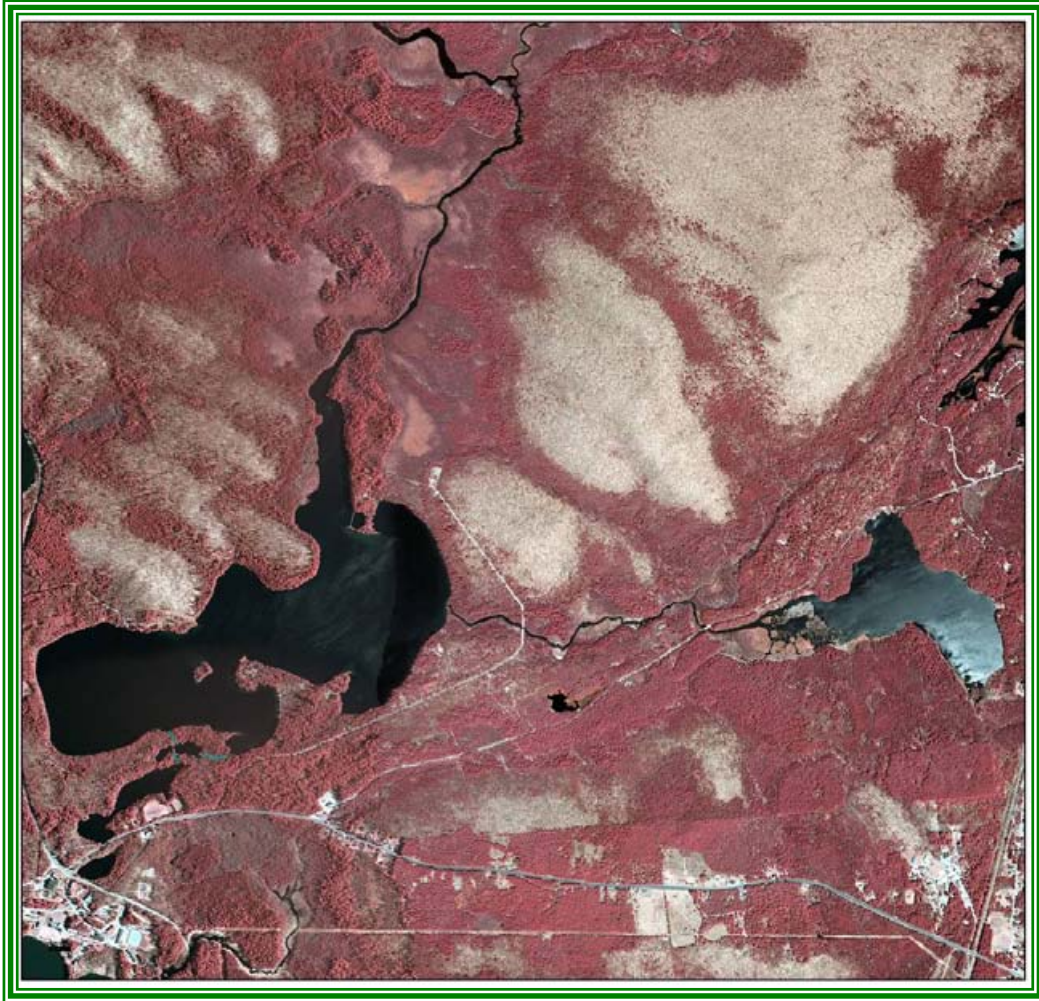


THE AQUATIC PLANTS OF THE CHURCH POND CHAIN

**JONES POND, JONES POND OUTLET, CHURCH POND,
LITTLE OSGOOD POND, AND OSGOOD POND**



**Conducted August/September 2009
Report Date: March 2010**

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Of the Church Pond Chain
Jones Pond, Jones Pond Outlet, Church Pond,
Little Osgood Pond and Osgood Pond

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Appendix A — Line Drawings of Key Aquatic Plants

Acknowledgments

Special thanks to Bob Hall and members of the Osgood Pond Association
for their interest and their assistance

Aquatic plant illustrations provided by the Information Office
of the University of FL Center for Aquatic Plants
used by permission

Introduction

Background

A major threat to the aquatic ecosystems of the Adirondacks are several invasive, non-native species of plants recently discovered in some of our lakes, ponds, wetlands, and riparian habitats. The plants that are of concern include purple loosestrife (*Lythrum salicaria*), Eurasian milfoil (*Myriophyllum spicatum*) and curlyleaf pondweed (*Potamogeton crispus*).

Once established, these non-native species successfully outcompete native plants, severely reducing the biodiversity of the aquatic system. In Lake George, on the outskirts of the Adirondack Park, Eurasian milfoil was first documented in 1985. At that time, it was only found in three bays. As of 1991, the milfoil had displaced the natural vegetation in over 90 locations. In 1993, the presence of Eurasian milfoil and purple loosestrife was documented in Franklin County in the north central Adirondacks. Eurasian milfoil was discovered in Upper Saranac Lake in 1996 and has spread from several sites to over 50 locations and covering large expanses of shoreline in certain areas. Middle Saranac was not known to contain Eurasian milfoil until last year. This year, Eurasian milfoil has already established dense beds in many areas of the lake.

While the Adirondack Park contains the State's, and perhaps the east coast's, largest refuge of lakes and ponds free of invasive species, aquatic invasive species have been identified in 74 water bodies within the Park, including at least 17 in Franklin County alone¹. In many of the Park lakes where Eurasian milfoil has been identified, the aquatic invader has established a stronghold, encompassing numerous locations and often large expanses of shoreline and shallower waters. Another invasive aquatic plant, fanwort (*Cabomba aquatica*), has been identified in Saratoga County, in the southeast corner of the Park. Curlyleaf pondweed (*Potamogeton crispus*) is also known to occur in a number of lakes in the region. Variable-leaf milfoil (*Myriophyllum heterophyllum*), which has been a nuisance aquatic plant in New Hampshire and Vermont for decades, was recently identified in several Park lakes, as well.

Recommended Invasive Species Strategy

The best way to avoid the spread of these non-native plants is to find them before they become well established in a body of water. Once introduced, these plants spread quickly, and after becoming established, eradication is extremely difficult and expensive. Within the Adirondack Park, there are very few acceptable methods to address invasive species except for mechanical means (benthic mats or hand-pulling). Unfortunately, these methods are costly and have not been very successful in controlling the spread, let alone eradicating the plant from any Adirondack lake. Other alternatives, such as herbicides and limited dredging are more effective and widely used outside of the Park. As yet, no applications for these methods have been approved for use within the Adirondack Park.

¹ Analysis of 2009 APIPP Annual Report and APIPP maps, Adirondack Park Invasive Plant Program – <http://adkinvasives.com>

Consider limiting uncontrolled access to your lakes. While this is difficult in situations where popular public access exists, it is the key to minimizing exposure to infection by invasive species. Any boats that are brought into the Osgood chain should be thoroughly cleaned and inspected before being placed in the lakes. This inspection should not be limited to motor boats, since Eurasian milfoil is being spread by canoes in the Adirondacks as well. In the case of Association members with property on the lake, consider insisting that boats used on the Osgood chain remain solely on the Osgood Pond. It should also be made policy that renters not be allowed to bring their own watercraft. This strategy has been used effectively for years by the Mount Arab Preserve Association in Piercefield to protect their two lakes. In the case of public access, the use of water stewards during the summer months is an inexpensive way to provide education and some measure of protection against the introduction of invasive species from outside water craft.

Have a professional shoreline aquatic plant survey conducted every three to five years. This provides a good baseline and also serves to have a trained individual looking for any other signs of lake problems that may go undetected. In addition, enlist lake residents to be vigilant about looking for signs of new aquatic plant growth. Volunteer surveys should be conducted at least once per year, and more often if possible. Everyone on the lakes should learn to recognize the plants that are commonly present so that an invader can be quickly spotted.

Ecological Role of Aquatic Plants

Not all aquatic plants are bad. Aquatic plants are an important part of a lake ecosystem, providing food, shelter, and breeding sites to a wide variety of aquatic and non-aquatic animals. Aquatic plants also help prevent erosion of banks and near-shore areas due to wind and wave action. When excessively abundant, aquatic plants not only detract from the recreational and aesthetic uses of a waterbody, but may actually reduce the ecological value and negatively impact the fisheries.

Types of Aquatic Plants

There are three general groups of aquatic plants: those that have erect stems and leaves and emerge out of the water, those whose leaves are primarily floating, and those with stems and leaves that are primarily submerged. Emergent plants are typically limited to wet areas and shallow waters along the shore. Cattails are typical emergent aquatic plants. Floating-leaf plants occur from near shore regions to waters that are 3 to 4.5 meters (10 or 15 feet) deep. Water lilies are typical emergent aquatic plants. Submerged plants are variable in their habit. Some submerged plants, such as elodea, grow along the lake bottom, and may only extend 15 centimeters (6 inches) or less above the sediments. Other submerged plants, such as some milfoils, may grow in depths of 4.5 meters (15 feet) or more and extend to the lake's surface. Still others, such as the pondweeds, have both submerged leaves and floating leaves.

