

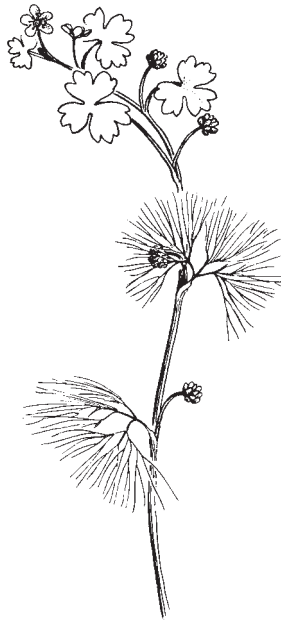
Introduction to Common Native & Potential Invasive Freshwater Plants in Alaska



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Tara Chestnut/Hannah E. Anderson, Jamie Fenneman, Vanessa Morgan, Dana Visalli,
Jamie Fenneman, Lynda K. Moore and Denny Lassuy.

**Introduction to
Common Native
&
Potential Invasive
Freshwater Plants in Alaska**



This document is based on *An Aquatic Plant Identification Manual for Washington's Freshwater Plants*, which was modified with permission from the Washington State Department of Ecology,

by the

Center for Lakes and Reservoirs at Portland State University
for

Alaska Department of Fish and Game

US Fish & Wildlife Service - Coastal Program

US Fish & Wildlife Service - Aquatic Invasive Species Program

December 2009

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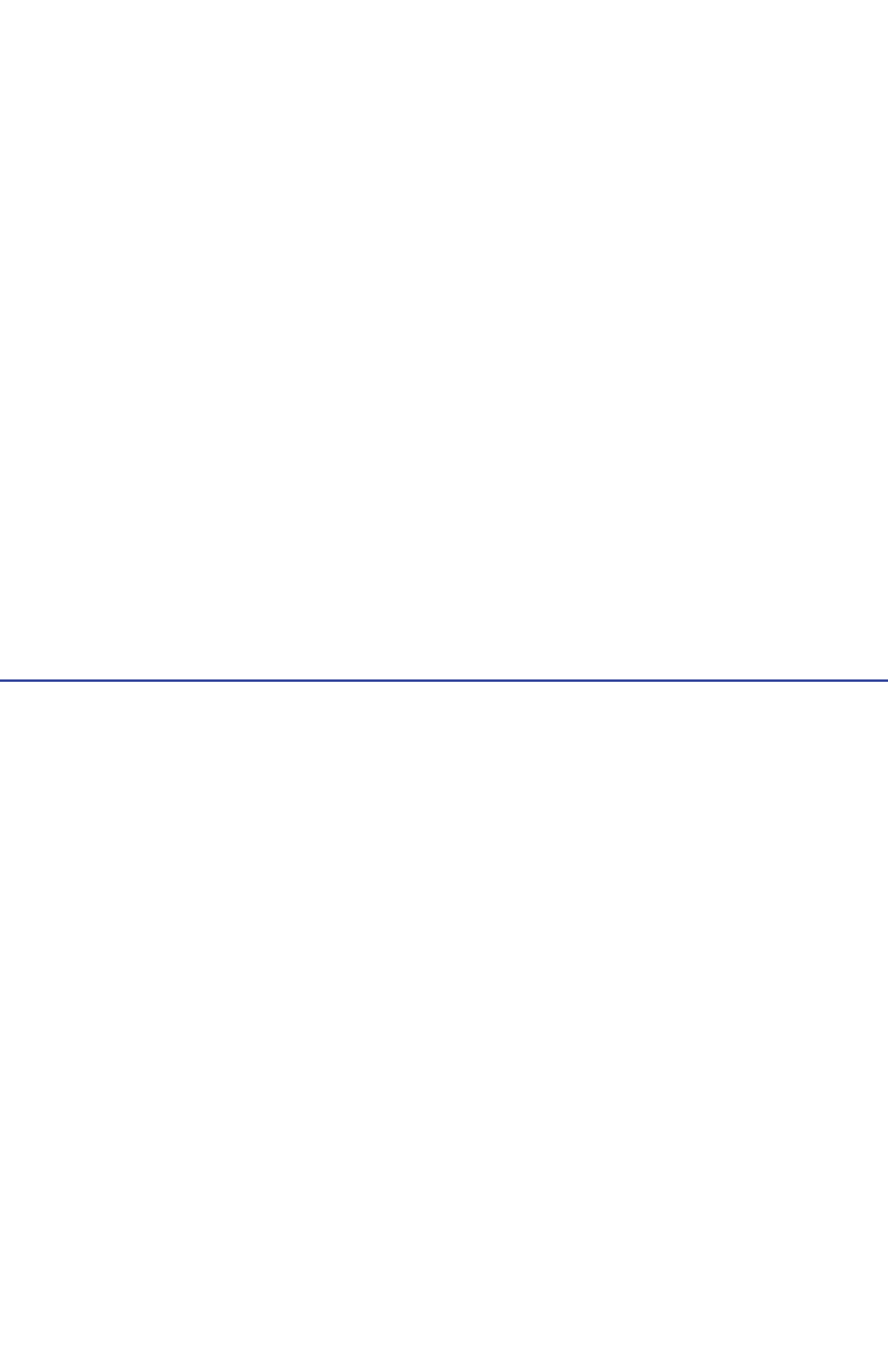
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Introduction to Common Native & Potential Invasive Freshwater Plants in Alaska

