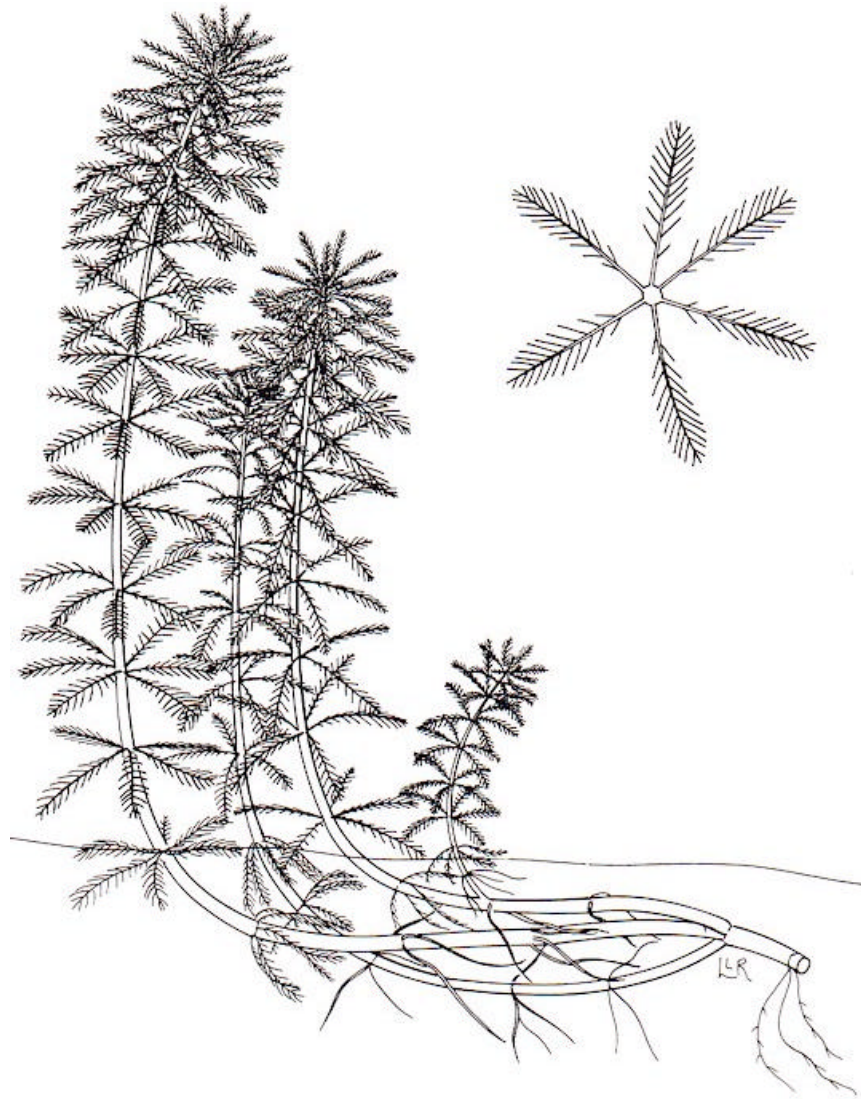


# Invasive, Exotic, Aquatic Plants

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**Washington Department of Ecology**

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## **Acknowledgments:**

### **Illustrations:**

Eurasian watermilfoil, parrotfeather, fanwort, purple loosestrife, waterlily, and bladderwort illustrations were provided by IFAS, Center for Aquatic and Invasive Plants, University of Florida, Gainesville. Used with permission.

The hydrilla, Brazilian elodea, and water hyacinth illustrations are from *A Citizen's Manual for Developing Integrated Aquatic Vegetation Management Plans* published by the Department of Ecology. The illustrator is Ruth Gothenquist.

The yellow floating heart illustration by Phyllis Wood.

The water primrose illustration is from *Aquatic and Wetland Plants of Southwestern United States* by Correll and Corell.

### **Authors:**

The Eurasian watermilfoil, parrotfeather, hydrilla, Brazilian elodea, water hyacinth, and fanwort pages are taken from *A Citizen's Manual for Developing Integrated Aquatic Vegetation Management Plans* published by the Department of Ecology. They were written by Maribeth Gibbons, Harry Gibbons, and Mark Systma.

The other pages were written by Jenifer Parsons and Kathy Hamel.

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# Invasive, Exotic, Aquatic Plants

## Introduction

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This booklet is published by the Department of Ecology to increase public awareness of invasive, exotic aquatic plants. None of the plants illustrated here are native to the Pacific Northwest. Many of the plants come from exotic locations such as Asia, Australia, Africa, and South America. Most have already invaded Washington and are well established in certain lakes and rivers.

These plants are all truly invasive and carry with them, few, if any, of the natural controls that keep them in check in their native ranges. As a result, their uninhibited growth carries the potential for great harm to wildlife habitat as well as to the recreational uses of lakes and rivers. Once established, the cost for management of these plants is very high.

These plants form single species stands that exclude beneficial native aquatic species. They form surface mats that create areas of stagnant water suitable for mosquito breeding. They create areas of low oxygen and high pH. They form swimming and boating hazards. In short---these are highly undesirable plants.

Many of these plants have been introduced into Washington waters through well-meaning aquarium owners who have dumped their aquarium fish and plants into a lake or stream. Eurasian watermilfoil, fanwort, and Brazilian elodea are all thought to have been introduced to Washington by people dumping aquariums. Once introduced, these plants can be readily spread by boaters carrying plant fragments into uninfested waters.

The early location and identification of new colonies is important. If you think that you have found one of these species, please contact **Kathy Hamel (360) 407-6562 (e-mail [kham461@ecy.wa.gov](mailto:kham461@ecy.wa.gov)) or Jenifer Parsons (e-mail [jenp@ecy.wa.gov](mailto:jenp@ecy.wa.gov))** at the Department of Ecology for advice. You may also send a plant to Ecology for confirmation. Contact Kathy or Jenifer for directions on mailing plants.