Factors that Control Aquatic Plant Distribution and Abundance

The distribution and abundance of aquatic plants are generally limited, in order of importance, by light (a function of water clarity and depth), availability of suitable substrate, and nutrients. Submerged aquatic plants are particularly limited by light, growing out into deeper water in clear lakes and restricted to near-shore regions in less clear waters. Therefore, a long-term change in the

mean depth or transparency of a lake would likely lead to a change in submerged plant cover and biomass. Aquatic plants with floating leaves are capable of growing to much greater depths, and are generally not limited by water column light availability.

Excessive external nutrient loading is not a direct cause of aquatic plant problems. In fact, higher external nutrient loading tends to reduce aquatic plant biomass due to shading associated with algal blooms. Sediment nutrient concentrations are important, however. Problematic growth of aquatic plants can be expected in lakes or ponds having shallow warm water, sediments of rich, fine-textured, moderately organic soils, and transparency greater than or equal to 2 meters (6½ feet). Plants may also be locally more abundant in areas that naturally have a more organic bottom, such as near inlets, outlets and quiet bays or in areas that receive runoff from shoreline development and septic systems.

Impact of Invasive, Non-Native Species

Invasive non-native species tend to grow in dense stands, crowding out members of the native plant community. The extreme densities these exotic species can reach causes several other negative impacts on the aquatic environment. In lake systems, the fish community can be negatively impacted through loss of spawning and foraging grounds. Also, the decomposition of this extra plant material can cause oxygen stressed conditions, which can result in a fish kill. Furthermore, these plants release nutrients and increase the rate of sediment accumulation, thereby accelerating the eutrophication process. Finally, by impairing boating and swimming, fishing success, and reducing a lake's aesthetic appeal, the presence of these exotic plant species can cause economic hardships to communities which rely heavily on tourism dollars. In wetland systems, this reduction in plant biodiversity is also accompanied by a reduction in wildlife food and shelter value, causing a near total disruption of the ecosystem.

Who to Contact for More Information

If you think that you have discovered a non-native species, or would like more information, contact our office or one of the following organizations:

Adirondack Park Agency
P.O. Box 99, Ray Brook, New York 12977
518 891-4050

Adirondack Park Invasive Plant Program
The Nature Conservancy Office Building
PO Box 65, Keene Valley, NY 12943
518-576-2082

New York State Department of Environmental Conservation
Region 5, Ray Brook, New York 12977
518 897-1200

Additional Reading

Basic Lake and Plant References

Michael R. Martin of Cedar Eden Environmental LLC maintains an on-line Aquatic Plant Image Library with photographs and line drawings of aquatic plants common to our region, as well as invasive species. The Image Library can be found at <http://cedareden.com/aquaplant.html>

The following books are useful resources for anyone interested in aquatic plants or lake ecology:

Diet for a Small Lake: The Expanded Guide to New York State Lake and Watershed Management – Second Edition by New York State Federation of Lake Associations. 2009.

Lake and Reservoir Restoration Guidance Manual, Second Edition by the North American Lake Management Society for U.S. Environmental Protection Agency. 1990. EPA 440/4-90-006.

Newcomb's Wildflower Guide by Lawrence Newcomb. 1977. Little, Brown and Company. Boston.

Through the Looking Glass . . . : A Field Guide to Aquatic Plants. Wisconsin Lakes Partnership. 1997.

Wetlands by William A. Neiring. An Audubon Society Nature Guide. 1985. Alfred A. Knopf, Inc. Chanticleer Press, Inc. New York.

Adirondack Upland Flora: An Ecological Perspective by Michael Kudish. 1992. The Chauncy Press. Saranac Lake, NY.

Advanced Lake and Plant References

The serious student of lakes and aquatic plants may wish to refer to one or more of the following books, which may be available at some libraries (Library at Paul Smith's College or any major city or University Library):

Aquatic and Wetland Plants of Northeastern North America by Garret Crow and C. Barry Hellquist. 2000. University of Wisconsin Press. Madison.

A Manual of Aquatic Plants by Norman C. Fassett. 1957. University of Wisconsin Press. Madison.

Limnology by Alex Horne and Charles Goldman. 1994. McGraw-Hill. New York.

Aquatic Plant Surveys of the Osgood Pond Chain

Introduction and Methodology

Cedar Eden Environmental LLC conducted surveys of the aquatic plant community in Jones Pond, Jones Pond Outlet, Church Pond, Little Osgood Pond, and Osgood Pond from mid-August to mid-September 2009 for the purpose of establishing a baseline of aquatic plant distribution and abundance and to identify the presence or absence of non-native invasive plant species in those water bodies. These water bodies are interconnected via both natural and dug channels, allowing for the free movement of aquatic animals and human-powered water craft. Relatively high use public access on Church Pond and Jones Pond, as well as the presence of Eurasian milfoil in nearby waterways make this chain of ponds highly susceptible to the introduction of non-native species of aquatic plants and animals. As a result, the Osgood Pond Association contracted with Cedar Eden Environmental LLC of Saranac Lake NY for aquatic plant surveys of these water bodies. The work was conducted by Michael R. Martin, Certified Lake Manager, with 26 years in lake and aquatic plant management experience across the northeastern United States, including 18 years within the Adirondack Park. This report and associated maps presents the findings of those surveys.

The survey was conducted by touring the complete shorelines by kayak. In Jones Pond and Jones Pond Outlet from Jones Pond to Osgood Pond, a presence/absence survey for invasive species of aquatic plants was conducted. In the remaining water bodies - Church Pond, Little Osgood Pond, and Osgood Pond - comprehensive surveys of the littoral zones² were conducted using a surface cover technique, identifying all species visible from the water surface and mapping their location using a combination of GPS mapping and paper mapping techniques. The surface mapping was augmented using rake tosses and rake grabs to assess deep water plant growth. Aquatic plant species were identified and geo-located using GPS and accurate field maps of lake shoreline created using recent, high-resolution aerial photography. Aquatic plant species were identified to species in the field, wherever possible. Specimens of plants that could not be readily identified in the field were collected and placed in a cooler for later study. Aquatic plants were keyed to species wherever possible, using standard reference keys, including Manual of Aquatic Plants Second Edition³, Manual of Vascular Plants⁴, Aquatic and Wetland Plants of Northeastern North America⁵, and others. In some cases, species identification could not be determined due to the absence of identifying features such flowers and/or fruiting bodies. In these cases, "most-likely" identifications

² Littoral zone is that area of a lake or pond receiving light penetration and sustaining the growth of aquatic plants. The zone includes three main plant communities: the open-water submerged plants, the floating-leaf plants, and the emergent plants.

³Fassett, N.C. 1957. A Manual of Aquatic Plants. University of Wisconsin Press. Madison

⁴Gleason, H.A. and A. Cronquist. 1963. Manual of Vascular Plants of Northeast United States and Adjacent Canada. D. Van Nostrand Company. New York.

⁵Crow, G.E. and C.B. Hellquist. Aquatic and Wetland Plants of Northeastern North America. 2000. University of Wisconsin Press. Madison.

were made using best professional judgment & experience. Species abundance was assessed using on-site assessment of coverage and density.

Cedar Eden Environmental LLC created maps of the distribution and general abundance of the aquatic plant communities for each lake. These maps, along with line diagrams of key species, are provided in this report for present and future reference.

Results

NO EXOTIC AQUATIC PLANT SPECIES WERE FOUND DURING ANY OF THE SURVEYS.

Jones Pond and Jones Pond Outlet

Jones Pond and Jones Pond Outlet are natural, somewhat acidic, tannic-colored water bodies. Jones Pond contains a large floating peat bog and the sediments of Jones Pond are primarily peat. The aquatic plant community in Jones Pond and Jones Pond outlet is typical of tannic, peaty water bodies in the northern Adirondacks, consisting of an assortment of submerged, floating and emergent aquatic plant species. Aquatic plants within the relatively large floating bog included typical scrub-shrub species, as well as classic bog-specific species such as sun dew (*Drosera*) and pitcher plant (*Sarracenia*). No invasive species were observed in Jones Pond or Jones Pond Outlet.

Church Pond and Little Osgood Pond

The shore and near-shore plant communities of Church Pond and Little Osgood Pond were typical of relatively low-nutrient, relatively high-altitude northeastern lakes. Church Pond tended to have more sandy sediments while Little Osgood Pond tended to have more peaty and organic sediments. The aquatic plants in Church Pond were confined mostly to the shoreline margins, consisting primarily of pondweed species (*Potamogeton spp*) and yellow water lily (*Nuphar advena*). Aquatic plant abundance in Church Pond was moderate along the shorelines and sparse overall.

Little Osgood Pond, with its shallower depth and organic sediments, had a greater abundance of aquatic plants. The plants were not confined to near-shore regions. The predominant aquatic plants were native milfol (*Myriophyllum sp.*, likely *M. farwellii*), pondweed species (*Potamogeton spp*), and pickerel weed (*Pontedaria cordata*). Aquatic plant abundance in Little Osgood Pond was moderate.