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Denis Barthel - (Creative Commons Attribution ShareAlike 3.0 License) *Sphagnum sp.*

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Arley Muth, USACE - *Myrica gale*

New York Department of Conservation - NYDEC - *Elodea canadensis*, *Lemna minor*

Richard Old - *Alisma trivale*, *Hydrilla verticillata*, *Polygonum persicaria*, *Sagittaria cuneata*

Jenifer Parsons - *Potamogeton richardsonii*

Grace Patrick - *Brasenia schreberi*, *Lysimachia thyrsiflora*, *Menyanthes trifoliata*

Kristian Peters - (Creative Commons Attribution ShareAlike 3.0 License) *Nitella* sp. (*Nitella mucronata*)

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INTRODUCTION

INTRODUCTION

I – OVERVIEW

Freshwater aquatic plants are found in most lakes and rivers in Alaska. They range from tiny floating plants that can form mats on a lake surface to emergent plants growing two meters above the water. Aquatic plants are an important part of freshwater environments. They provide food and shelter for a wide variety of insects, fish, mammals, and birds; stabilize shorelines; and form an important link in nutrient cycles. To date, Alaska has had relatively few problems with invasive, non-native aquatic plants. However, invasive aquatic plants pose an increasing threat to human safety and the integrity of native aquatic communities. Actions taken to detect and prevent the introduction and spread of invasive aquatic plants in Alaska are necessary in order to avoid the environmental and economic harm invasive plants have caused in other parts of the United States.

The primary purposes of this manual are to aide the identification of freshwater aquatic plants that are likely to be seen in Alaska's lakes, streams, bogs and marshes; and to help prevent the spread of harmful invasive plants. This manual was written for people who do not necessarily have a scientific background, but it also should be useful for professionals who need assistance in identifying common aquatic species.

All scientific names follow those currently listed as accepted by the Integrated Taxonomic Information System (www.itis.gov); common names follow those listed in the NRCS Plants Database. Although many common aquatic plants are described, this manual does not include all the aquatic plants in Alaska. Additional useful books, guides and literature are listed in the References section. **Most important:** if you cannot identify a plant species, please follow the reporting guidelines (see page xxiii); you may have found an invasive species!

II – HOW TO USE THIS MANUAL

Plants with similar growth forms and from similar habitat types are grouped together into six categories. A seventh category of non-plant organisms that may be seen in Alaska lakes is also included. These categories are broadly accurate, but keep in mind that certain plants may cross these categories depending on the water-level, the time of year or other factors. A brief description of each plant category follows; icons for each category are shown next to each description.

Go to the category that best seems to describe the unknown plant. Compare the plant

with the illustrations and photographs of each plant within the category. When you find a similar looking plant, read the species description to see if your plant fits the description. Refer to the glossary in Appendix A for definitions of unfamiliar terms.

Plant Categories

Shoreline Plants



Shoreline plants grow along edges of lakes, rivers, streams, and ponds or on wet ground away from open water. They have at least part of their stems, leaves, and flowers emerging above the water surface and are rooted in the sediments. Some plants that typically grow in deep water may be found along the shoreline in late summer when water levels are low.



Jamie Fenneman

Floating Leaved Rooted Plants



These plants are rooted in the sediment with floating leaves along the water surface, but may also have underwater leaves. Their stems are often not firm enough to keep them upright when removed from the water; at low water they may be found collapsed on the lake bottom. These often form a band of vegetation along a lake margin, in water one to three meters deep.



L. K. Sawyer

Free Floating Plants



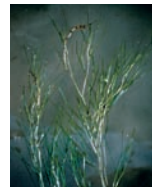
Free-floating plants float in the water column, on the surface of the water, or lie on the bottom. This category includes some of the smallest members of the plant kingdom, such as watermeal plants, which look like green specks on the water surface. These plants do not root in the sediment, although some species have roots that dangle in the water. They sometimes form extensive green mats on the water surface.



Clayton Antieau

Submersed Rooted Plants

The entire plant is usually underwater, but the flowers and fruits may rise above the water surface. Submersed species are rooted in the sediment and have underwater leaves. They can grow from shallow water to depths greater than ten meters in very clear water.