Once an exotic weed becomes wide spread in a lake or river, management is often ongoing and expensive. Alert lake residents can discover pioneering colonies of an exotic species before it becomes established. In these cases it is sometimes possible to remove the plants before they become widespread. Lake residents need to be aware of how to identify exotic aquatic plants. The information and illustrations in this booklet will help with the identification of the following exotic species:

Eurasian watermilfoil	Pages 2-3	Swollen Bladderwort	Pages 14-15
Parrotfeather	Pages 4-5	Yellow Floating Heart	Pages 16-17
Hydrilla	Pages 6-7	Fragrant Water Lily	Pages 18-19
Brazilian elodea	Pages 8-9	Water Primrose	Pages 20-21
Fanwort	Pages 10-11	Purple Loosestrife	Pages 22-23
Water Hyacinth	Pages 12-13		

# **Eurasian Watermilfoil**

## ***(Myriophyllum spicatum L.)***

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### ***Description***

Eurasian watermilfoil (milfoil) has finely dissected leaves that form in whorls of four around the stem. Milfoil leaves fall off as they age, so occasionally you may find less than four leaves in a whorl, especially near the bottom of the plants. Leaves near the surface are often a reddish or brown color. Milfoil generally has 12 – 16 divisions per leaflet and these divisions have a feather-like arrangement. It is often difficult to distinguish milfoil from its native cousins – northern milfoil and whorled milfoil. Calling an expert at Ecology may be the best way to positively identify your milfoil specimen.

### ***Growth Habit***

Milfoil is the culprit in many nuisance aquatic plant cases in Washington. It has been the subject of much research and its growth habits are well known. Milfoil overwinters as short bright-green stems from a few inches to a few feet long that are rooted in the sediments. In eastern Washington, milfoil tends to die back to the fleshy root crowns over the winter. Milfoil stores energy and nutrients in its roots ready to start growth in the spring. In early spring, plants grow rapidly to the surface where they can form a mat or canopy of branches. Rapid spring growth and canopy formation allows milfoil to outgrow and shade out other, more desirable native plants.

### ***Propagation***

Milfoil, a native of Europe and Asia, is primarily spread by stem fragments. Fragments are formed when pieces of the plant are cut off of the main plant body, such as by a boat propeller or during harvesting operations. These stem fragments can root and produce new plants. Milfoil also fragments naturally. In the late summer, the stems of milfoil become quite brittle and roots begin to form on the stem. Wave action or a duck paddling through a milfoil bed can cause stems to break.

### ***Control***

Prevention of milfoil invasion requires control of fragment spread. Some management techniques, harvesting for example, can create fragments and contribute to the spread of milfoil. Milfoil is susceptible to several herbicides. With the proper herbicide and application rate, milfoil can be selectively removed from an aquatic system, leaving more desirable aquatic plant species. Other intensive methods, such as bottom barrier placement and diver-dredging are effective against small-scale infestations of milfoil. Milfoil is relatively unpalatable and is low on the grass carp preference scale. Other biological controls of milfoil are under intensive investigation. A native weevil shows some promise as a biological control for milfoil.

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# Eurasian Watermilfoil

(*Myriophyllum spicatum*)

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## Key Features

- ❖ 12 to 16 leaflets on each leaf
  - ❖ Emergent flower stalks sometimes present during the summer
  - ❖ Milfoil leaflets look like feathers
  - ❖ No emergent leaves
  - ❖ Leaves near the surface may be reddish or brown
-

# Parrotfeather

## *(Myriophyllum aquaticum (Vell.) Verdc.)*

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### *Description*

Parrotfeather, a South American species, has both emergent and submersed leaves. The emergent stems can be from a few inches to over a foot long and are the most distinctive feature of parrotfeather. Emergent leaves form in whorls on the stem. The leaves are bright green and finely divided. In spring, very small, white, tuft-like flowers form where the emergent leaves attach to the stem. The submersed leaves are finely-dissected, and feathery, often with a reddish color. The submersed growth form of parrotfeather is often mistaken for Eurasian watermilfoil.

### *Growth Habit*

Parrotfeather grows best when rooted in shallow water. In nutrient-enriched lakes parrotfeather can grow as a floating plant in deep water. The emergent stems can survive on wet banks of rivers and lake shores, so it is well adapted to moderate water level fluctuations. Parrotfeather's distribution in Washington is limited to coastal lakes and streams, the Columbia River in South Western Washington, the Chehalis River, and private ponds and lakes where people have introduced it as a water garden plant. Parrotfeather invasion of lakes and streams severely changes the physical and chemical characteristics of the aquatic ecosystem. The emergent stems shade the water column, eliminating algal growth, which is the basis of the aquatic food web. Parrotfeather is also excellent habitat for mosquito larvae.

### *Propagation*

Parrotfeather spreads only by plant fragments. All the parrotfeather plants in Washington are female. In fact, there are no male plants anywhere outside of its native range in South America. Consequently, there is no sexual reproduction and no seeds are formed. Parrotfeather rhizomes are quite tough and can be transported long distances on boat trailers. Parrotfeather's attractive green foliage make it a popular aquascaping plant which has contributed to its spread. It is no longer possible to legally purchase parrotfeather in Washington.

### *Control*

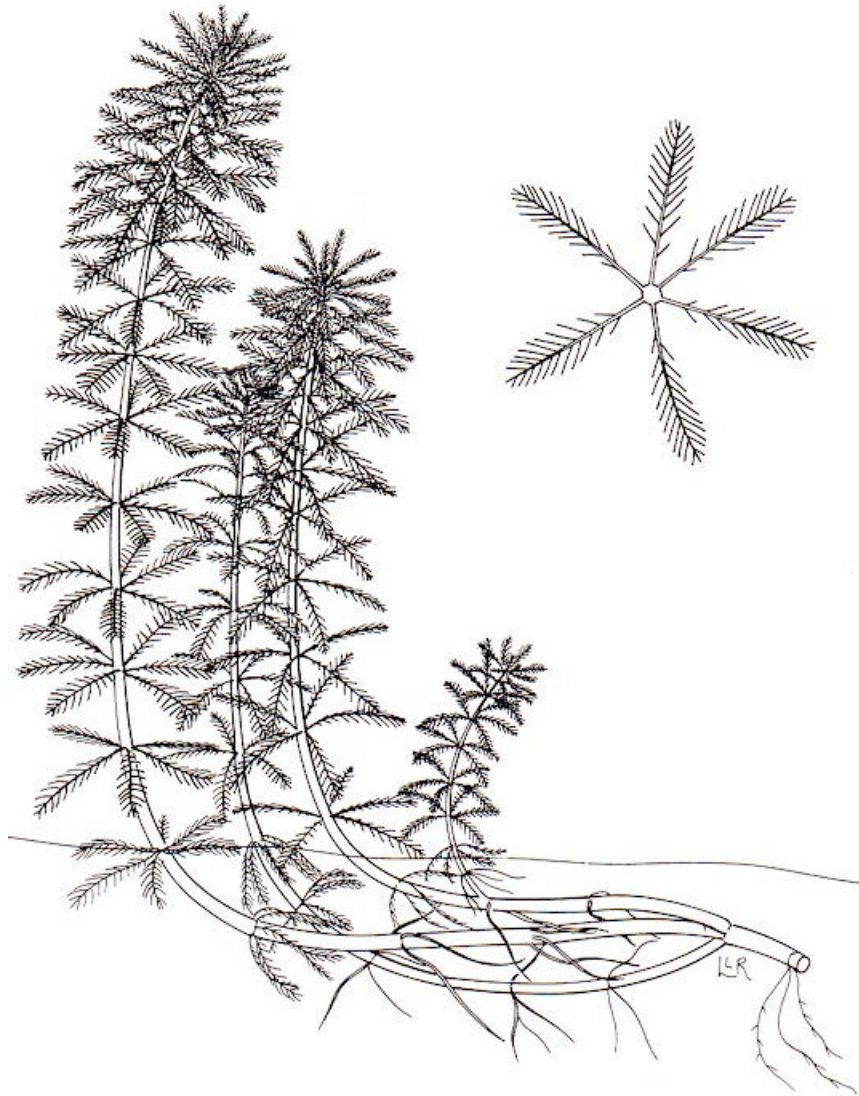
Parrotfeather is a difficult plant to manage. It has a high tannin content which makes it unpalatable to grass carp. A thick cuticle which forms a waxy cover on the emergent leaves hampers herbicide effectiveness. In deeper water, parrotfeather can be physically removed by hand or with a mechanical harvester. As with all invasive plants, control is most easily achieved when it is performed before the plants establish large stands.