A map of aquatic plant distribution is presented in Figure 1.

Osgood Pond

Osgood Pond is a tannic (tea-colored) water body. The bottom sediments consist primarily of sand deposits with some areas of organic sediments. Overall, aquatic plants in Osgood Pond are sparse to common. Areas of large sand bars typically contain few, if any plants. Other areas, such as sheltered bays and the outlet, where organic sediments have accumulated, contain moderate to dense densities of aquatic plants. One of the most common plants, pipewort (*Eriocaulon aquaticum*) is typical of Adirondack lakes and ponds with sandy shores and low nutrient concentrations and are therefore generally an indicator of good to excellent water quality. Bassweed (*Potamogeton amplifolius*) occurred in relatively dense stands in several areas of the lake where sediments were more organic. This, too, is a relatively common aquatic plant. Its significance is that in our region bassweed tends to occur at the same depths as Eurasian milfoil. As a result, these areas should be closely monitored for any signs of Eurasian milfoil.

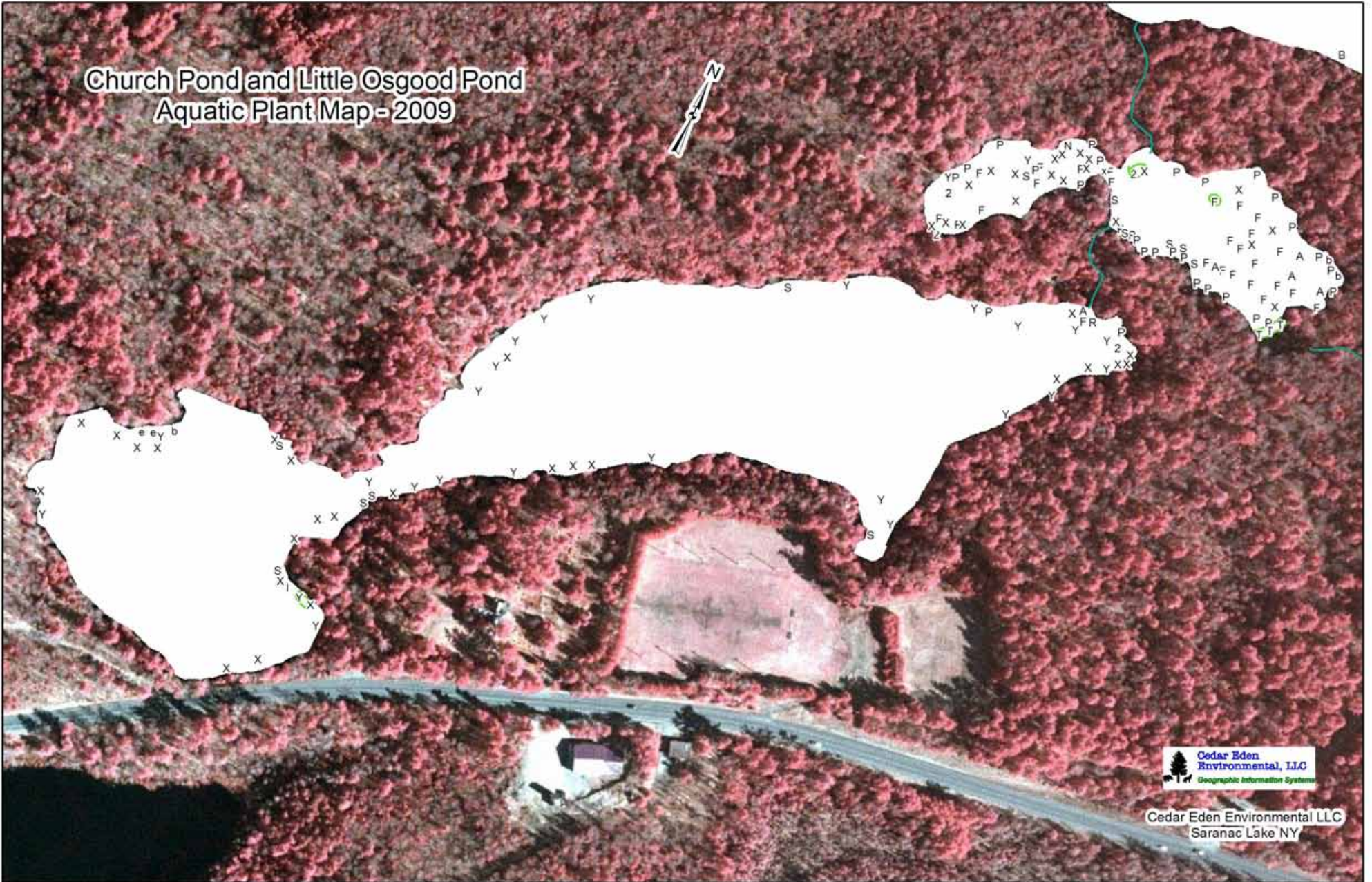
Maps of aquatic plant distribution in Osgood Pond are presented in Figure 2A and Figure 2B.

Conclusions

As of late summer 2009, the water bodies of the Osgood chain appear to be free from invasive, non-native aquatic plant species. The plant communities in each water body were typical for the Adirondack waters with similar chemistry, color, and sediment composition. The Osgood Pond Association should consider implementing the recommendations presented at the opening of this report, including minimizing boat traffic from other lakes and ponds, educating members and visitors about the dangers of non-native and invasive aquatic plant species, and conducting volunteer monitoring of the aquatic plants within the connected water bodies.

Appendix A provides line diagrams of several invasive species to watch for and some of the common plants that are found within the Osgood chain. You may also visit the on-line Aquatic Plant Image Library at <http://cedareden.com/aquaplant.html> for additional line drawings and photographs of common and invasive aquatic plants.

Church Pond and Little Osgood Pond Aquatic Plant Map - 2009



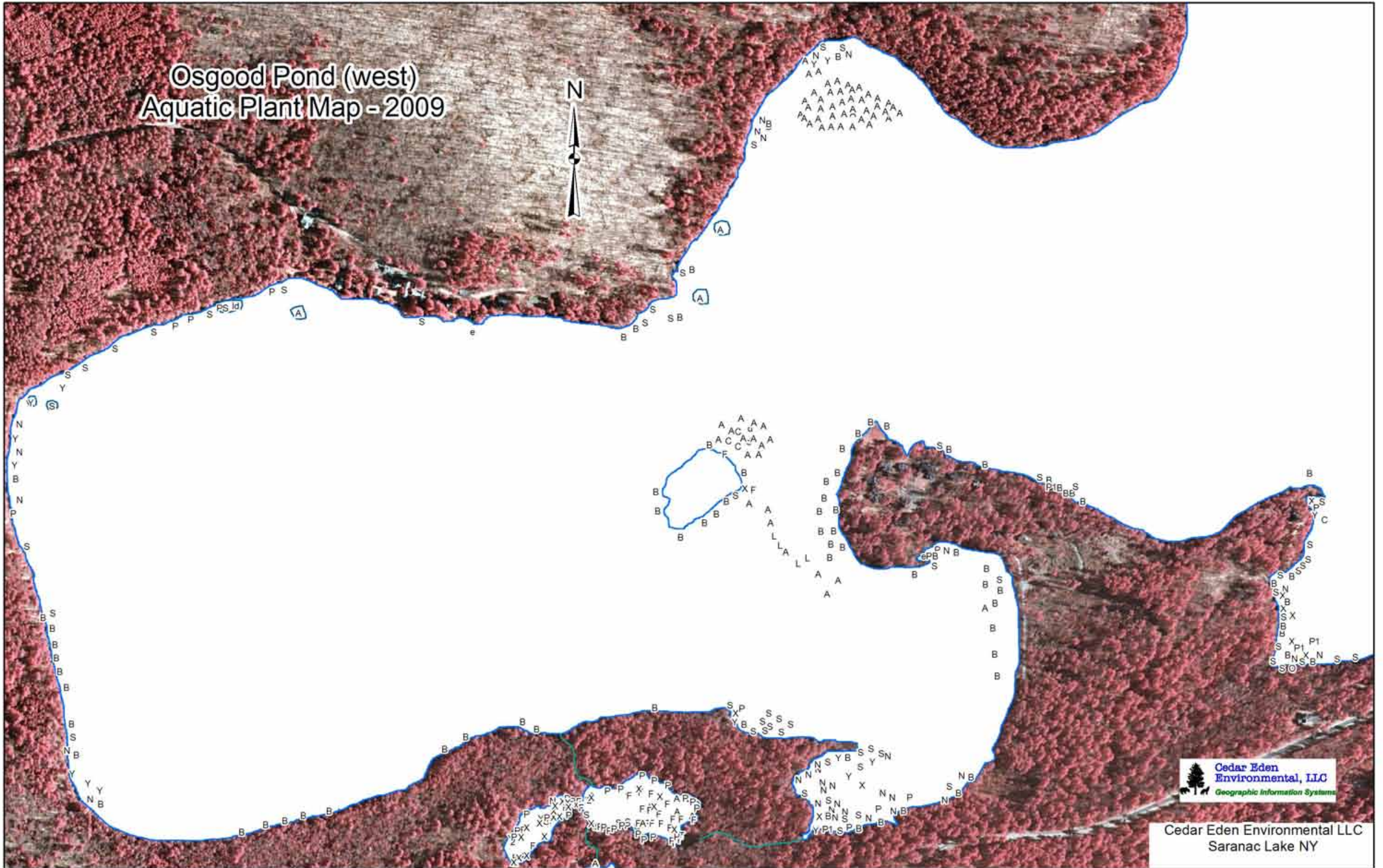
 Cedar Eden
Environmental, LLC
Geographic Information Systems