Gary Larson



Macroscopic Algae

Macroscopic algae lack stems and leaves, although sometimes they have structures that can be mistaken for stems and leaves. These algae are green with cylindrical, whorled branches. They lack roots, but some species attach to the sediment. Macroscopic algae tend to lie on or just above the sediments. They are found from shallow water to very deep areas (20-30 meters) in clear water.



Clayton Antieau



Aquatic Moss

Aquatic mosses are small plants with delicate stems and small closely overlapping leaves. These plants can have branched, stem-like and root-like structures. Unlike most other plants described in this book, the aquatic mosses never produce flowers. Aquatic mosses are often seen growing attached to rocks in mountain streams, but they also grow in shallow to moderately deep water of lakes.



Clayton Antieau



Curiosities

This category includes interesting things that may be found in freshwater lakes and rivers and which might be mistaken for aquatic plants. These curiosities include bryozoans and colonial animals, as well as filamentous algae.



HEC

If the plant fits the general description, use a metric ruler to measure leaves, petals, and other plant parts. Sometimes number of leaflets or petals helps with identification. When counting numbers of leaves, especially those arranged in a whorl around the stem, it is often helpful to examine a cross section of the plant at a node. Use magnification to see small detailed plant structures. If the plant doesn't seem to be referenced within a particular category, look at the plants in similar categories. Depending on the time of year, flowers, fruits, or floating leaves may not be present or underwater leaves may have decomposed. A young plant may look quite different in appearance than a mature plant.

Keep in mind that photos are provided as a general reference; aquatic plants are highly variable in size and form, depending on the time of year and site-specific environmental characteristics. Identifying plants purely by photos is unpredictable.

Don't be discouraged if you can't identify the plant to a particular species. Some species, such as the narrow leaved pondweeds, are notoriously difficult to distinguish from each other. If you can't identify the plant from this manual you may need to consult other plant references; not all freshwater plants from Alaska are described in

this book. See the reference section at the end of this manual for a list of references that may help you identify wetland and aquatic species. Check with the Herbarium of the University of Alaska Museum, the University of Alaska Fairbanks Cooperative Extension Service, the Committee for Noxious and Invasive Plants Management in Alaska or the Division of Agriculture to see if they may have staff who could help identify the plant.

Below is a sample page from the manual and a description of the layout of the page.

Scientific name	Authority	Frequently encountered synonym(s)
Species: <i>Egeria densa</i> Planch. (Synonym: <i>Elodea densa</i> (Planchon) Caspary)		
Brazilian waterweed, Brazilian elodea, anacharis		
Family: Hydrocharitaceae	Common name(s)	

This nonnative plant is commonly sold as an aquarium plant in most of the U.S. and Canada. Brazilian waterweed is an underwater and sometimes floating perennial that can form tangled masses near the water surface. Densely packed green leaves are arranged in whorls of 4-6 around the stem.

Leaf: Bright to dark green leaves, 2-4 cm long and 2-5 mm wide, have minutely toothed edges (requiring magnification). Whorls are tightly spaced and typically have 4 leaves, but some “double nodes” may appear to have 6-8 leaves per whorls. At the stem base, whorls are more widely spaced sometimes with just 3 leaves.

Detailed description of each plant part

Stem: Up to 3 m in length. Leaves occur along the entire length of the stem.

Flower: Fragrant white flowers have a yellow center with three, 7-9 mm long petals. Flowers float on the water surface and are attached at the base of leaf whorls by long slender stalks (to 6 cm). Two to three flower stalks may arise from the same whorl. Male and female flowers are produced on separate plants, but only male plants are found in the U.S. The plant flowers from late spring to early fall.

Fruit: Fruits and seeds have not been observed outside of its native range.

Reproduction

Root: Fibrous. Can produce white adventitious roots along the stem.

Propagation: Because only male plants are found here, propagation is from stem fragments and by collapsed stems that sprout roots and form the base of new plants. Dormant shoots develop in fall and overwinter in the sediment.

Problems with or the benefits of the plant

Importance of plant: Crowds out native species. Eaten by wildlife, although not preferred forage.

Distribution: South American native. Introduced via the aquarium trade and widely distributed in North America; not currently known in Alaska.

Habitat: Lakes, ponds, sloughs, streams.

Where the plant grows

World-wide and North American distribution

May be confused with: Common waterweed (*Elodea canadensis*) and hydrilla (*Hydrilla verticillata*), both non-native invasive species with few or no known populations in Alaska. Common waterweed has smaller leaves in whorls of 3. Hydrilla has tubers and leaves usually in whorls of 5, with spiny margins visible without magnification.

Look alike plants

Icon for the plant category



INVASIVE
Report this plant!

