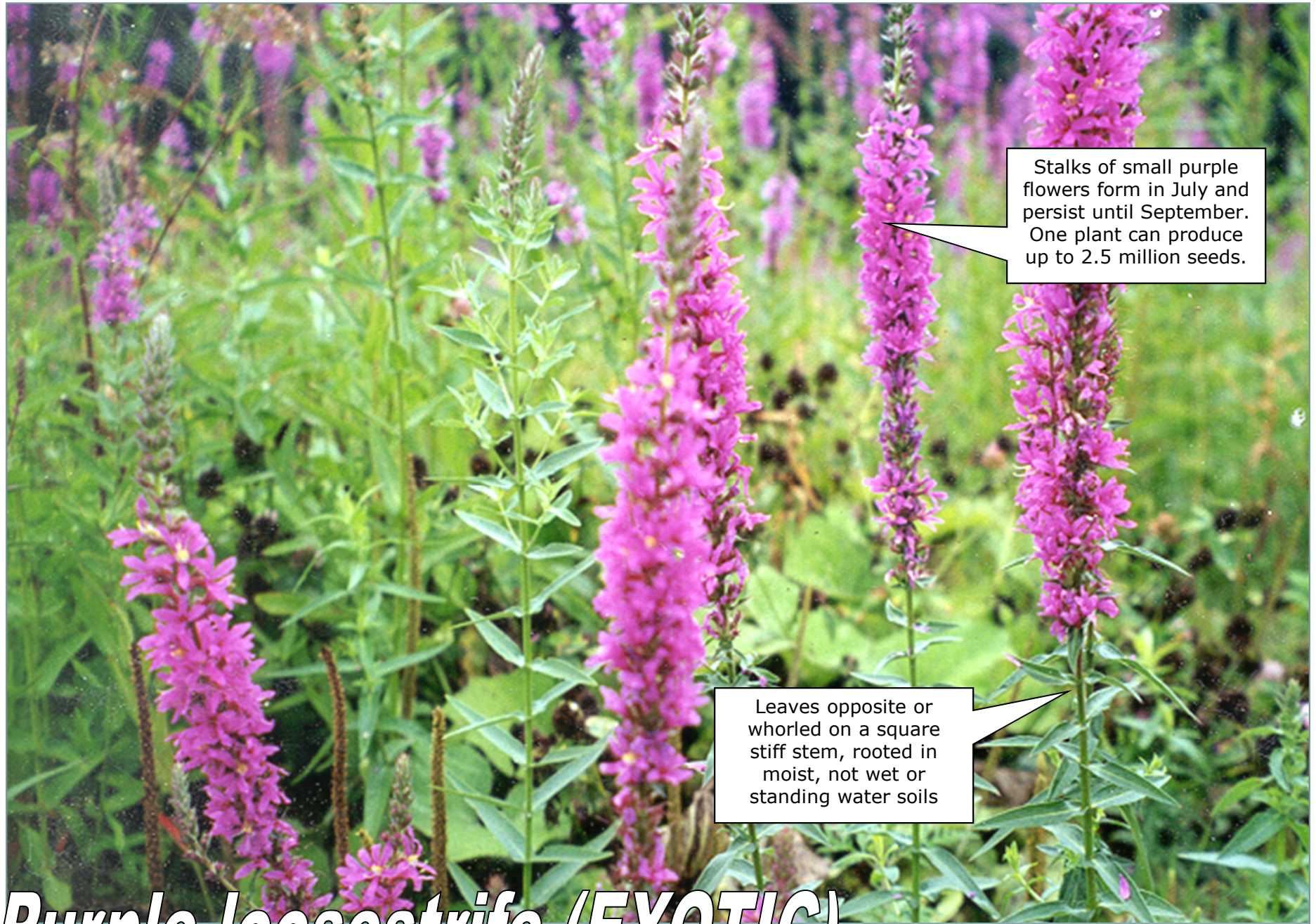


- Following are photos of the more common species to keep an eye out for while on the water



# Emergent Invasive Plants





Stalks of small purple flowers form in July and persist until September. One plant can produce up to 2.5 million seeds.

Leaves opposite or whorled on a square stiff stem, rooted in moist, not wet or standing water soils