Cedar Eden Environmental LLC
Saranac Lake NY



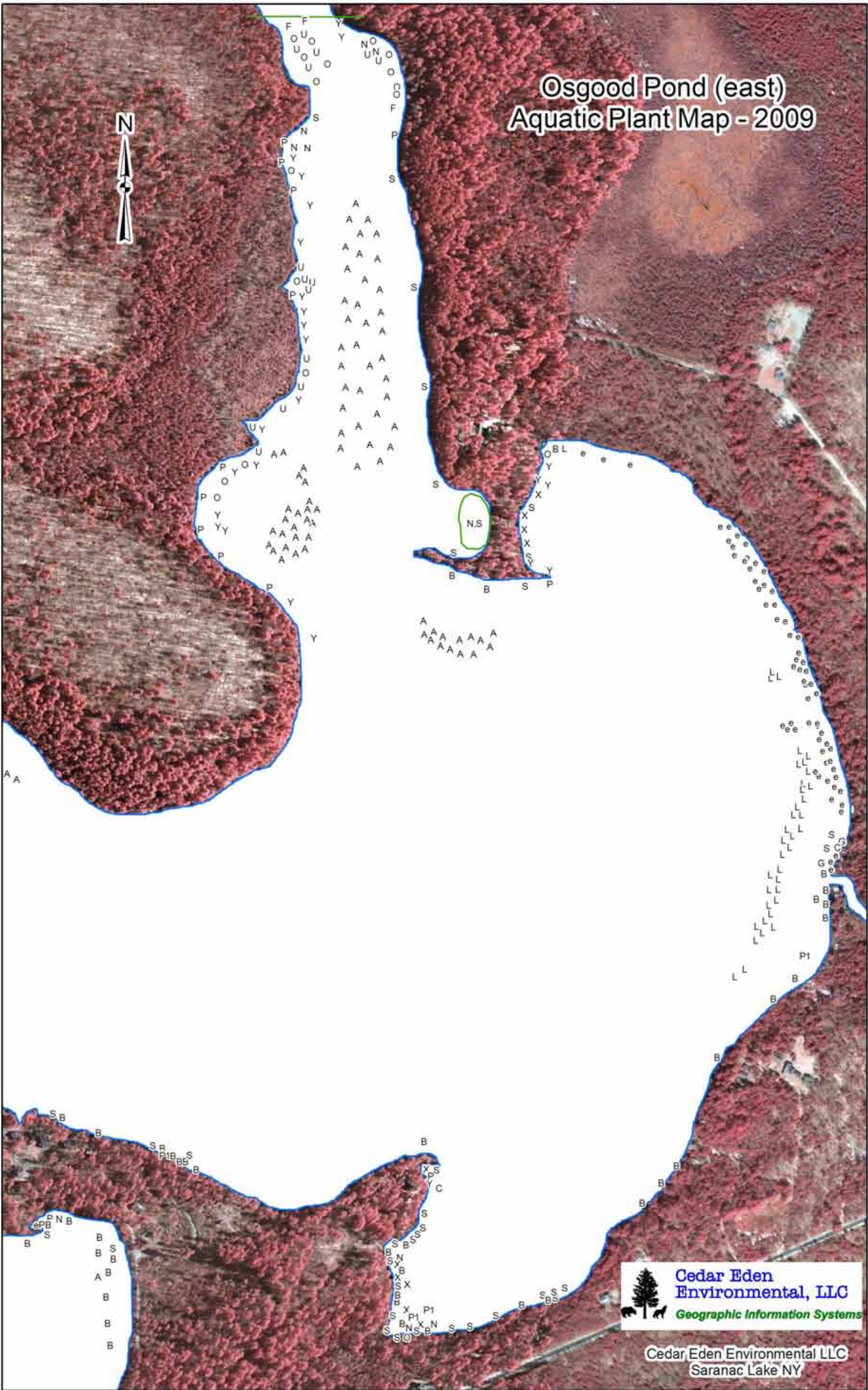
| Legend for Aquatic Plant Maps: Church Pond and Little Osgood Pond | | |
|--|--|---|
| Code | Common Name | Scientific Name |
| 2 | Clasping-leaved pondweed | <i>Potamogeton perfoliatus</i> |
| A | Bassweed | <i>Potamogeton amplifolius</i> |
| b | Bulrush | <i>Scirpus spp</i> |
| e | Spikerush | <i>Eleocharis spp</i> |
| F | Milfoil (native) | <i>Myriophyllum sp., likely M. farwellii</i> |
| I | Quillwort | <i>Isoetes spp.</i> |
| N | White water lily | <i>Nymphaea odorata</i> |
| P | Pickerel weed | <i>Pontedaria cordata</i> |
| R | Robin's (fern) pondweed | <i>Potamogeton robbinsii</i> |
| S | Bur-reed (mainly narrow-leaf, some eastern) | <i>Sparganium spp.</i> <i>(S. angustifolium, .S. americanum)</i> |
| X | Pondweed (finely dissected) | <i>Stuckenia sp./P. pusillus var. tenuissimus</i> |
| Y | Yellow water lily | <i>Nuphar advena</i> |

Osgood Pond (west) Aquatic Plant Map - 2009



Cedar Eden Environmental LLC
Saranac Lake NY

Osgood Pond (east) Aquatic Plant Map - 2009



 Cedar Eden
Environmental, LLC
Geographic Information Systems

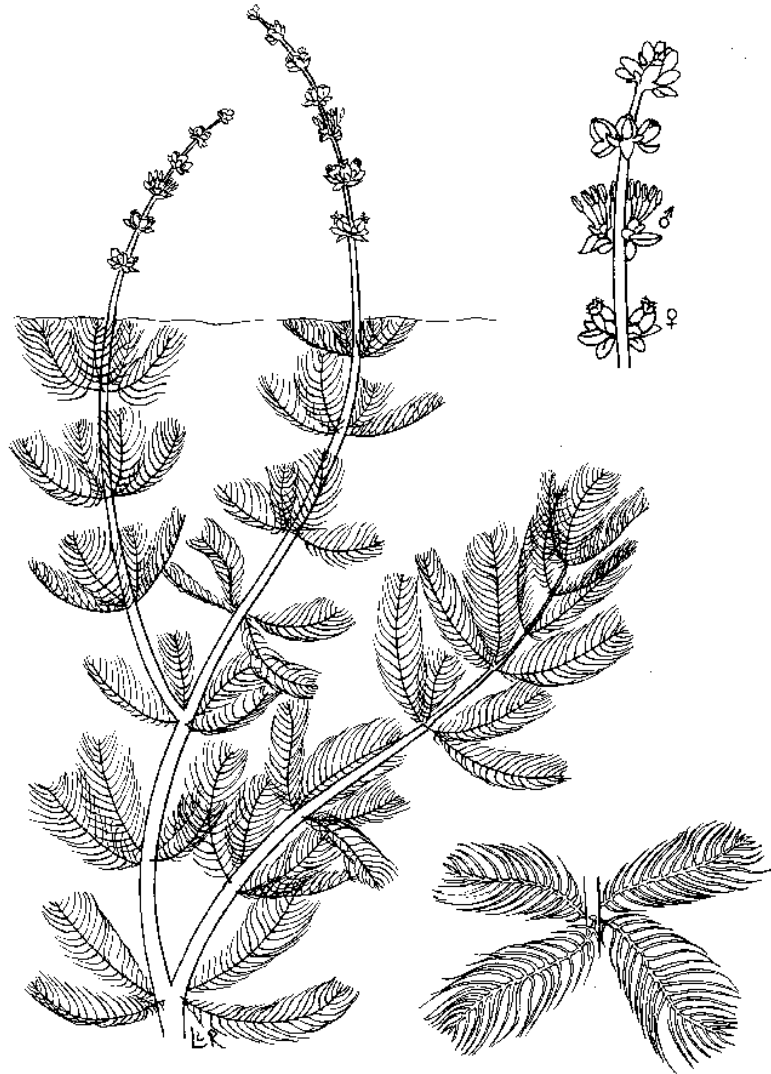
Cedar Eden Environmental LLC
Saranac Lake NY