This icon indicates that this plant is an invasive, non-native species

III - CATEGORIES OF SPECIAL INTEREST

Certain plants are of particular interest because of their relative rarity, their ethnobotanical uses by Indigenous Peoples, or because they are invasive, non-native plants. Icons or special notes may be found throughout the pages on individual species. Descriptions of each category follow.

IMPERILED, RARE & UNCOMMON AQUATIC SPECIES

Scientists estimate there are more than 2,500 different vascular plants native to Alaska. This botanical diversity has evolved over the millennia and reflects the wide diversity of Alaskan habitats. Although extinction is a natural process, in modern times this process has occurred at an accelerated rate. The major current cause of extinction is the widespread elimination or disturbance of native habitats by humans and the associated encroachment of non-native, invasive species. Loss of plant diversity results in loss of ecosystems that might be vital to ecosystem services and to human economic or subsistence purposes. The loss of such biological diversity is a major and growing concern, as climate change adds yet another stress on native plants and enables expansion of many invasive species.

It is very difficult to classify plants in Alaska as imperiled, rare, or uncommon. This is because botanists have not fully “collected” or assessed the state of Alaska. Data on the distribution (or lack thereof) of certain aquatic species in Alaska may be the result of only one or two collections – not generally sufficient to classify a plant as rare, imperiled or uncommon.

However, the Botany Program of the Alaska Natural Heritage Program (AKNHP) of the University of Alaska, Anchorage does maintain current listings of potentially rare and uncommon plant taxa within the state. This list is regularly updated as new collection reports are obtained and verified. For updated listings, visit the AKNHP website: <http://aknhp.uaa.alaska.edu>.

When reviewing individual plant descriptions in this guide, take note of the “Distribution” section for additional information on whether or not a plant is currently on the Heritage Program’s rare and uncommon list. Sightings of, and collection locations for, rare and uncommon plants should be reported to the Heritage Program and any collections should be archived. The ability to recognize these and other plants may help prevent their unintentional loss resulting from management activities and shoreline development. By identifying and protecting these species, we can all protect Alaska’s botanical heritage for future generations

Appendix B provides instructions for collecting and preserving aquatic plant specimens. **However, do not collect plants unless you are certain the removal of a few individuals will not significantly reduce the population**



INDIGENOUS PEOPLES USE OF AQUATIC PLANTS

The indigenous peoples of the North America have long depended on plants they could gather and wildlife they could hunt for their food, clothing, and shelter. While much knowledge of their plant use has been lost, certain plants have fairly well known uses that are noted in this manual. **Uses noted herein represent ethnobotanical information from across the continent, but are not necessarily specific to Alaska.**



Non-native, invasive plants are noted by this icon and their names appear in red throughout the text.

INVASIVE AQUATIC PLANTS

IMPACTS: The term “invasive” refers to plants that are not native to a given ecosystem (they did not evolve there or get there without human assistance) and that may cause economic or environmental harm (including harm to subsistence species and activities) or harm to human health. Such species often spread aggressively and may quickly become difficult to manage and control. To date, there are many fewer invasive plants known in Alaska than in the highly invaded and altered eco-

systems of other states. However, all ecosystems - even the most intact and pristine ecosystems - are susceptible to invasion by these plants.

Invasions may lead to the loss of biological diversity when invasive species displace native plants, spread pathogens to them, or so drastically alter the habitat that native plants cannot survive. Prolific growth of plants like Eurasian watermilfoil (*Myriophyllum spicatum*) can clog water intake systems for municipal and industrial uses, alter habitat structure so dramatically that fish can no longer swim upstream, and even proliferate so extensively that a lake becomes unnavigable for boating and unsafe for float plane operation. Even at lesser levels of invasion, recreational uses like boating or swimming are impacted and aesthetics of lakes are often impaired. Dense beds of plants alter water chemistry, temperature, and habitat structure; leading to changes in invertebrate and fish communities. Dense growth may also be a major source of organic matter to the waterbody, and decomposition of these plants may deplete dissolved oxygen. This may lead to problems with odor, color, and taste in the water. Depletion of dissolved oxygen may also cause fish kills.

Lake margins are also vulnerable to invasion by non-native plants. Invasive shoreline species such as purple loosestrife (*Lythrum salicaria*) and reed canarygrass (*Phalaris arundinaceae*) may create large, single-species stands, which reduce diversity and eliminate natural sources of food and cover essential to wetland wildlife.