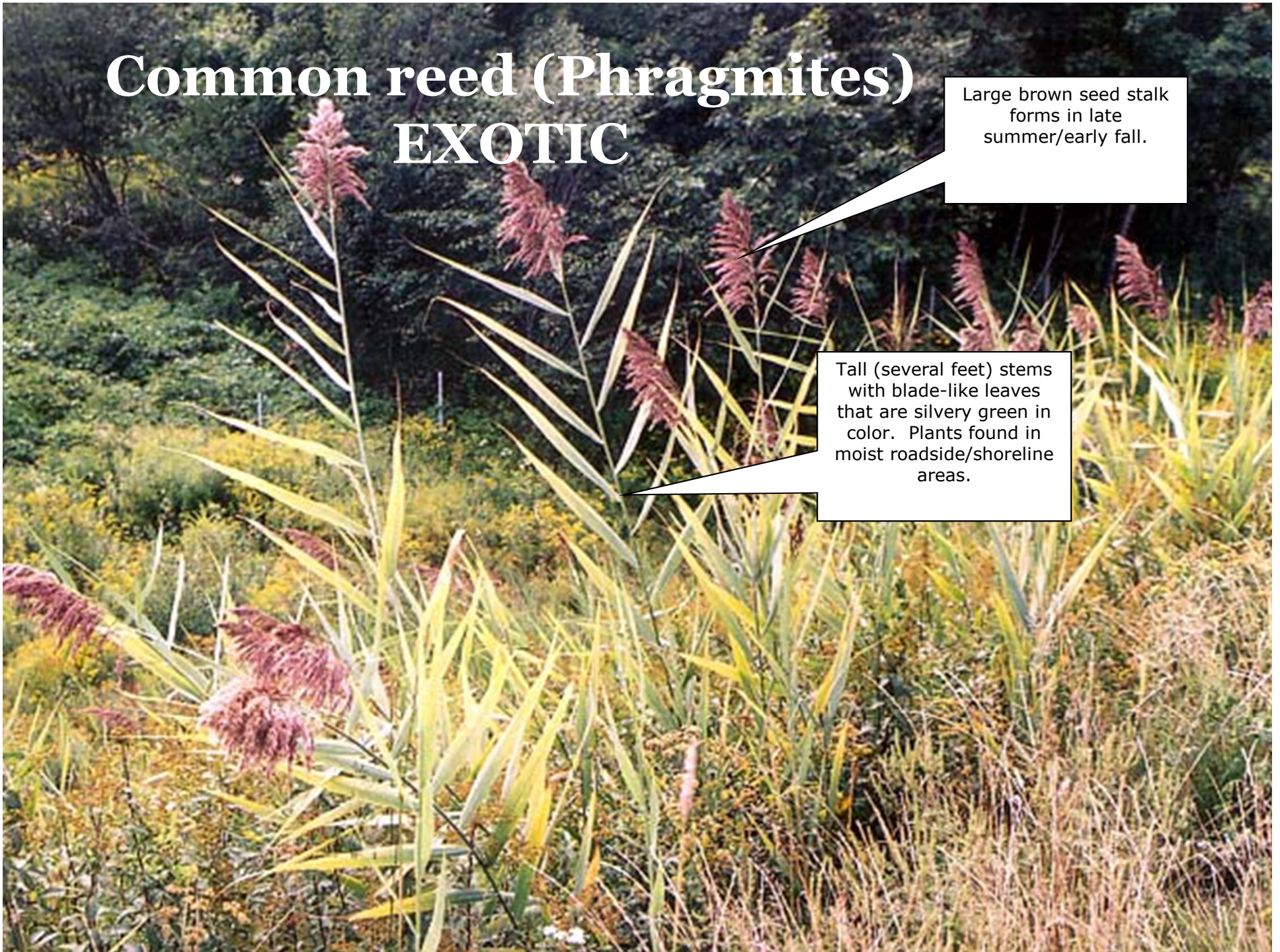
***Purple loosestrife (EXOTIC)***



# Common reed (Phragmites) EXOTIC

Large brown seed stalk forms in late summer/early fall.

Tall (several feet) stems with blade-like leaves that are silvery green in color. Plants found in moist roadside/shoreline areas.