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# Parrotfeather

(*Myriophyllum aquaticum*)

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## Key Features

- ❖ Bright green, fir-tree like emergent stems
  - ❖ Dense mat of intertwined rhizomes in the water with abundant, long roots
  - ❖ Reddish feathery-leaved, very limp submersed leaves may be present
-

# Hydrilla

## *(Hydrilla verticillata (L.F.) Royle)*

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### *Description*

Hydrilla, native to Asia, Africa, and Australia, closely resembles its cousins Brazilian elodea and American waterweed (*Elodea canadensis*). The primary distinguishing feature of hydrilla is the presence of tubers that form on the roots. The tubers are small potato-like structures one-quarter to one-half inch long. Hydrilla also has small spines along the leaf edges. Hydrilla typically has five leaves in whorl around the stem. The leaves are about one quarter to three quarter inches long. Hydrilla also forms turions (small, hard overwintering buds) on the stem and has small (one-half inch diameter) white, floating flowers.

### *Growth Habit*

Hydrilla is a submersed plant that is rooted in the sediment. Hydrilla is probably the most troublesome submersed aquatic plant in North America. It grows rapidly under very low light levels, in a variety of aquatic habitats from still to flowing water and depths from a few inches to fifty feet. Hydrilla can fill the water column with vegetation interfering with the recreational use of lakes and rivers.

### *Propagation*

Hydrilla has three primary means of spread: stem fragments, tubers, and turions. Stem fragments are formed by harvesting operations and by boat propellers. Each stem piece can root and form a new plant. Tubers form on the roots in the sediment, and turions form on the stem in the water column. Tubers are produced in the sediment by the thousands, and sprout in the spring. Turions are smaller and are easily carried by water currents, providing a mechanism for long distance transport. The strain of hydrilla found in Washington can also produce very small seeds.

### *Control*

Hydrilla was discovered in one interconnected lake system in Washington in 1995. The state and local governments took immediate action to initiate an eradication program. Because tubers are long-lived and do not all sprout each growing season, this effort will continue until no more hydrilla plants are seen. Fluridone, a systemic herbicide is effective in killing the vegetative parts of the plant, but herbicides do not affect the tubers. Grass carp relish the stems and leaves of hydrilla, but do not eat the tubers.

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# Hydrilla

(*Hydrilla verticillata*)

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## Key Features

- ❖ Looks very like native American waterweed (*Elodea canadensis*) and Brazilian elodea
  - ❖ Small (one-quarter to one-half inch long), potato-like tubers are attached to the roots in the sediment
  - ❖ Tiny spines on the leaf edge. Hydrilla may have rough feel
-

# **Brazilian elodea**

## **(*Egeria densa* Planch.)**

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### ***Description***

Brazilian elodea, a native of South America, is often confused with hydrilla and American waterweed (*Elodea canadensis*). Since American waterweed is a native species and hydrilla an extremely aggressive invader, it is important that the plants be correctly identified. American waterweed has three leaves per whorl, Brazilian elodea four (sometimes eight) leaves per whorl, and hydrilla five leaves per whorl. American waterweed leaves are usually less than one-half inch long. Brazilian elodea leaves are greater than one-half inch long. Hydrilla has small “spines” along the leaf edges and sometimes there are spines along the midrib of the leaf. Hydrilla also forms small (one-quarter to one-half inch long) tubers in the sediments, which are not formed by the other two species. Brazilian elodea has three-petaled white flowers, less than an inch in diameter that float on the water surface in summer.

### ***Growth Habit***

Brazilian elodea is rooted in the sediment and grows rapidly in the spring, forming a canopy of intertwined stems at the surface that shades out native aquatic plants. Although it is now illegal to sell Brazilian elodea in Washington, it is a popular aquarium plant elsewhere. The characteristics that make it a good aquarium plant: rapid growth under low light levels, easy propagation, and tolerance of a wide range of water and sediment types also makes it a nuisance plant when people dispose of aquarium contents into our lakes and streams.

### ***Propagation***

All the Brazilian elodea plants in the United States are male. Therefore, like parrotfeather, it spreads by only by plant fragments. Fragments are formed when pieces of the plant are cut off the main plant body, such as by a boat propeller or during harvesting operations. The stem fragments can root and produce new plants.

### ***Control***

As with other aquatic plants that are spread by stem fragments, prevention of Brazilian elodea fragments is critical to preventing the invasion of new lakes. Some management techniques, harvesting for example, can create fragments and contribute to the spread of this plant within water bodies. Once established, Brazilian elodea is susceptible to several herbicides and appears to be a preferred species grazed by grass carp. Other methods, such as bottom barrier placement and diver dredging are effective against small-scale infestations of Brazilian elodea.