0 100 200 Feet

| Legend for Aquatic Plant Maps: Osgood Pond | | |
|--|--|---|
| Code | Common Name | Scientific Name |
| A | Bassweed | <i>Potamogeton amplifolius</i> |
| B | Pipewort | <i>Eriocaulon aquaticum</i> |
| C | Chara (muskgrass) & Nitella | <i>Chara spp., Nitella spp.</i> |
| d | Canadian (common) waterweed | <i>Elodea canadensis</i> |
| e | Spikerush | <i>Eleocharis spp</i> |
| F | Milfoil (native) | <i>Myriophyllum sp., likely M. farwellii</i> |
| G | Aquatic grasses | |
| L | Water lobelia | <i>Lobelia dortmanna</i> |
| N | White water lily | <i>Nymphaea odorata</i> |
| O | Watershield | <i>Brasenia schreberi</i> |
| P | Pickerel weed | <i>Pontedaria cordata</i> |
| P1 | Pondweed (tiny natans) | <i>Potamogeton tennesensis/P. spirillus</i> |
| R | Robin's (fern) pondweed | <i>Potamogeton robbinsii</i> |
| S | Bur-reed (mainly narrow-leaf, some eastern) | <i>Sparganium spp.</i> <i>(S. angustifolium, .S. americanum)</i> |
| T | Cattail | <i>Typha spp.</i> |
| U | Bladderwort | <i>Utricularia spp.</i> |
| X | Pondweed (finely dissected) | <i>Stuckenia sp./P. pusillus var. tenuissimus</i> |
| Y | Yellow water lily | <i>Nuphar advena</i> |