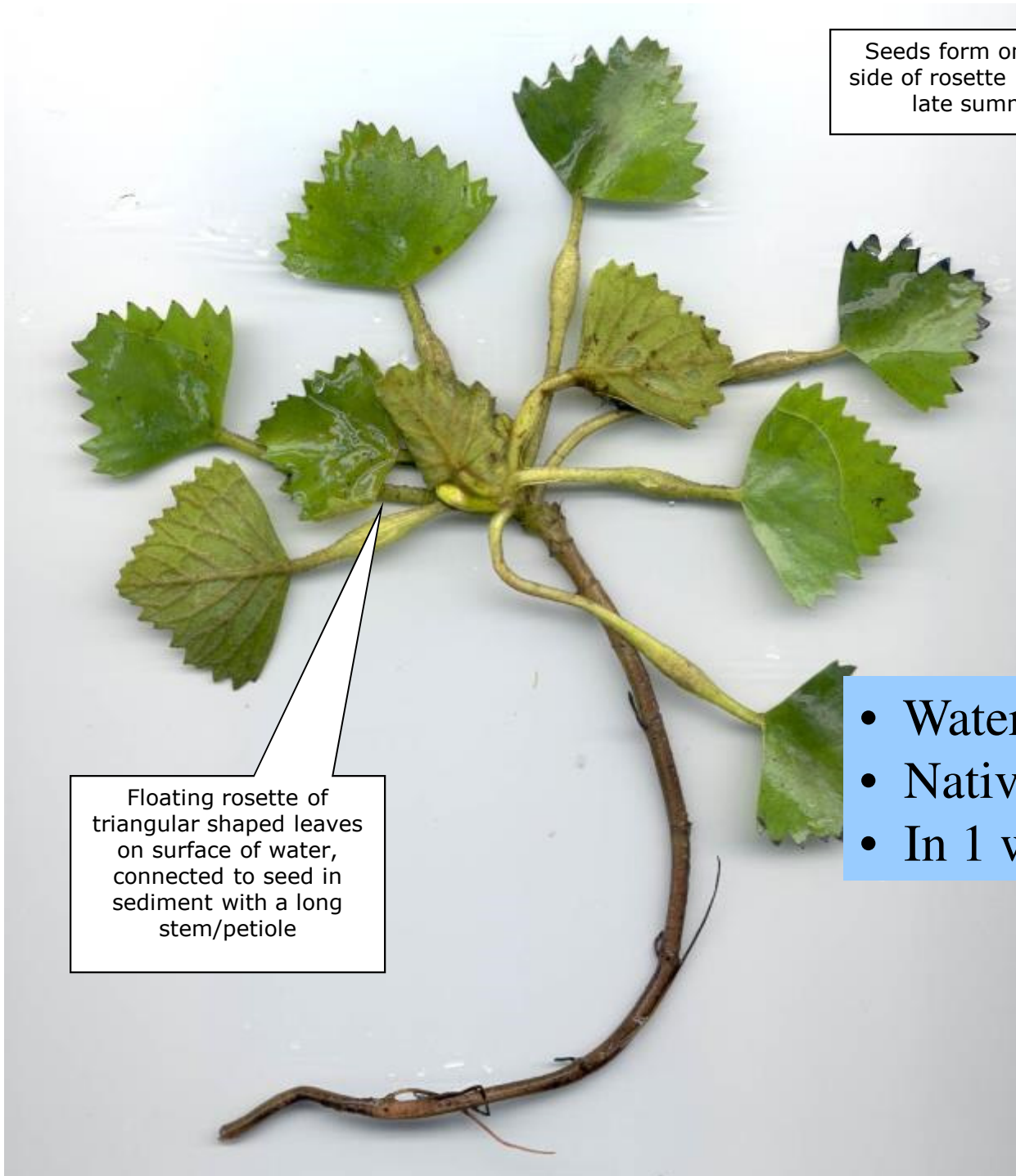




# Floating Leaved Invasive Plants

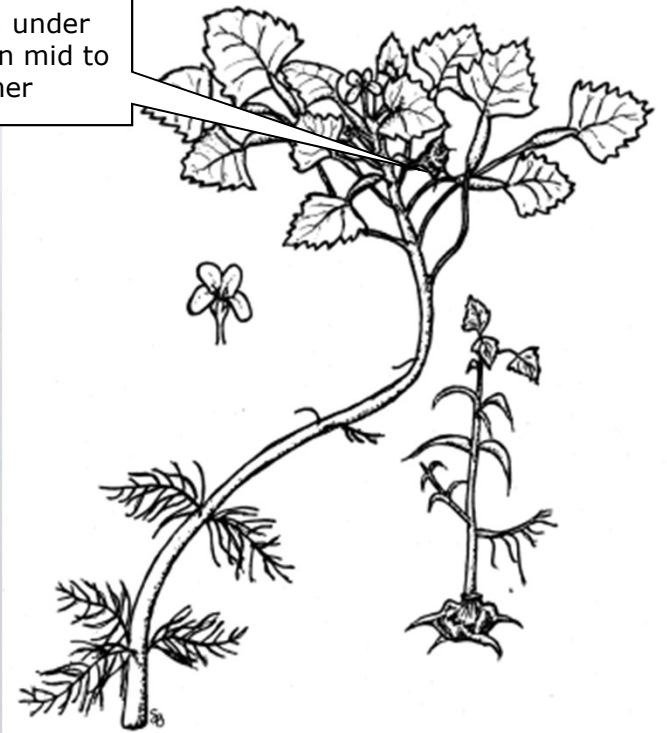






Floating rosette of triangular shaped leaves on surface of water, connected to seed in sediment with a long stem/petiole