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## Brazilian elodea (*Egeria densa*)

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### Key Features

- ❖ Submersed plant with leafy green leaves
  - ❖ The leaves are in whorls of four (sometimes eight)
  - ❖ The leaves are greater than one-half inch long and less than one-quarter inch wide
  - ❖ No tubers attached to the roots in the sediment
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# Fanwort

## (*Cabomba caroliniana* Gray)

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### *Description*

Fanwort, native to the eastern United States, has distinctive fan-shaped submerged leaves arranged in pairs on the stem. In the water, fanwort has a tubular look because the leaves are quite dense on the stem and there is little branching. Submersed leaves resemble those of water buttercup (*Ranunculus aquatilis*). Buttercup leaves, however, are arranged alternately (one per node) on the stem. Distinctive, but small floating leaves may also be present. The stem attaches to the floating leaf blade at the center where there is a slight constriction. Small, (less than one-half inch diameter), white flowers float on the waters surface.

### *Growth Habit*

Fanwort is a rooted aquatic plant with a limited distribution in the Northwest. In Washington, it is restricted to side-channels of the Columbia River near Longview. In contrast to other rooted aquatic plants, fanwort is reported to obtain nutrients important for growth from the water column rather than the sediment. Fanwort has been seen in Cullaby Lake, on the north coast of Oregon, for at least fifteen years where it creates severe nuisance conditions. Fanwort is a serious aquatic weed as far north as upstate New York and Michigan. It clearly has the ability to grow and create serious weed problems in Washington.

### *Propagation*

Like many problem aquatic plants, fanwort can regenerate from small stem fragments. Fanwort stems become brittle in late summer, which causes the plant to break apart, facilitating distribution and invasion of new water bodies. Fanwort is self-pollinating in the South and seeds readily germinate. There is no information on seed viability in the Northwest.

### *Control*

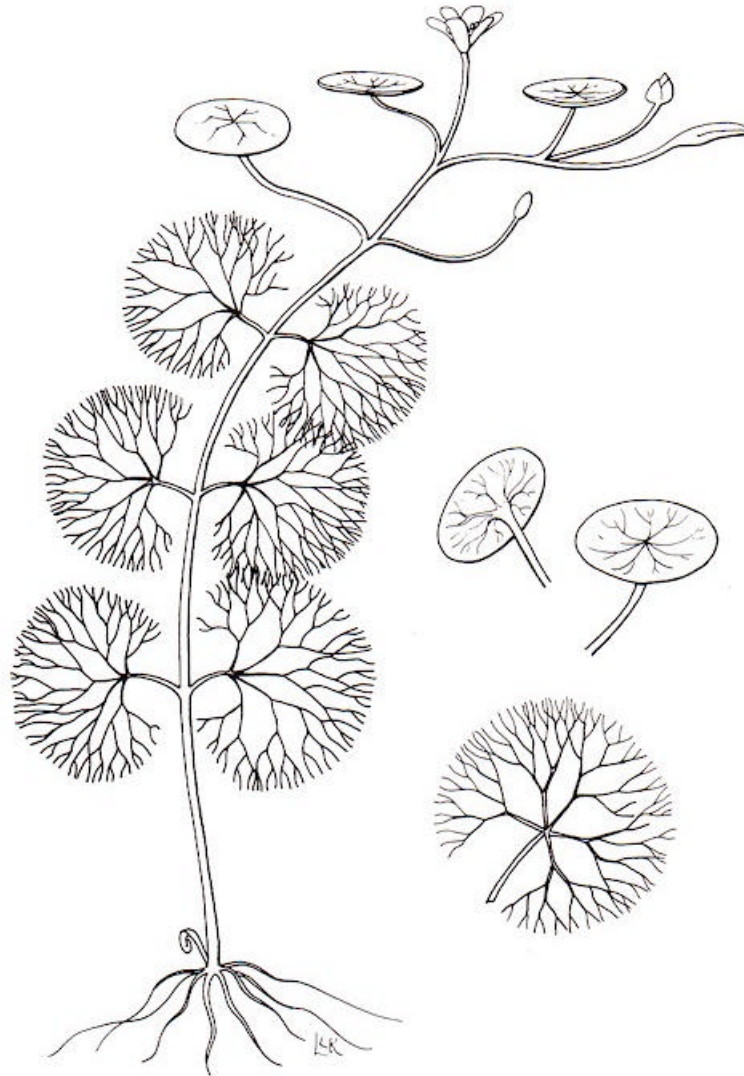
There has been little research into fanwort biology or management. There are reports that fanwort is less sensitive to herbicides available for management in Washington than other aquatic plants. Drawdown has been used to reduce fanwort growth in the South, however, extreme drying is necessary to prevent regrowth from seeds. Grass carp eat fanwort, but there has been no research on other biocontrol agents. Because it may obtain most of its nutrients from the water column, fanwort may be sensitive to reduction in nutrients in the water. The fanwort invasion in Washington is in a pioneering stage. Prompt action and vigilant monitoring of our lakes may prevent further spread and increased management costs in the future.

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# Fanwort

(*Cabomba caroliniana*)

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## Key Features

- ❖ Fan-shaped leaves in pairs on the submersed stem
  - ❖ Submersed stems have a tubular appearance
  - ❖ Small, oval floating leaves with the stem attached at the center of the leaf
  - ❖ The floating leaves are less than one inch long
-

# **Water Hyacinth**

## **(*Eichornia crassipes* ( Mart. ) Solms)**

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### ***Description***

Water hyacinth is a floating plant with round to oval leaves up to ten inches in diameter, although smaller leaves are common. The leaves are bright green and shiny and held upright so they act like sails, which facilitates distribution of the plant. The leaf stalk is spongy and thick and helps to keep the plant buoyant. Masses of fine roots hang in the water column. Flowers are large (two-three inches) and attractive. They are bluish purple or lilac colored with a yellow spot.

### ***Growth Habit***

Water hyacinth can form impenetrable mats of floating vegetation. Water hyacinth has not been found in the wild in Washington, but it is sold as an ornamental plant in garden stores in the state. Although it is thought that water hyacinth cannot survive Washington's winters, its presence as an ornamental makes it possible for escape and growth in the wild under the right conditions.

### ***Propagation***

Water hyacinth reproduces by seeds and vegetatively. Daughter plants develop on rhizomes and form dense beds of water hyacinth. In one study, two plants produced 1,200 daughter plants in four months. Individual plants break off of the mat and are dispersed by water currents. As many as 5,000 seeds can be produced by a single plant. Seeds are eaten and transported by waterfowl. The seeds sink to the bottom and may remain viable for 15 years. Seedlings are common on mud banks exposed by low water levels.