VECTORS: Invasive species have been introduced into North America in a variety of ways. Purple loosestrife has been - and in some states continues to be - sold as an ornamental landscaping plant. The State of Alaska, alarmed at the spread of this invader into the wild, added this plant to its official noxious weed list and banned the sale, transport and distribution of purple loosestrife seeds. Many other plants plague lakes in the Lower 48 and in Canada; these include a number of species introduced by the aquarium industry, such as Brazilian elodea (*Egeria densa*) and hydrilla (*Hydrilla verticillata*). Because of their attractive flowers, gardeners and landscapers have planted water hyacinth (*Eichornia crassipes*) and white waterlily (*Nymphaea odorata*). The latter is known in Alaska, but is not yet known to have spread dramatically. Some aquatic and wetland species that are now considered to be undesirable were unfortunately introduced during restoration projects. For example, reed canarygrass (*Phalaris arundinaceae*) has been planted intentionally as both a soil



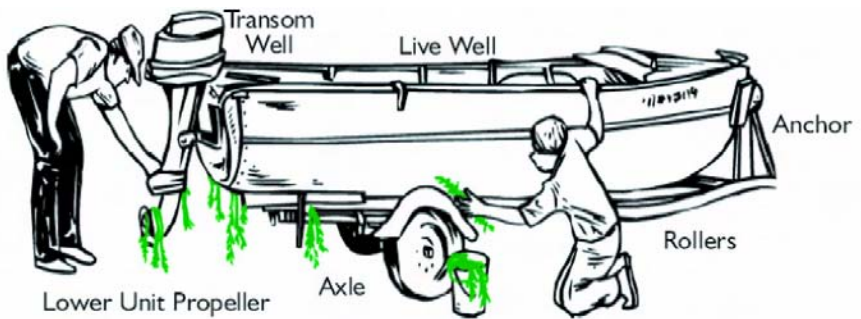
binder and for forage. Once introduced into an area, invasive aquatic plants may spread from lake to lake on boats, boat trailers, float planes or they may even be carried by birds or other animals.

Waders, hip boots, nets, ropes, and other gear can move seeds or plant fragments around, and also other organisms like didymo (*Didymosphenia geminata*) (which can clog streams and smother salmon eggs), New Zealand mudsnails (*Potamopyrgus antipodarum*) (which can rob streams of food for juvenile salmonids) and whirling disease (*Myxobolus cerebralis*) (which can damage nerves and spines of several fish species).

Beginning in 2011, State of Alaska regulations ban the use of felt-soled wading boots in Southeast Alaska's freshwater streams. This proactive measure will help to protect Alaska's freshwater habitats and native fish populations, particularly if the measure is expanded to include the entire state.

PREVENTION TIPS: Since many native aquatic plants are common to Alaska, Canada and the Lower 48, there is no reason to believe Alaska is immune to infestations that have displaced these native species elsewhere. Certain species profiled in this field guide are not yet known in Alaska, but could be introduced or spread from established infestations elsewhere in North America. Others have already been introduced, but are not widespread. There are many things people can do to prevent non-native invasive species from being introduced or to prevent spreading them:

- Avoid using known invasive ornamental species for use in gardens, ponds or aquariums
- Never release plants, fish or animals into the wild
- Always clean, drain and completely dry everything that comes into contact with water (boats, trailers, equipment, clothing, dogs, etc.) or use a diluted bleach solution to wash your gear
- When boating, remove all visible mud, plants, fish or animals before transporting any equipment and eliminate all water from your equipment



WA Dept. of Ecology

Float-plane pilots can:

- Avoid taxiing through heavy plant beds when possible
- As part of standard safety checks prior to take-off, remove all tangled plants from struts, floats or rudders and pump water from floats
- After take-off, waggle the water rudders several times in an effort to free plant fragments while over land or the waters you are leaving
- Avoid using felt-soled waders that can trap and spread seeds

Denny Lassoy, USFWS



Float plane rudder at Lake Hood, Anchorage - the world's busiest float plane port. The plants shown here are native, but if they were harmful invasive species, they could potentially be carried to thousands of other lakes in a very short time.

EARLY DETECTION & REPORTING OPTIONS:

Control measures are much more likely to succeed, and the time and costs required will be much lower, if invasive plant infestations are found early on when populations are small. It is our hope that this field guide will help you identify invasive plants and encourage you to report your observations. This will allow action to be taken immediately to prevent further spread of invasive plants in Alaska. If you know of a new population of an invasive plant or suspect you may have found one, **report it!** Early detection is critical to protecting Alaska's natural resources. You can report by either telephone or online.

- Call **1-877-INVASIV** (1-877-468-2748)
Alaska Department of Fish and Game, Invasive Species Program
- Online at **EDDMapS Alaska's** Early Detection Reporting Form
(www.eddmaps.org/alaska/report/report.cfm)
- Online at the **Alaska Exotic Plant Information Clearinghouse**
(<http://akweeds.uaa.alaska.edu>)

IV - GLOSSARY

Use of scientific terminology has been kept to a minimum. However, some technical terms are necessary to accurately describe the plants. A glossary that defines the technical terms used in this manual is located in Appendix A.