Seeds form on under side of rosette in mid to late summer



- Water chestnut- *Trapa natans*
- Native to Asia
- In 1 waterbody in NH





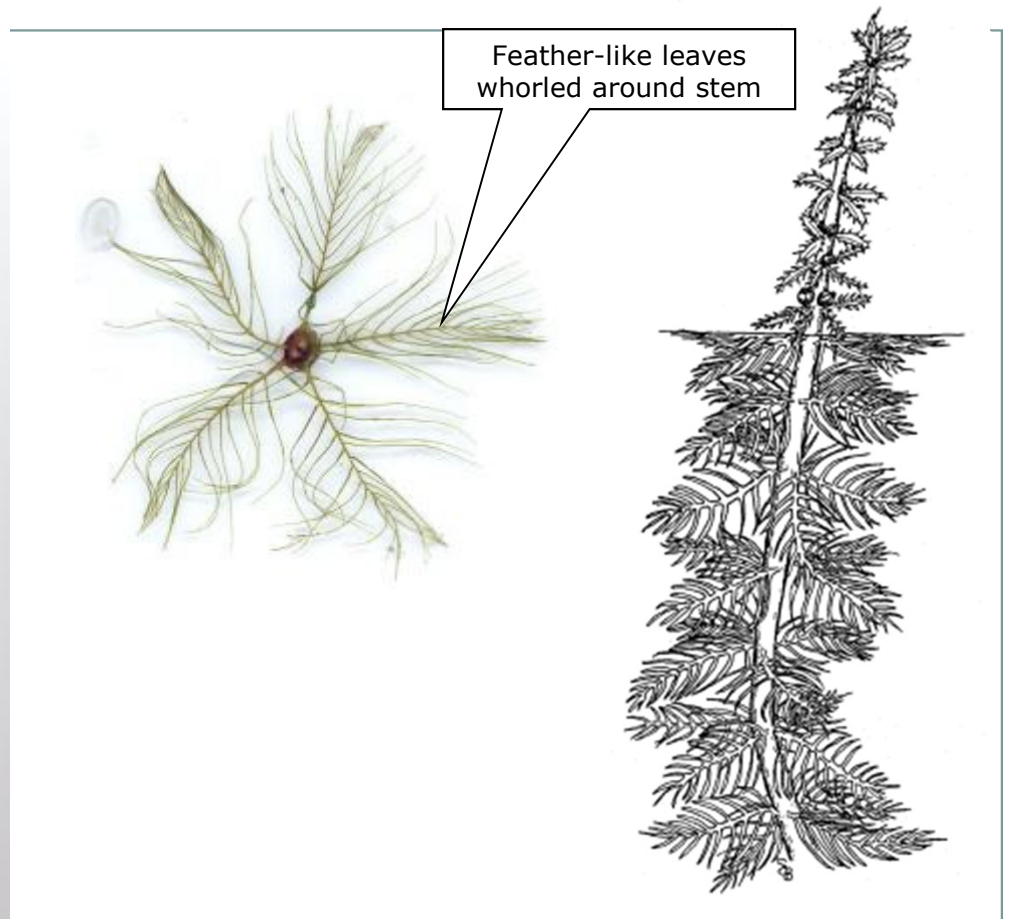
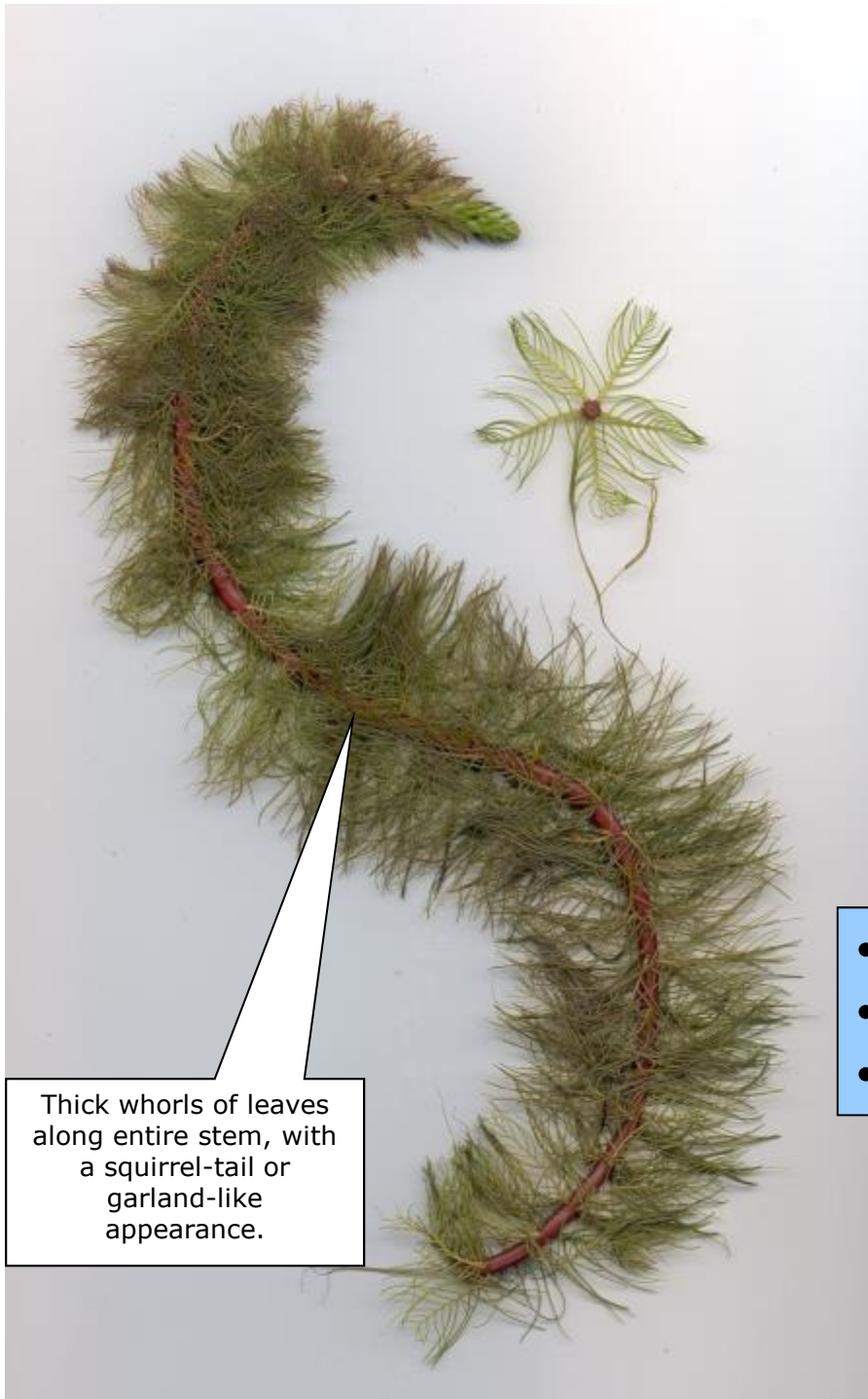


*Water chestnut- EXOTIC*

# Submergent Invasive Plants







- Variable milfoil- *Myriophyllum heterophyllum*
- Native to southern and central U.S., not to NH
- In over seventy waterbodies in NH