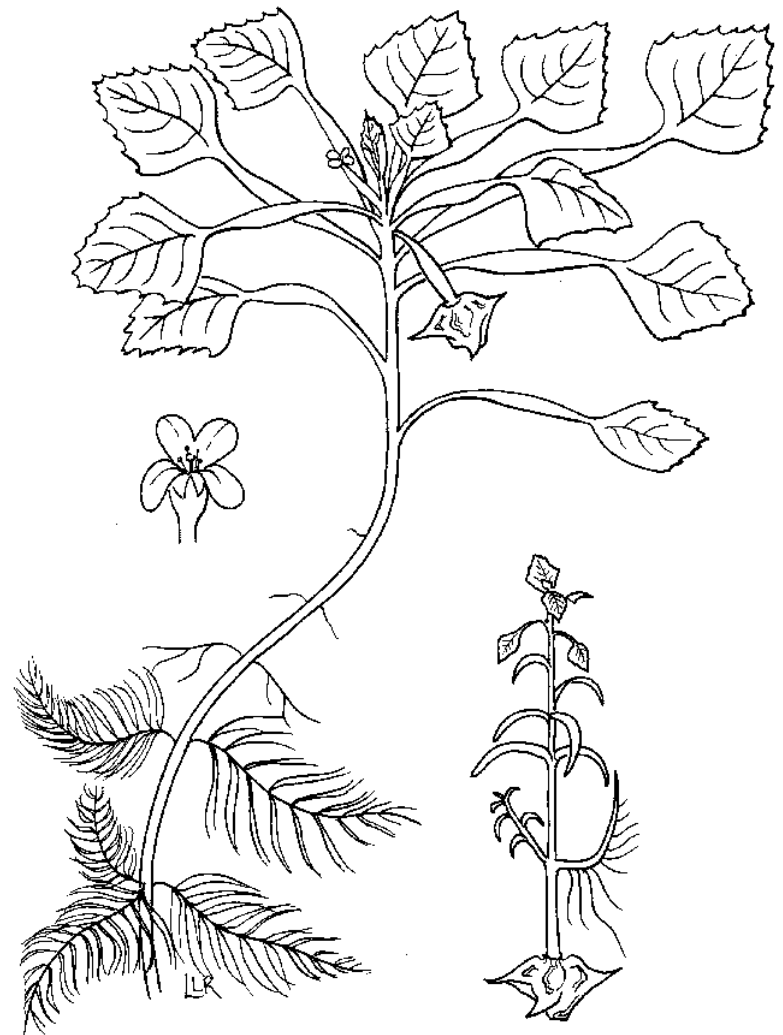
Appendix A

Line Drawings of Key Aquatic Plants



Eurasian milfoil – *Myriophyllum spicatum*

INVASIVE – NOT PRESENT

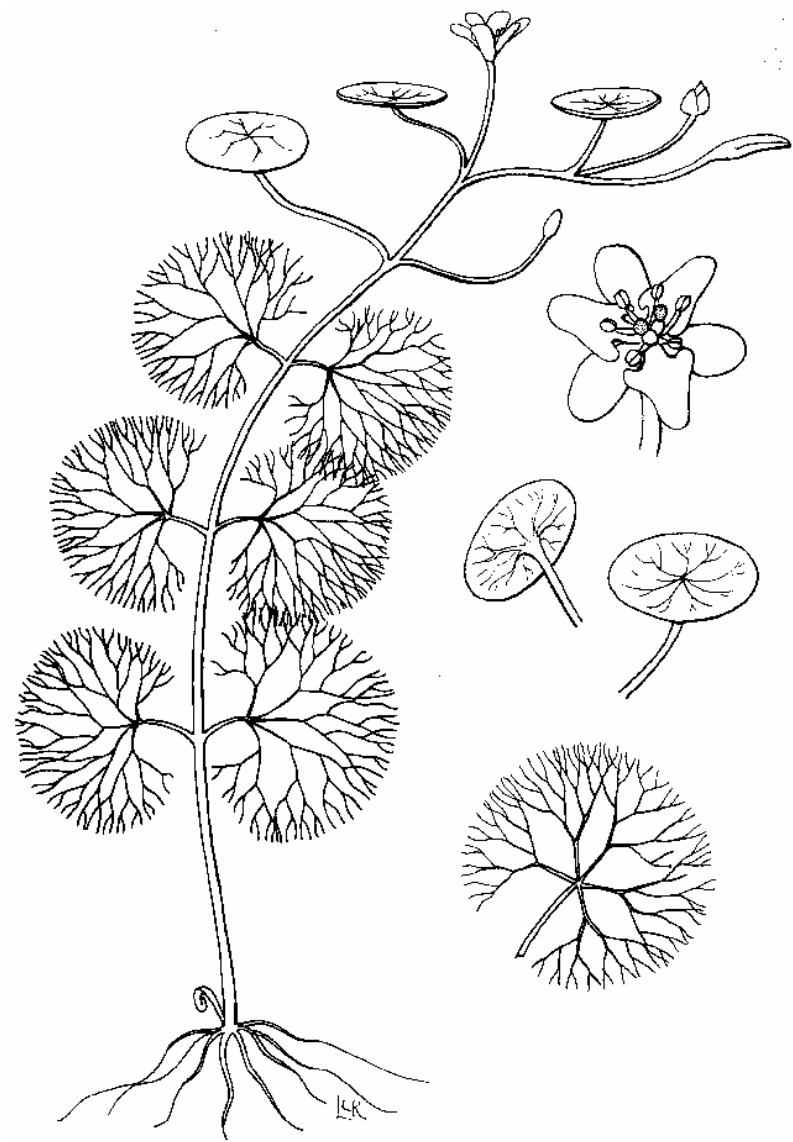


Water chestnut – *Trapa natans*

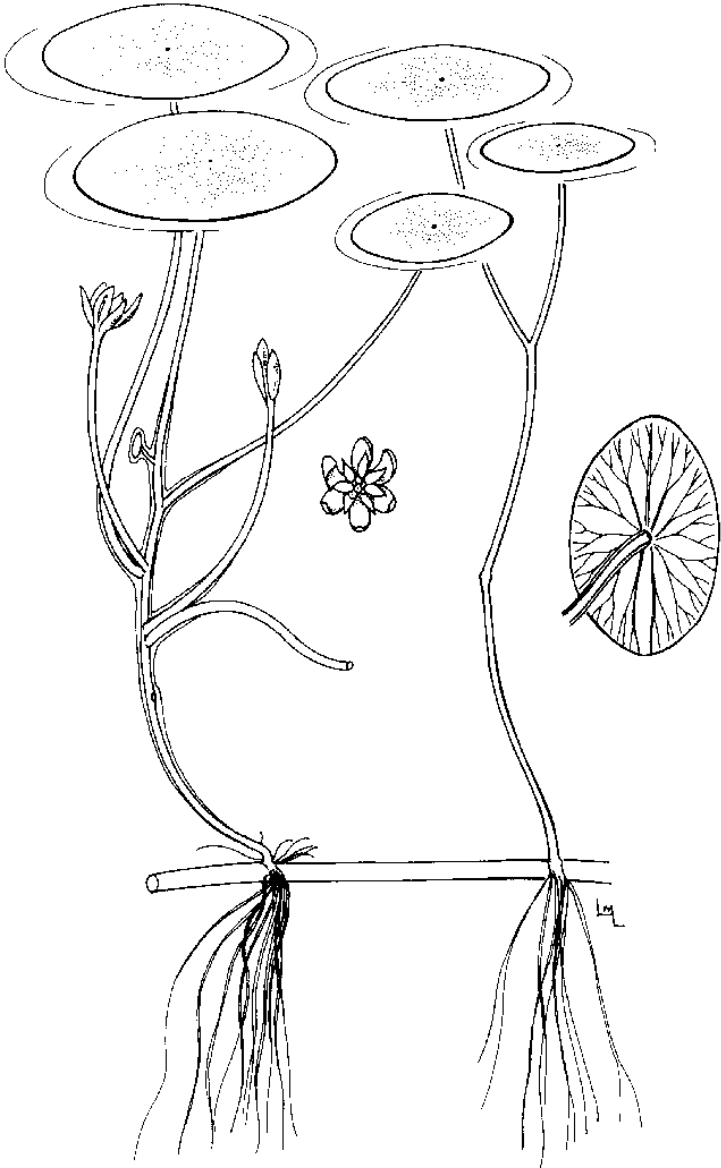
INVASIVE – NOT PRESENT



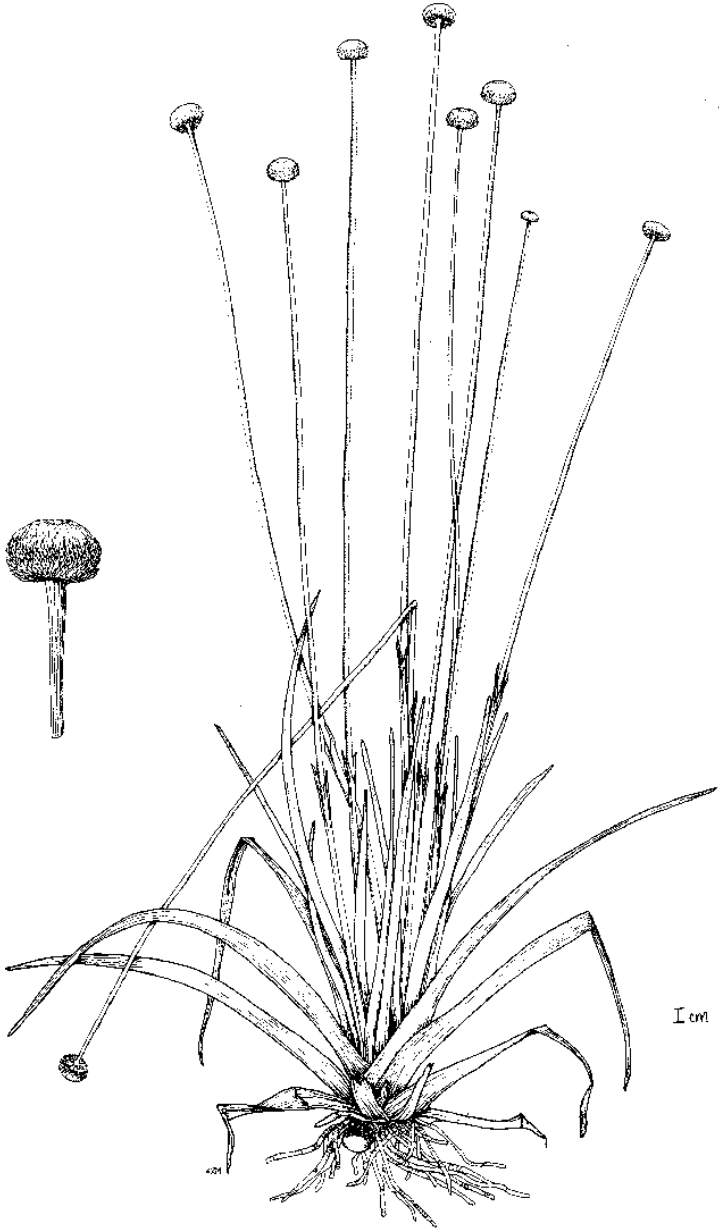
Yellow iris – *Iris Pseudacorus*
INVASIVE – NOT PRESENT