### ***Control***

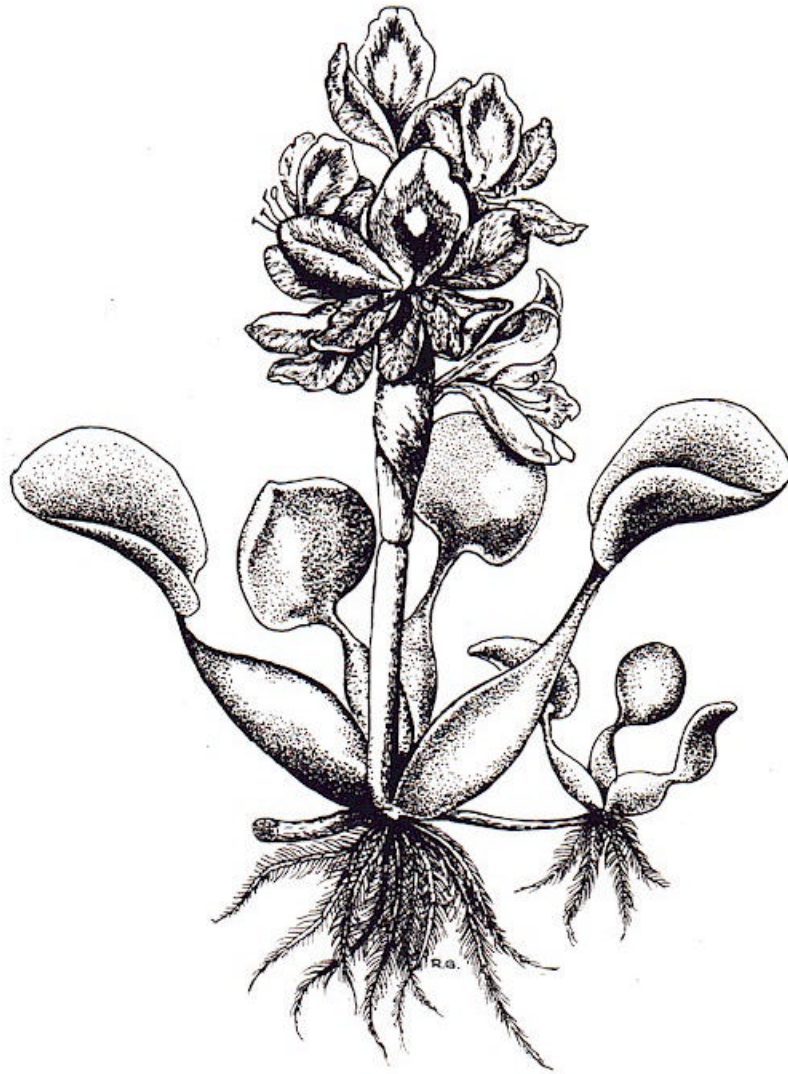
The best way to manage water hyacinth is to keep it from becoming established in Washington. Grass carp will eat water hyacinth and the plant can be managed with herbicides. All management options are very expensive and require an ongoing commitment. Be aware of the threat of water hyacinth and report any sightings (in the wild) to Kathy Hamel at the Department of Ecology! Under no circumstances should lake residents purchase water hyacinths and place them in Washington's lakes, rivers, or streams. Nor should water hyacinth be placed in private waterbodies where they may be transported into natural systems.

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# Water Hyacinth

(*Eichornia crassipes*)

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## Key Features

- ❖ Floating bunches of oval leaves that form a dense surface mat
  - ❖ Long roots dangling in the water
  - ❖ Attractive, hyacinth-colored (purplish) flowers
-

# Swollen Bladderwort

## (*Utricularia inflata* Walt.)

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### *Description*

Swollen bladderwort is a member of a fascinating group of freely-floating, rootless, carnivorous aquatic plants. It is native in the southeastern United States, but is increasingly being seen in some western Washington lakes where it is considered to be a nuisance. The plant is distinctive when flowering because a spoke-like structure supports the showy yellow flowers. It also has many seed-like bladders. These bladders are actually traps that use a vacuum to capture small invertebrates that trigger a trap door. Once inside the bladder, enzymes are secreted to digest the prey, providing the plant with nutrients.

### *Growth Habit*

Swollen bladderwort forms dense beds of floating plants that hover below the water surface. The plant rises to the surface during June to July when it flowers. When flowering, the plant forms a wheel-like floating platform that supports a yellow snapdragon-like flower. These flowers stick up about six inches above the water surface. Washington's native bladderworts do not have this "floating wheel" to support their flowers, but when not flowering our native bladderwort and swollen bladderwort are very similar in appearance.

### *Propagation*

In Washington, swollen bladderwort flowers from June to July. Swollen bladderwort reproduces from small fragments and from seed. A Florida botanist reports that when plants become stranded on mud, they can produce long threadlike branches with each "thread" bearing a tiny tuber at its tip. Swollen bladderwort has been observed in isolated ponds where it is unlikely that boats visit. This plant is probably being spread from lake to lake by waterfowl.

### *Control*

The swollen bladderwort infestation in Washington appears to be in a pioneering stage. We do not have much information about how to control these plants. A 1996 Sonar treatment in Lake Limerick, Mason County, appeared to control this species for about two years and grass carp will consume swollen bladderwort, although it did not appear to be a preferred species in Silver Lake, Cowlitz County, Washington. A technique used by Lake Limerick residents is to hire school kids to rake or hand pull each plant from the lake.

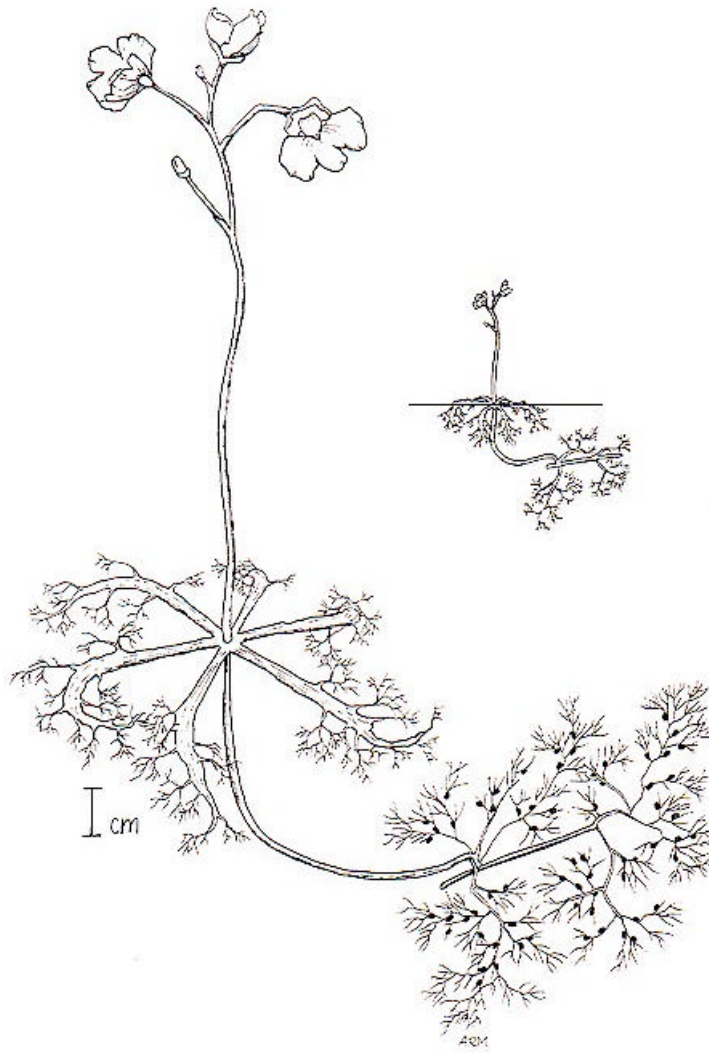
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# Swollen Bladderwort