V - COLLECTING AND PRESERVING AQUATIC PLANT SPECIMENS

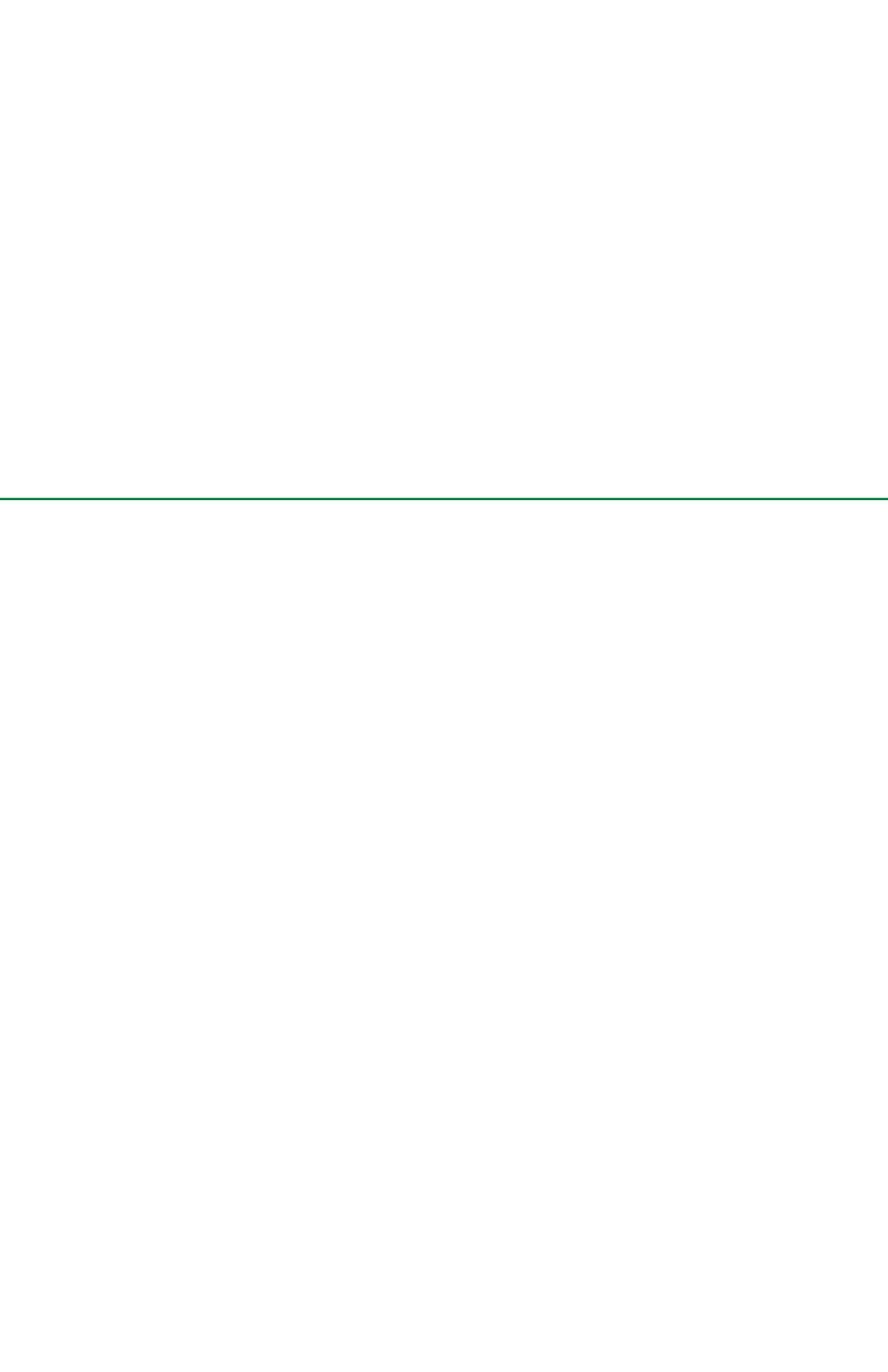
Detailed information about collecting and preserving aquatic plant specimens is presented in Appendix B.

VI - REFERENCES

A list of botanical books and manuals that were used to help prepare the *Introduction to Common Native & Potential Invasive Freshwater Plants in Alaska* is included in the references section. Consult these references for additional information about aquatic and wetland plants.

VII - PLANT SPECIES INDEXES

You may quickly find page numbers for specific plants using common or scientific names by looking at the two indexes towards the end of this book. Names of invasive plants are shown in red text. Common names can cause confusion since distinct species sometimes share the same common name and individual plants often have multiple common names. Using scientific names whenever possible can reduce potential misunderstandings.