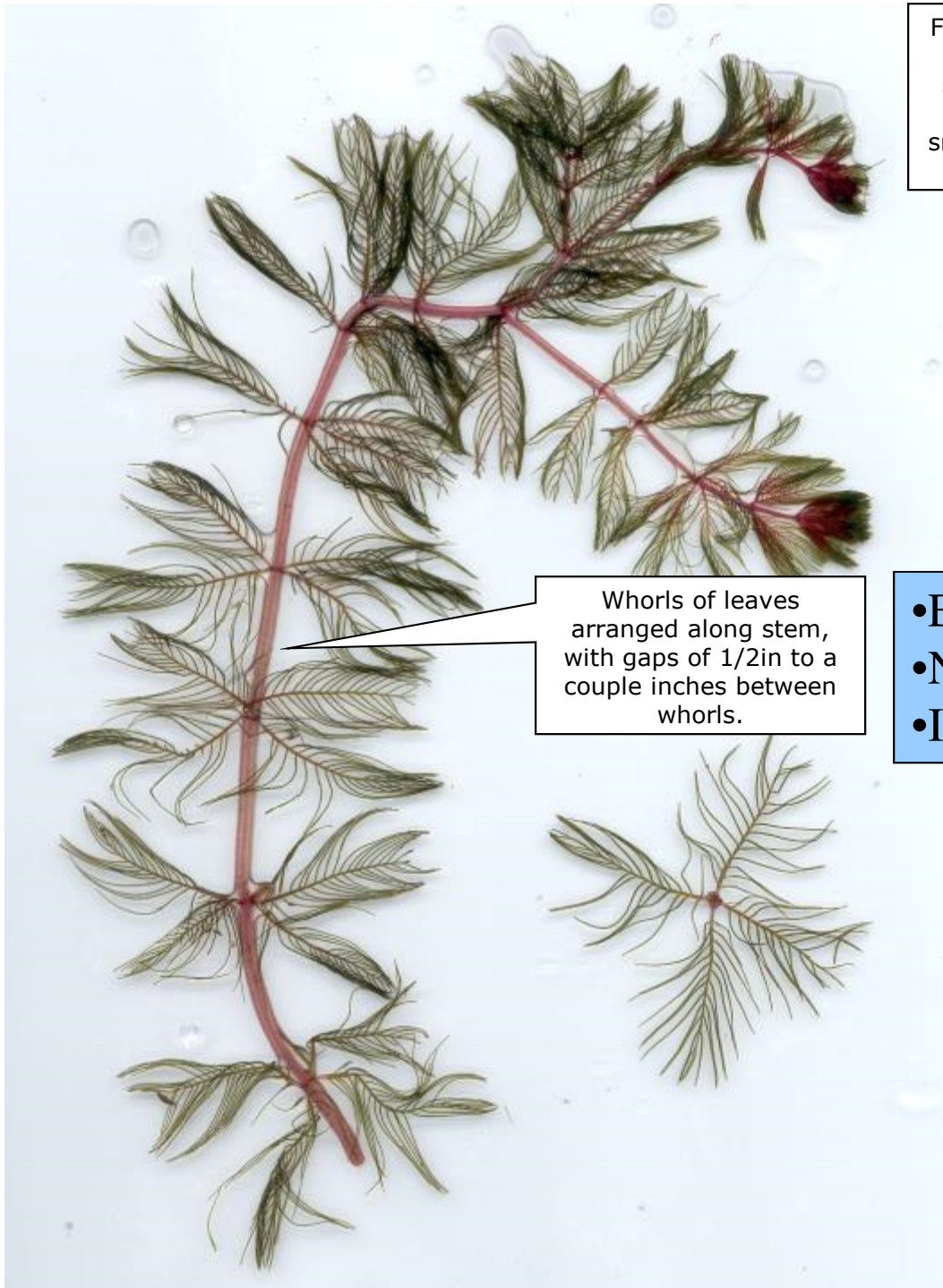




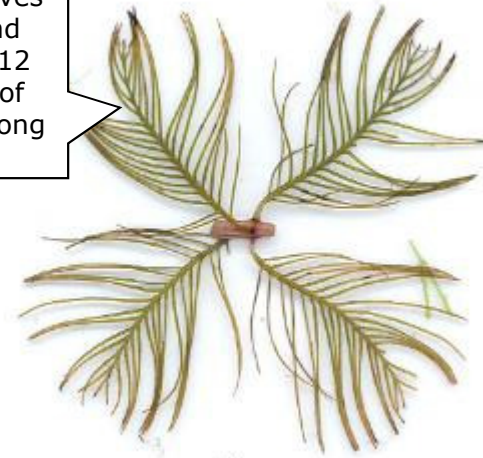









Feather-like leaves  
whorled around  
stem, at least 12  
or more pairs of  
small leaflets along  
one leaf



Whorls of leaves  
arranged along stem,  
with gaps of 1/2in to a  
couple inches between  
whorls.