Fanwort – *Cabomba aquatica*
INVASIVE – NOT PRESENT



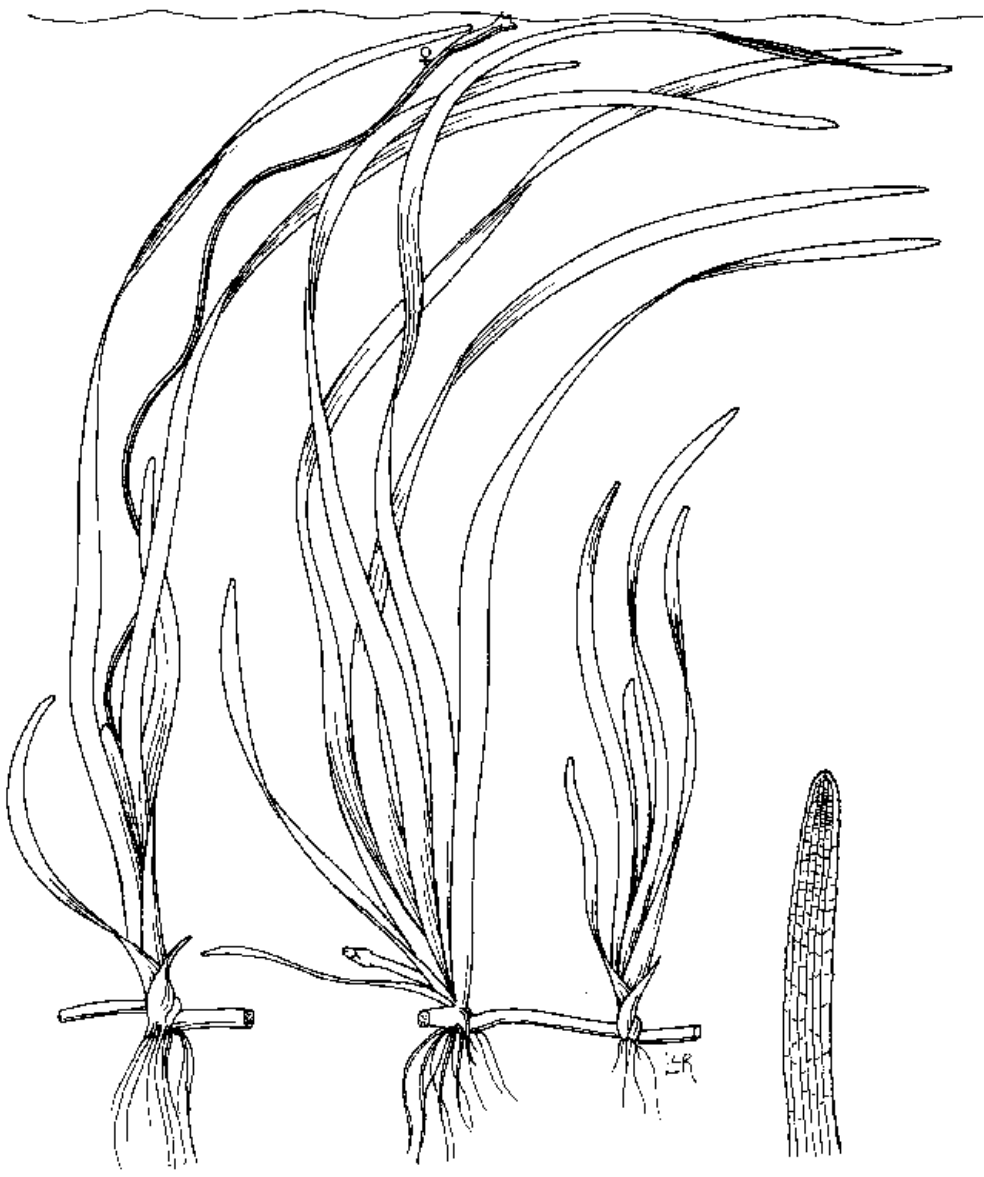
Watershield – *Brasenia schreberi*



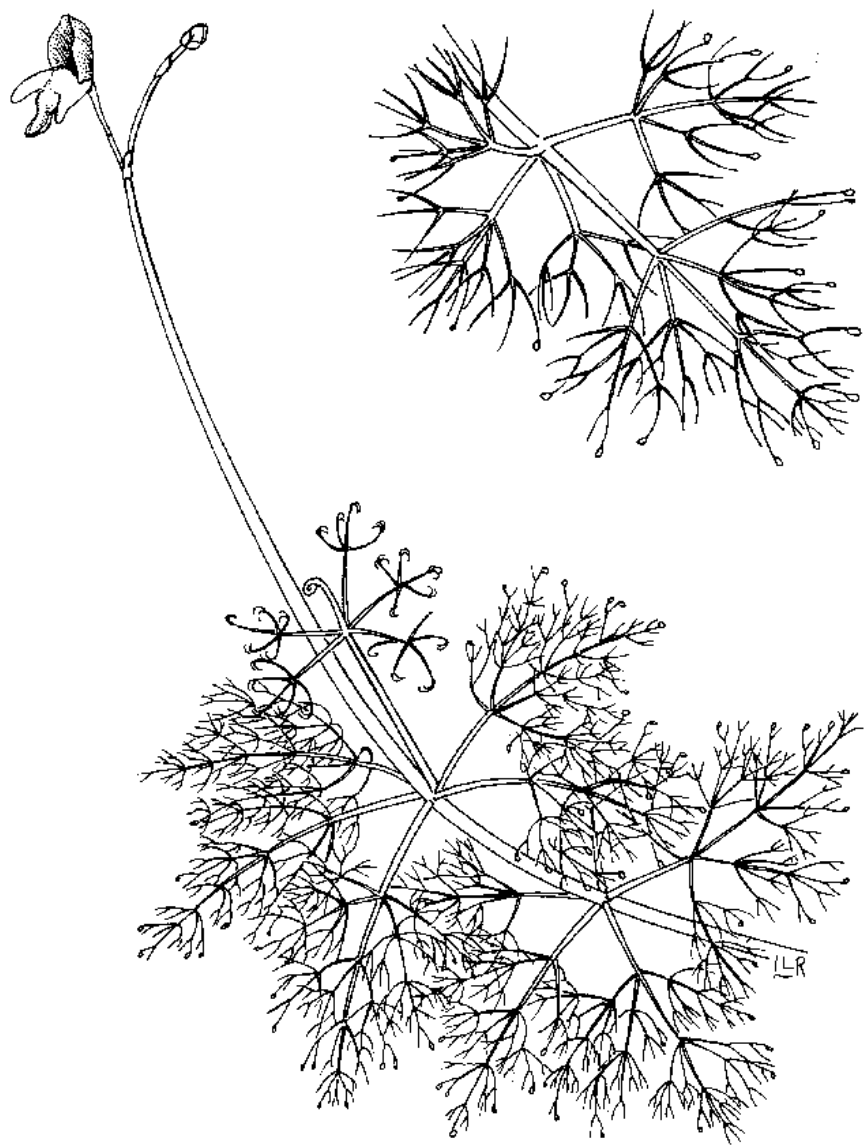
Pipewort – *Eriocaulon decangulare*



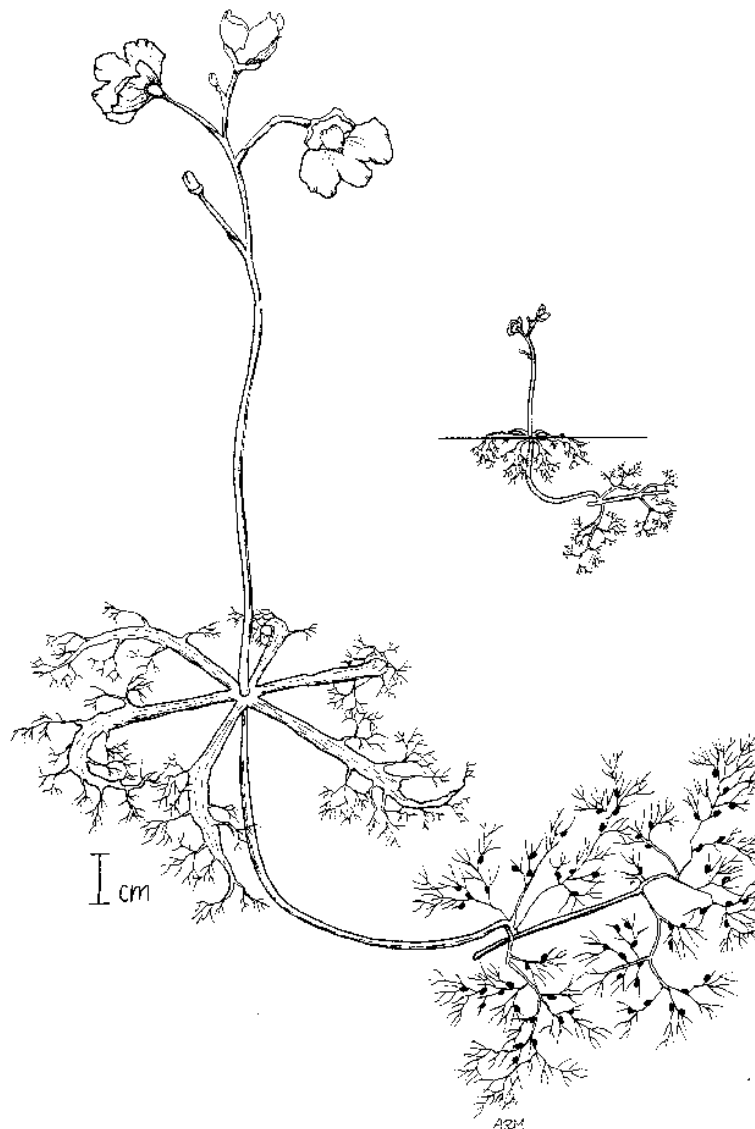
Bur reed – *Sparganium americanum*



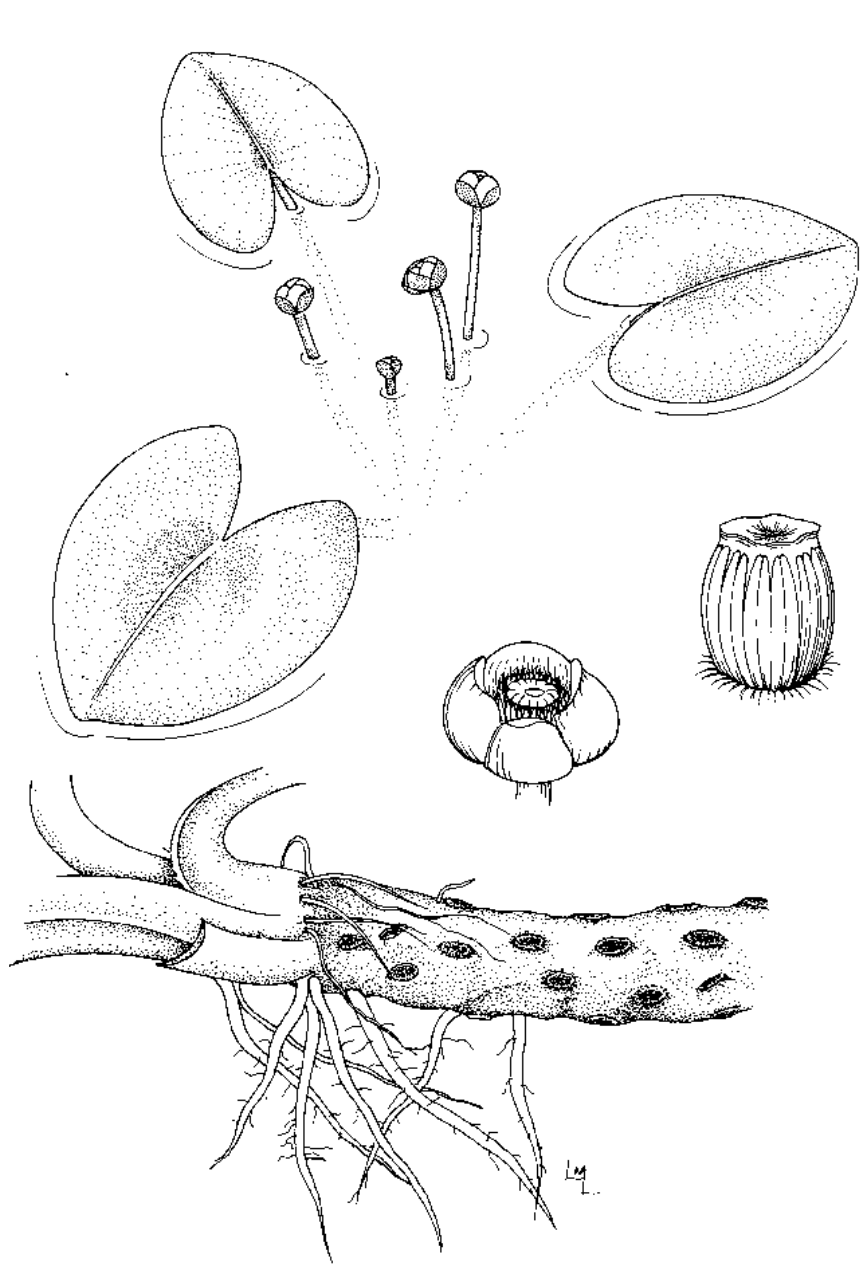
Tape grass – *Vallisneria americana*