CHAPTER 1

SHORELINE PLANTS

Species: *Alisma triviale* Pursh (previously known as *A. plantago-aquatica* ssp. *brevipes* (Greene) Samuelsson); northern water-plantain

Family: Alismataceae

Water-plantains typically grow on wet soil or in shallow water. Look for parallel-veined leaves rising from the plant base. The small white to pink flowers occur on delicate stalks arranged in whorls around the main flower stalk. Stiff leaves generally stand above the water surface, but young plants often have ribbon-like underwater leaves. The taxonomy of this genus is confusing since it has been revised several times and differing environmental conditions result in variations in traits, possibly leading to misidentification.

Leaf: Leaves with parallel-looking veins arise from the plant base and are stiff when growing above the water; petioles (leaf stalks) are triangular in cross-section. Submersed leaves may be ribbon-like and flexible. Northern water plantain grows to 35 cm long including the petiole, the oval-shaped blade is up to 15 cm long and 10 cm wide.

Stem: What appear to be stems are actually long petioles. The stem is a bulb-like fleshy corm, usually buried in sediment.

Flower: Individual flowers each have 3 sepals and 3 petals and occur on whorls borne on slender branches arranged around a central flower-stalk, up to 1 m tall, much longer than leaves. Whorls form a cone-shaped outline. Flowers of Northern water-plantain are white, up to 7 mm across; other species may be white, purplish white or purplish pink.

Fruit: Dry, brown, flattened, oval-shaped achenes are arranged in a ring on small, flat receptacles. Achene of most *Alisma* spp., including northern water-plantain, has 1 groove.

Root: Many, fibrous, arising from the corm.

Propagation: Seed or division of corms.

Importance of plant: Food and habitat for waterfowl, fish, and wildlife. Historical medicinal uses, and corms were stored for human food.

Distribution: Northern water plantain is found across much of North America; in Alaska, it has been found in the interior-boreal ecoregion. A few sources note European water-plantain (*A. plantago-aquatica*) as introduced to Alaska, but probably reference previous taxonomic divisions.

Habitat: Marshy areas and along shorelines; occasionally completely submerged.

May be confused with: Similar to duck potato (*Sagittaria cuneata*), though the achenes of duck potato are arranged in a ball rather than a ring and the leaves are arrow-shaped. When growing submersed water-plantains are easily confused with submersed forms of bur-reed (*Sparganium* spp.) or tapegrass (*Vallisneria americana*), which is present in Canada and the Lower 48, but not known in Alaska.



Clayton Antleau

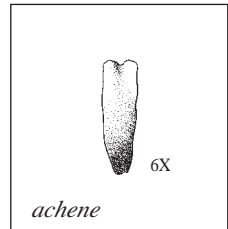


Alisma triviale

Richard Old, www.tdservices.com



Alisma triviale flower



Alisma triviale
(northern water-plantain)

Species: *Sagittaria cuneata* Sheld., arumleaf arrowhead, duck potato, wapato

Family: Alismataceae

Arumleaf arrowhead is a perennial species that grows along shorelines or in shallow waters. Growing to heights of 20 - 60 cm, this species has highly variable leaves, with arrow-shaped leaves emerging above the water, and floating to submerged leaves when water levels are higher. Bears whorls of three-petaled flowers on long stalks in late summer. Large, round tubers are produced off rhizomes.

Leaf: Emergent leaves have arrowhead-shaped leaf blades, 5-15 cm long, on long stalks that are usually triangular in cross section. May also have long, narrow, oval-to-heart-shaped floating leaves, and long, narrow submersed leaves, up to 40 cm long, 2-10 mm wide.

Stem: Short, at plant base (stem-like leaf stalks arise from plant base).

Flower: Usually in whorls of 3, each flower 2.5 cm across and with 3 white petals (1-2 cm long) and 3 green, recurved sepals (5-8 mm long). When in fruit the stalks are held upright.

Fruit: Achenes approximately 2 to 2.5 mm long, crowded on globe-shaped heads. Beak at achene tip < 0.5 mm.

Root: Rhizomes with thick, round, white or bluish tubers that may grow as large as chicken eggs.

Propagation: Tubers, rhizomes, seeds.