(*Utricularia inflata*)

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## Key Features

- ❖ Lacy underwater foliage with seedlike bladders
  - ❖ Yellow snapdragon-like flowers
  - ❖ A spoke-like structure supporting the flower stalk
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# Yellow Floating Heart

## *(Nymphoides peltata (S. Gmelin) Kuntze)*

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### *Description*

Yellow floating heart is a perennial, waterlily-like plant that carpets the water surface with long-stalked heart-shaped leaves. The showy five-petaled yellow flowers occur on long stalks and rise a few inches above the water. The flower petals are fringed and this plant is sometimes called water fringe. Yellow floating heart is a native of Eurasia and the Mediterranean area and has been introduced into Washington, particularly along the Spokane River near Spokane. Because of the attractive yellow flowers, this plant is being sold as an ornamental water garden plant. Lake residents are strongly discouraged from planting yellow floating heart in lakes or natural waterbodies. These plants appear to be aggressive growers and sometimes "hitchhiker" plants such as hydrilla can also be introduced to our lakes when nursery or mail order species are planted. There are also other ornamental species of *Nymphoides* that are sometimes sold at aquatic plant nurseries and may be confused with yellow floating heart.

### *Growth Habit*

Like other floating leaved plants, yellow floating heart grows in dense patches, excluding native species and even creating stagnant areas with low oxygen levels underneath the floating mats. These mats make it difficult to fish, water ski, swim, or even paddle a canoe through. Yellow floating heart prefers to grow in slow moving rivers, lakes, reservoirs, and ponds.

### *Propagation*

Yellow floating heart reproduces by water dispersed seeds and by new stolens. Broken off leaves with part of a stem will also form new plants.

### *Control*

We have had no direct experience controlling yellow floating heart in Washington. However yellow floating heart has a similar growth habit to the fragrant waterlily and it is expected that methods used to manage waterlilies would also be effective on yellow floating heart. Waterlilies (and yellow floating heart) can be controlled by cutting, harvesting, covering with bottom barrier materials, and aquatic herbicides (Rodeo®). Grass carp do not eat waterlilies in Washington and it is not known if they would readily eat yellow floating heart.

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# Yellow Floating Heart

(*Nymphoides peltata*)

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## Key Features

- ❖ Bright, yellow flowers about an inch or so in diameter
  - ❖ Two to five flowers from each flower stalk
  - ❖ Five petals per flower with a distinctive fringe along the edges of the petals
  - ❖ Heart-shaped floating leaves with slightly wavy margins and purplish undersides
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# Fragrant Waterlily

## *(Nymphaea odorata)*

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### *Description*

Fragrant water lilies are exceptionally beautiful water plants with floating leaves and large many-petaled fragrant blossoms. They are wonderful additions to backyard ponds and even "tub gardens." The nursery industry has hybridized them and produced many color variations. They sell tropical water lilies and hardy water lilies. It is the hardy white and (sometimes) pink lilies that have become naturalized in Washington lakes and rivers. These plants are native to the eastern United States and it is believed that the water lily was introduced to Washington during the Alaska Pacific Yukon Exposition held in Seattle in the late 1800s. Because of their great beauty, water lilies have been intentionally planted in many Washington lakes, especially lakes in western Washington. However, lake residents are strongly discouraged from planting fragrant waterlilies in lakes or natural waterbodies. Not only are water lilies aggressive plants, but sometimes "hitchhiker" plants such as hydrilla can also be introduced to our lakes when water lilies are planted.

### *Growth Habit*

Water lilies grow in dense patches, excluding native species and even creating stagnant areas with low oxygen levels underneath the floating mats. These mats make it difficult to fish, water ski, swim, or even paddle a canoe through. Although relatively slow-growing, water lilies will eventually colonize shallow water depths to six feet deep and can dominate the shorelines of shallow lakes. For this reason, planting water lilies in lakes is not recommended.

### *Propagation*

Water lilies reproduce by seed and also by new plants sprouting from the large spreading roots (underground stems called rhizomes). A planted rhizome will cover about a 15-foot diameter in about five years. If pieces of the rhizome are broken off during control efforts, they will drift to other locations and establish a new patch of lilies.