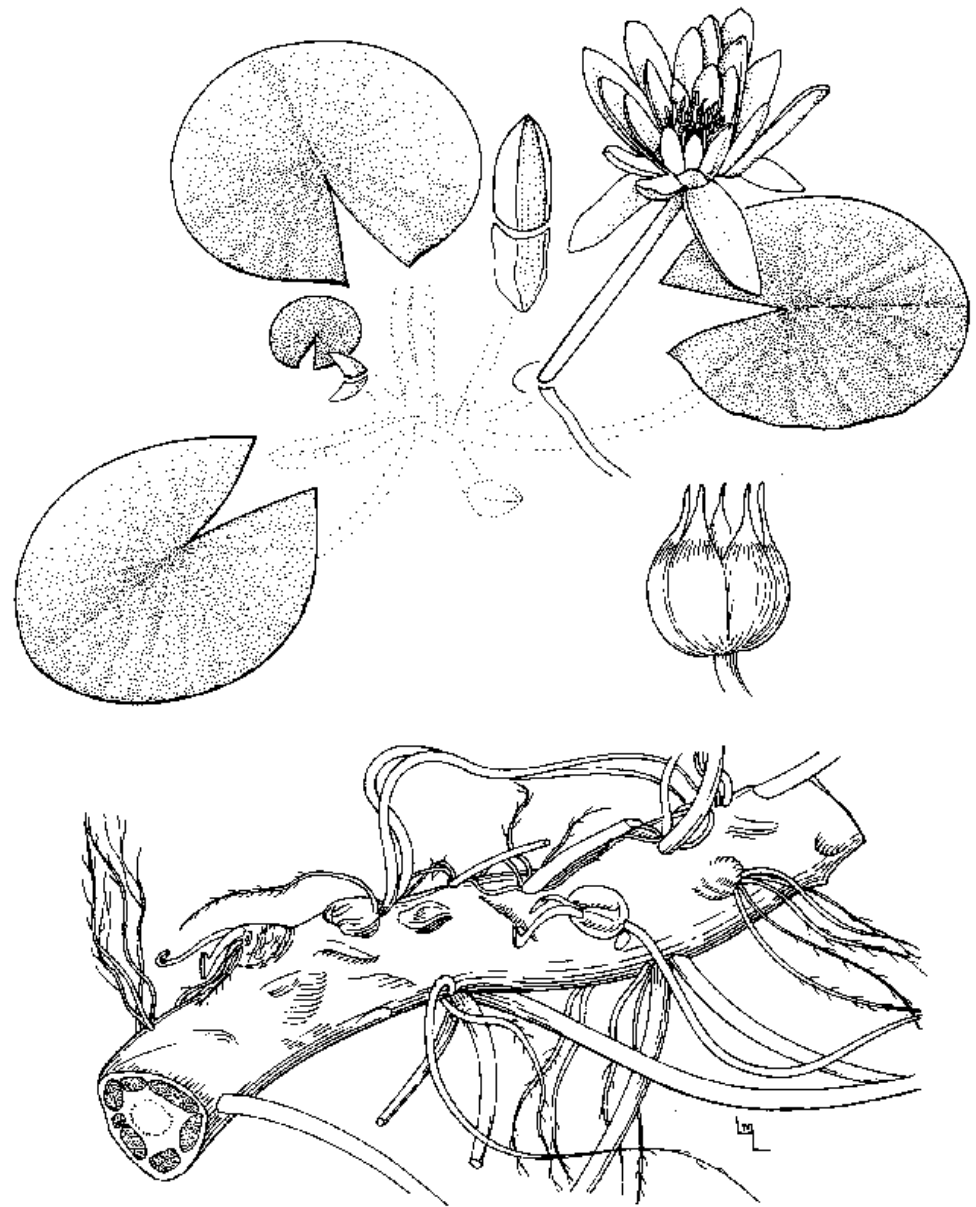
Bladderwort – *Utricularia purpurea*



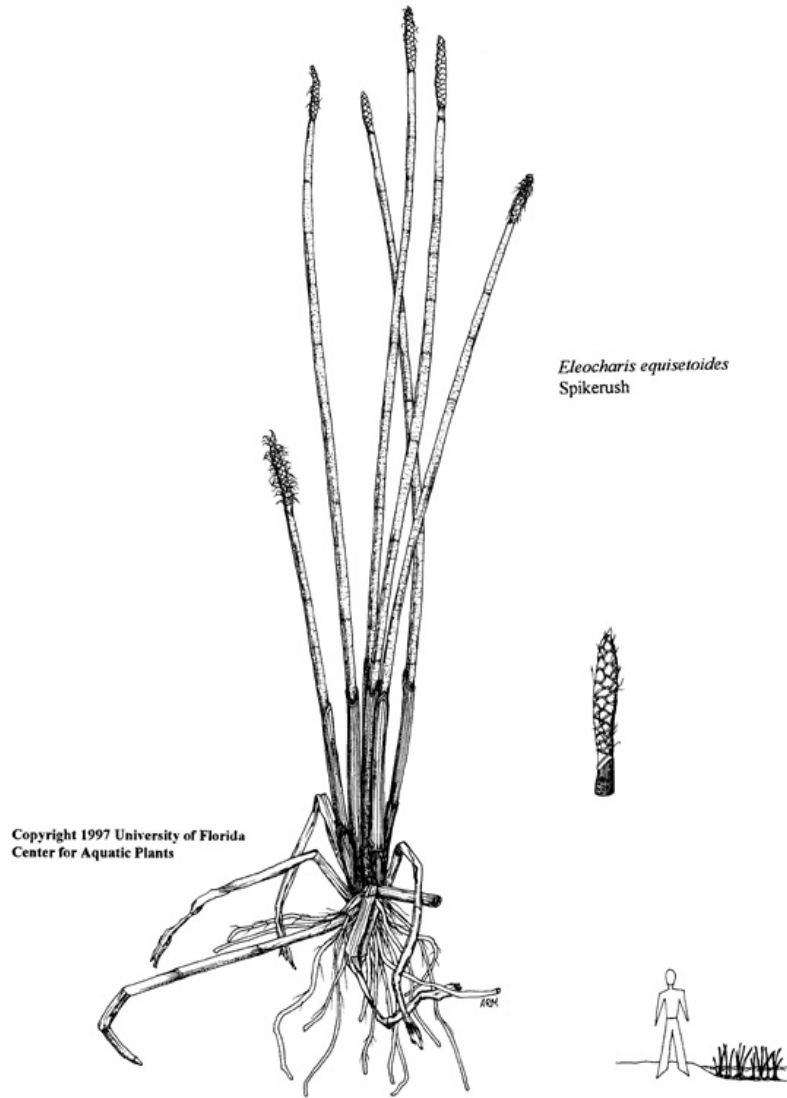
Bladderwort – *Utricularia radiata*



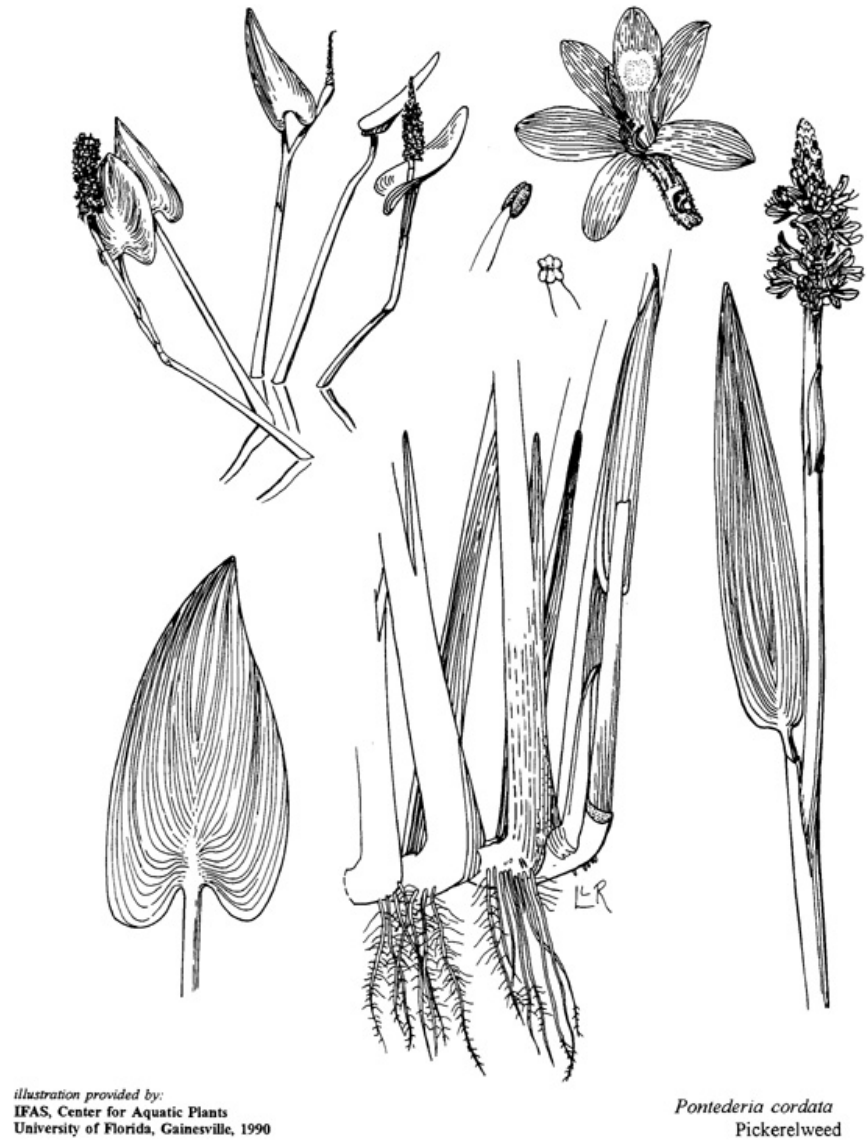
Yellow water lily – *Nuphar* spp.



White water lily – *Nymphaeae oderata*



Spike Rush – *Eleocharis equisetoides*



Pickerelweed – *Pontederia cordata*