- Eurasian milfoil- *Myriophyllum spicatum*
- Native to Asia
- In 5 waterbodies in NH





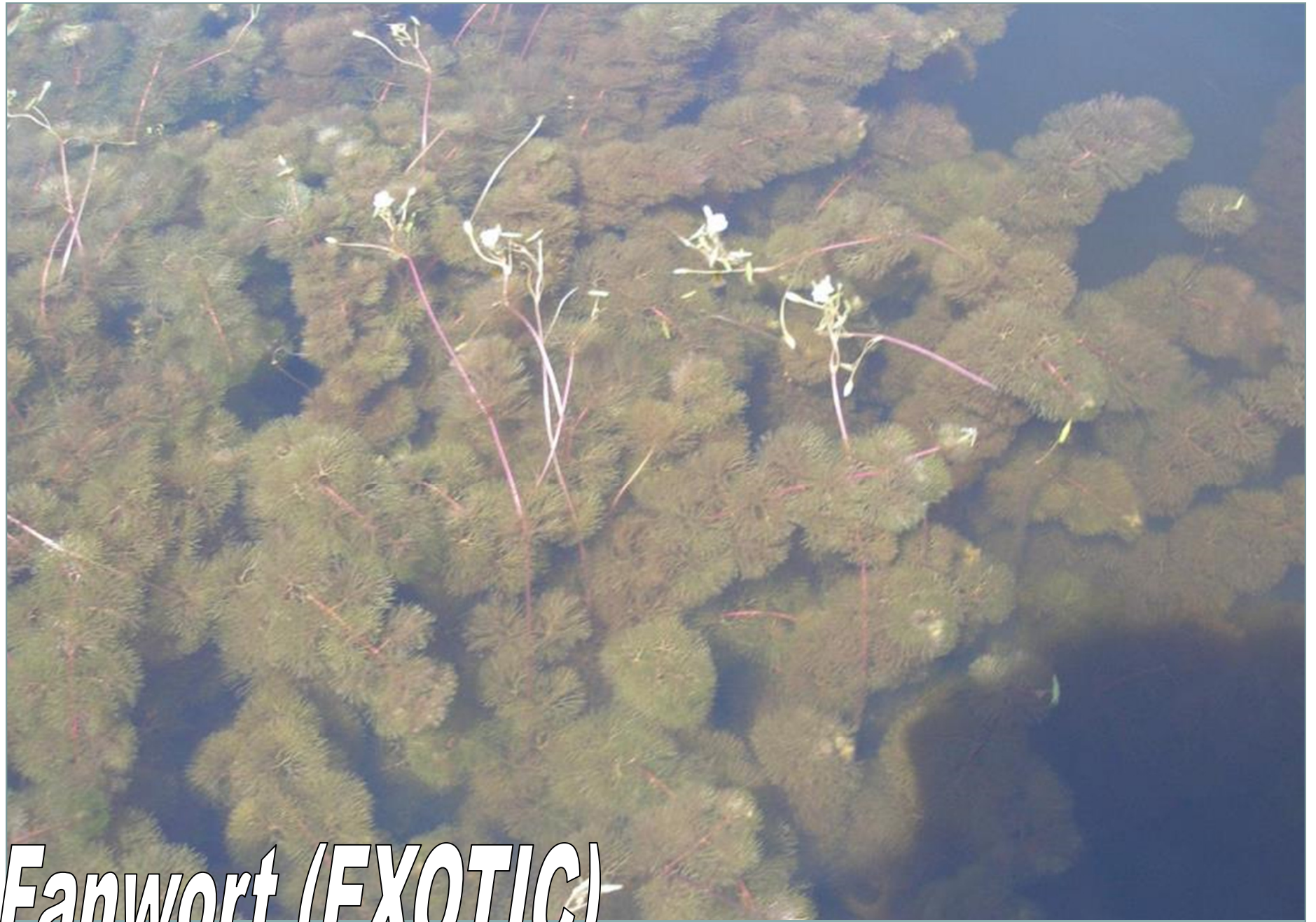
Branching leaves  
arranged opposite along  
stem. Note leaf is  
attached by a short  
stem to main stem of  
plant.



- Fanwort- *Cabomba caroliniana*
- Native to Europe/Asia
- In 9 waterbodies in NH