### *Control*

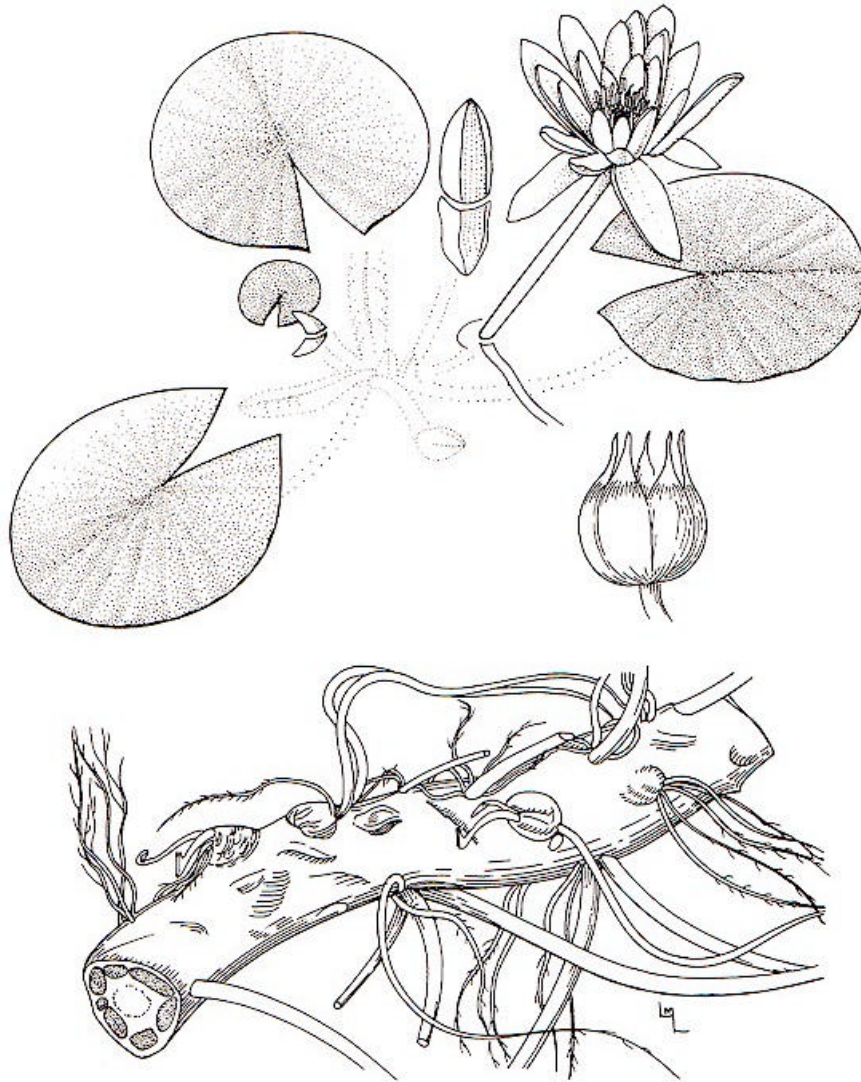
Water lilies can be controlled by cutting, harvesting, covering with bottom barrier materials, and aquatic herbicides (Rodeo®). Grass carp will not eat these plants. Lake residents have indicated that extremely persistent "picking" of emerging water lilies leaves every other day during the growing season for two to three seasons will eventually kill the plants. When waterlilies are killed by herbicides or other means, the dead and decomposing roots (rhizomes) will sometimes form nuisance floating mats in the lake or waterbody.

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# Fragrant Waterlily

(*Nymphaea odorata*)

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## Key Features

- ❖ Large showy white or pink flowers
  - ❖ Nearly-circular floating leaves, up-to-11 inches in diameter
  - ❖ The underside of the leaf is often red or purple with numerous veins
  - ❖ Stem attached to the center of the leaf; leaves cleft to the stem
-

# Water Primrose

*(Ludwigia hexapetala* (Hook & Arn.) Zardini, Gu, and Raven)

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## *Description*

Water Primrose is a perennial herb that can be found creeping along the shoreline, floating on the water surface, or growing upright. It is a robust plant with bright yellow, showy flowers and willow-like leaves. It is a non-native species originally from South America and the southern United States that has been introduced into Europe and northern North America. In Washington water primrose has established in the drainage canals in the Longview/Kelso area. A new site was also recently discovered in King County. Because of its showy yellow flowers, this plant is being sold as an ornamental species. Lake residents are strongly discouraged from planting water primrose in lakes, private ponds with an outlet or in a flood zone, or in natural waterbodies. These plants are very invasive and aggressive and will form very dense mats of vegetation.

## *Growth Habit*

Water primrose grows in dense mats along shorelines and out into the water. It favors the margins of lakes, ponds, ditches, and streams. Water primrose blooms throughout the summer and has bright yellow showy flowers. The plant grows to three feet tall, but the stems may be many feet long when floating on the water.

## *Propagation*

Water primrose reproduces by seeds and by plant fragments.

## *Control*

The Longview Diking District uses mechanical methods to remove water primrose and other noxious plants from the canals and ditches in Longview/Kelso. Other methods such as cutting, covering with opaque materials, and using the aquatic herbicide (Rodeo®) may be effective. It is not likely that grass carp would find water primrose to be palatable.

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# Water Primrose

(*Ludwigia hexapetala*)

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## Key Features

- ❖ Bright, yellow flowers; normally with 5 petals.
  - ❖ Alternately-arranged, slightly hairy, willow-like leaves.
  - ❖ Dense sprawling tangled mat of vegetation.
-

# **Purple Loosestrife**

## **(*Lythrum salicaria* L. )**

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### ***Description***

Purple loosestrife is a shoreline and wetland emergent plant that can grow to two meters (about six feet) tall and has spikes of five-petaled reddish-purple flowers. The plant's leaves occur opposite each other along a square stem. Purple loosestrife is a Eurasian native perennial plant which is responsible for the degradation of a considerable amount of wetland habitat in the United States. Invasion of North American wetlands by purple loosestrife began in the early nineteenth century when the plant was carried to North America in ballast.

### ***Growth Habit***

Purple loosestrife prefers to grow in marshes, ponds, stream banks, ditches, and lake shores; occasionally it can be found in upland areas. Because purple loosestrife grows so aggressively, over time large stands of the plant take over an area and replace the native plant species. This results in eliminating the natural food and cover essential to many wetland inhabitants including waterfowl. In addition, purple loosestrife can grow in and around irrigation systems and impede the flow of water. The Winchester wasteway, an irrigation system in Grant County, Washington, is reported to be one of the largest stands of purple loosestrife in the country. Purple loosestrife invasion is a cause for grave concern among water users and purveyors.

### ***Propagation***

A single mature plant can produce more than 2.5 million seeds annually. The seeds are long-lived and easily dispersed by water and in mud adhering to aquatic wildlife, livestock, and people. A strong rootstock serves as a storage organ, providing resources for plant growth if the above ground stems are cut, burned, or killed by application of foliar herbicides. All of these characteristics make a very aggressive plant extremely difficult to control.

### ***Control***

Current means of plant control include mechanical cutting or application of herbicides. Exciting research into using biological controls on purple loosestrife is currently being conducted. These efforts are focused on using insects from the plant's native range in Europe. Several types of insects including a root-mining weevil and a leaf-eating beetle have been introduced into Washington in an attempt to control purple loosestrife. The introduction of these insects on purple loosestrife on the Winchester wasteway is beginning to pay dividends. In 1997 and 1998, the insects had significant impacts on purple loosestrife stands; defoliating the plants and preventing seed set. These insects are now being collected and dispersed to other purple loosestrife sites in Washington and to surrounding states.

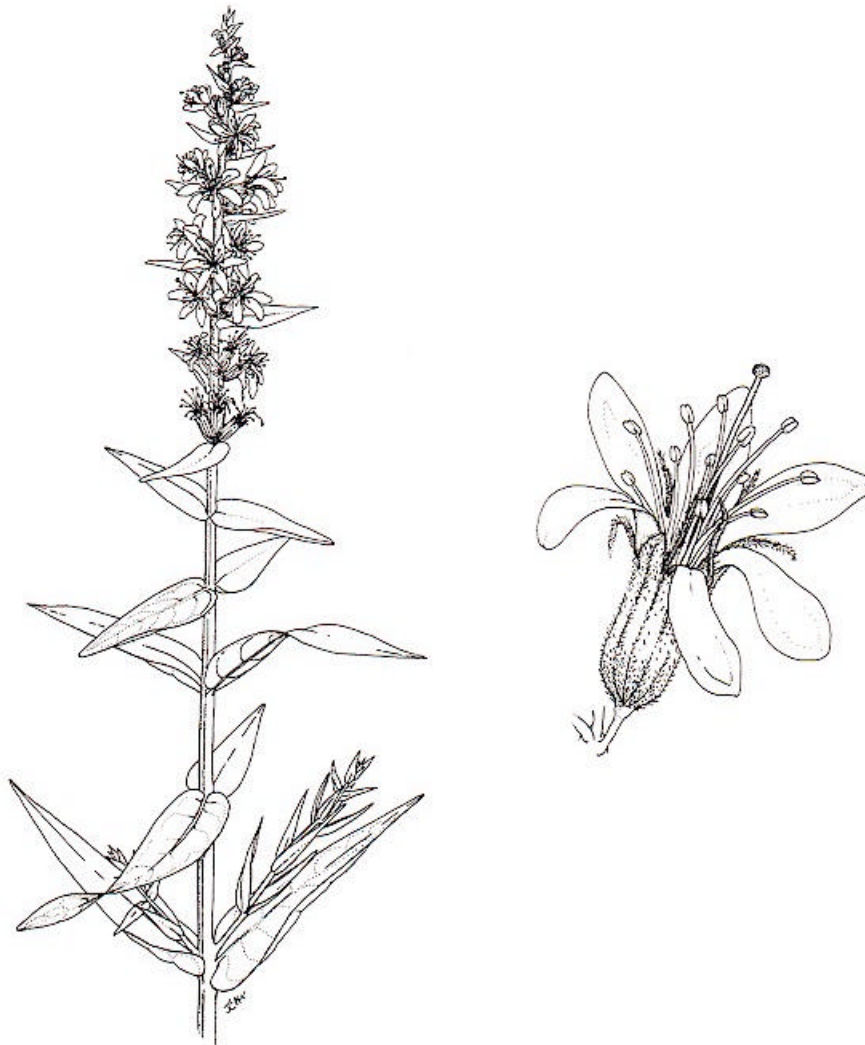
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# Purple Loosestrife

(*Lythrum salicaria*)

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## Key Features

- ❖ Vivid purple-pink flowers in summer and early fall
  - ❖ The stems are generally square
  - ❖ The leaves are usually oppositely arranged and are lance-shaped
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# Invasive Exotic Plants

## What You Can Do to Help

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**Never dispose of aquarium plants and animals** into lakes, rivers, or streams. Popular aquarium plants, such as Brazilian elodea and fanwort are wreaking havoc in waterways around the county.

**Inspect nursery-supplied and mail order aquatic plants**, such as waterlilies, that are shipped into Washington. Hydrilla has been known to hitchhike on nursery-sold and mail order plants. Also be aware that the zebra mussel, a small non-native mollusk that clogs water intakes, damages boat engines, and alters native species populations can be transported on aquatic plants.

**Be careful not to send or receive potentially harmful plants or animals through the mail.** Use mail order and Internet services wisely.

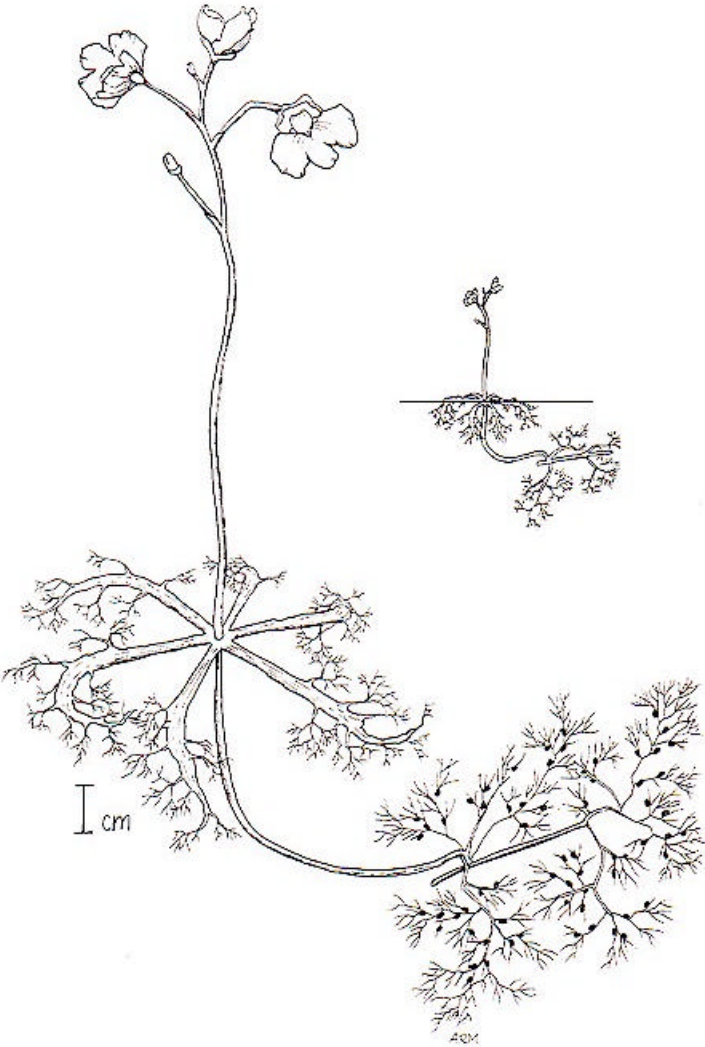
**Remove all plant material from boats** and boating/recreational equipment before transporting them from one waterbody to another. Boating activities are the number one way that Eurasian watermilfoil is being spread from lake to lake.

**Spread the word and not the weed!** Educate yourself and others about the problem of invasive exotic plants and animals.

# For More Information about Exotic Aquatic Weeds

See our Website at:

<http://www.wa.gov/ecology/wq/links/plants.html>



Swollen Bladderwort (*Utricularia inflata*)