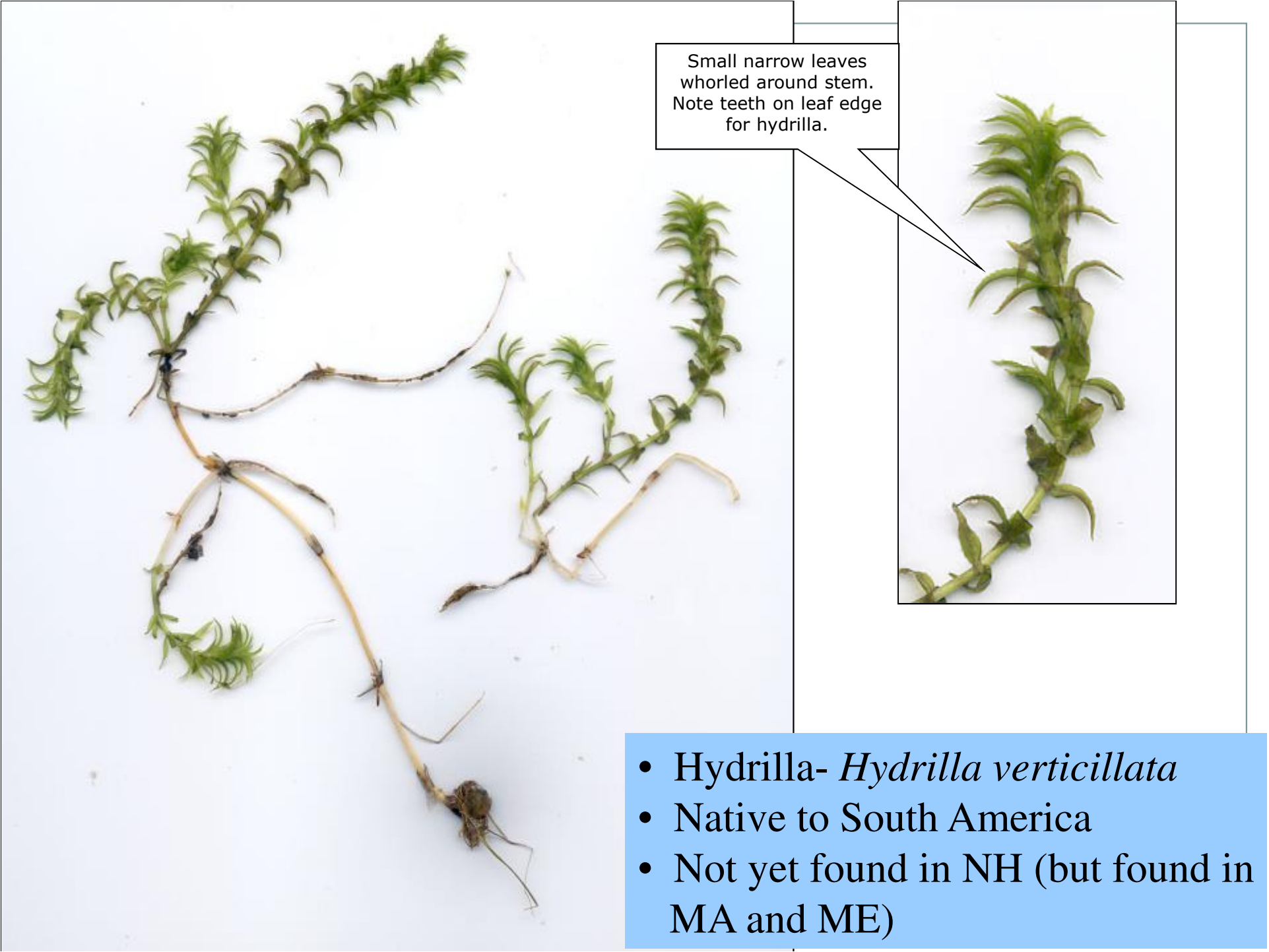


***Fanwort (EXOTIC)***



# Curly-leaf Pondweed

Leaves are narrow with wavy (lasagna noodle) like edges to them, crisp like lettuce

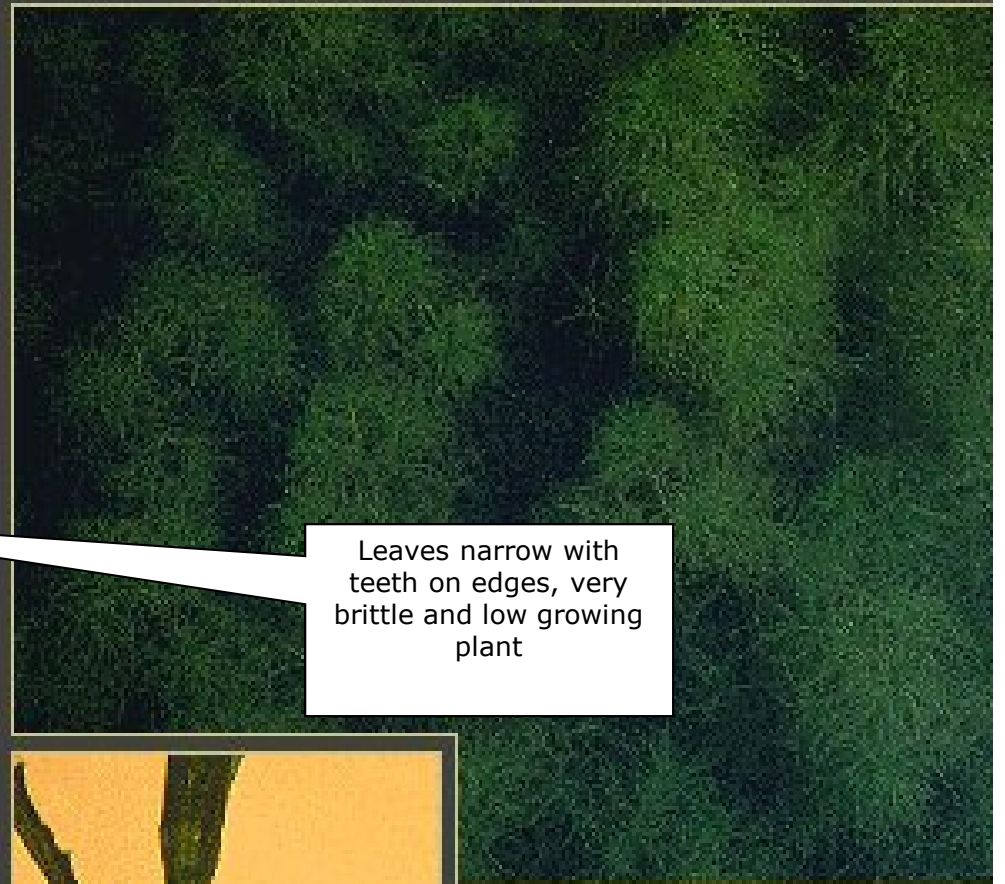


Small narrow leaves  
whorled around stem.  
Note teeth on leaf edge  
for hydrilla.

- Hydrilla- *Hydrilla verticillata*
- Native to South America
- Not yet found in NH (but found in MA and ME)



# Water Naiad



Leaves narrow with  
teeth on edges, very  
brittle and low growing  
plant



# Invasive Aquatic Animals



# Asian Clam



Roughly the diameter of a dime,  
sometimes a quarter







Asian clam shells littered on the bottom of Cobbett's Pond, Windham





Asian clam shells accumulated in fish beds in Cobbetts Pond, Windham



# Chinese Mystery Snail



# Zebra Mussel



Roughly the size of a pistachio nut

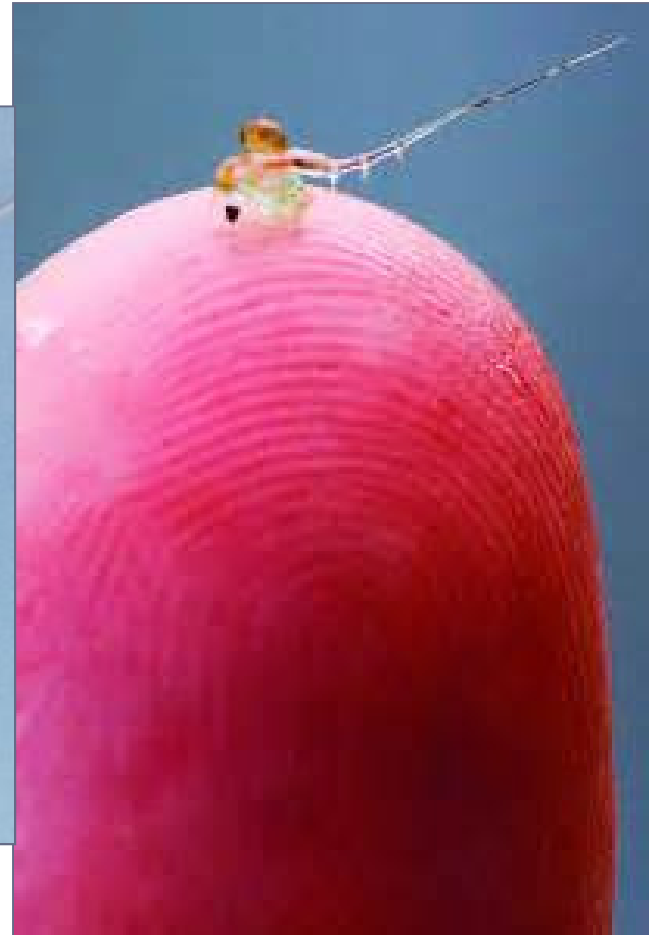




# Spiny Water Flea



Several spiny water fleas on fishing line



Spiny water flea on fingertip

**Jar containing  
spiny water flea**





# Invasive Species Mantra



- Prevention
- Early Detection
- Rapid Response
- Management

# Prevention



- Lake Host Program
- Signs at all public access sites
- Information/pamphlets at kiosks
- New Clean, Drain, Dry card coming soon
- Newsletters/newspapers/town mailings,etc.



# Early Detection and Survey Work



- Early detection with the Weed Watcher Program
- Survey Work
- Survey Methods
  - Invasive Aquatic Plants
    - ✦ Boat survey and GPS
    - ✦ Diver and GPS
  - Invasive Aquatic Animals
    - ✦ Visual
    - ✦ Sediment sample sieving
    - ✦ Vegetation/dock/hard surface surveys

# On the Water



- Break the shoreline into sections and have volunteers sign up for each section
- From shore move in a zig-zag or parallel pattern out to deeper water to maximize how much area you cover in your survey.
- Alternate methods each month to cross over areas for thorough checking.

**Scan the surface,  
scan the bottom.**

Parallel

Zig zag



# What You Are Looking For?



- Anything in the water that is new or out of place (was not there last month, last year, etc)
- Anything that appears to be growing quickly and taking over, appearing bigger each month
- Anything very bright green in color for plants
- Any animals like mussels or clams that appear to be very high in number
- There are 29 invasive aquatic plants of concern, but the biggest threats to most waterbodies are from variable milfoil, but some regional concerns exist.

# If You Find Something



- **Mark it**
  - With a buoy
  - With GPS
  - Triangulation
  - Flag shoreline
  - Notes on site (distance off shore, water depth, landmark)



## After you find something suspicious and make note of its location

- If practical, collect a sample and put in plastic bag with a damp paper towel
  - Be careful not to create any plant fragments. They can spread the infestation.
- If you suspect milfoil or other underwater invasives
  - Contact Neil Santos, Milfoil Team Leader,
    - [neilsantos@comcast.net](mailto:neilsantos@comcast.net) , 603 437-8468
- For any other invasives
  - Contact Steve Soreff, Weed Watch Leader
    - [soreff15@aol.com](mailto:soreff15@aol.com), 603 895-6120

# Management Options



- **Physical control**
  - Hand removal
  - Diver-Assisted Suction Harvesting (DASH)
  - Drawdown
- **Mechanical control**
  - Dredging
  - Hydro-raking
  - Mowing/harvesting
- **Biological control**
  - Using an introduced species to control the milfoil (insect, fish, etc)
- **Chemical control**
  - Aquatic herbicide