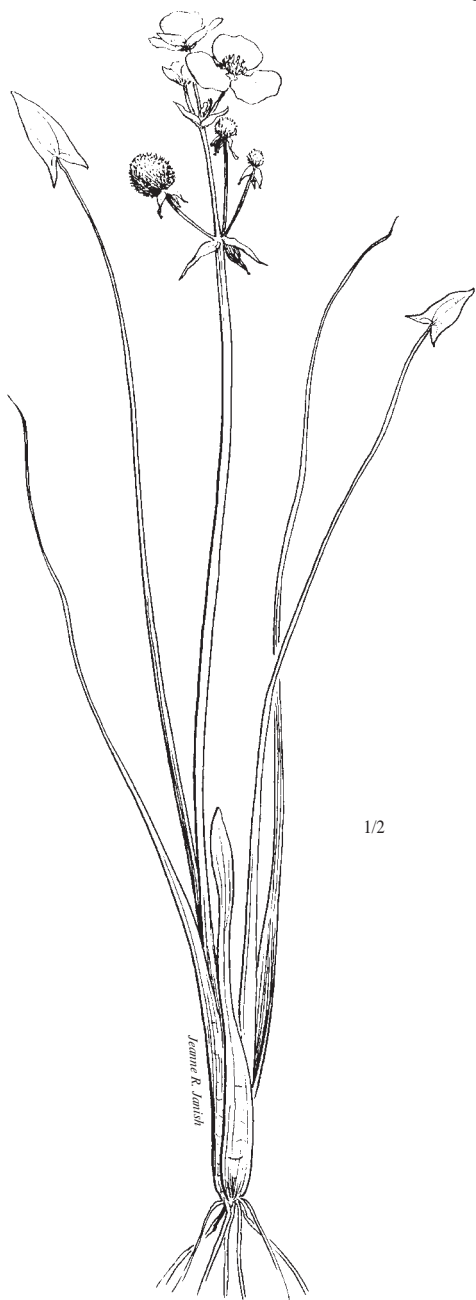
Importance of Plant: Tubers were an important food source for Native Americans. Tubers also provide food for beavers and muskrats. Tubers and achenes provide food for waterfowl.

Distribution: Throughout much of the U.S. and southern Canada; in Alaska, found in the interior boreal ecoregion.

Habitat: Shorelines and marshy areas up; in waters up to 1.5 m deep.

May be confused with: Unlikely to be confused with other plants when the arrowhead-shaped leaves are present. May be confused with other plants that have ribbon-like underwater leaves like water plantains (*Alisma* spp.), bur-reeds (*Sparganium* spp.) or even the ornamental European flowering rush (*Butomus umbellatus*), which also has a triangular stem.





Sagittaria cuneata
 (arrowleaf arrowhead, duck potato, wapato)

Gary Larson



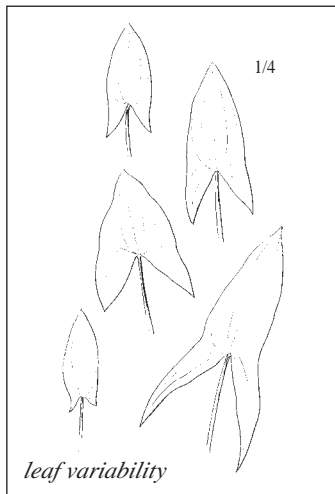
Sagittaria cuneata

Richard Old, www.ridold.com



Sagittaria cuneata flower

1/2



Species: *Calla palustris* L., water arum, water-dragon, wild calla

Family: Araceae

Water arum is a hardy perennial native typically found in acidic, marshy margins, bogs or other slow-moving, shallow waters. The plant has distinctively shaped white flowers and bright red berries make them relatively easy to identify. Neither this nor the related American skunkcabbage (*Lysichiton americanus*) has a true stem - leaves arise directly from rhizomes and are held above the water surface by long petioles.

Leaf: Shiny, cordate leaves, 4-14 cm wide, have curved-ascending, parallel lateral veins and petioles of 6-30 cm arising at rhizome nodes.

Stem: No true stem; leaves emerge directly from rhizomes.

Flower: Spathe surrounds a central spadix bearing many small true flowers. Spathe is bright white (occasionally green on lower surface), ovate to elliptic, 3-6 cm long, surrounds a shorter, cylindrical spadix on a thick short stipe. True flowers are small and yellow and bloom in late spring through summer.

Fruit: Red, pulpy berries surround spadix; individual seeds cylindrical, 3-5 mm long, with dark spots at one end.

Root: Creeping rhizomes, 0.5-2.5 cm diameter.

Propagation: Seeds and rhizomes.

Importance of plant: Stems and rhizomes eaten by bears, elk and raccoons. Emergency food sources by Native Americans, but contains poisonous compounds that must be neutralized prior to consumption.

Distribution: Water arum is found across northern portions of North America; present in all ecoregions of Alaska, but more commonly reported in interior boreal areas.

Habitat: Wet meadows, wooded swamps, bogs, margins of lakes and streams.



May be confused with: Not likely to be mistaken for other plants when in bloom. American skunkcabbage (*Lysichiton americanus*) has much larger leaves and rhizomes, as well as, a distinctive yellow spathe. The cultivated calla-lily (*Zantedeschia aethiopica*), is much taller with larger spathes surround a more narrow spadix, but this ornamental has not been found naturalized in Alaska.

Jamie Ferneman



Calla palustris



Calla palustris
(water arum, water-dragon, wild calla)

Species: *Lysichiton americanus* Hultén & H. St. John, American skunkcabbage

Family: Araceae

American skunkcabbage is a native plant typically found in acidic, slow moving and shallow waters like marshes or wet woods. Plants emit a pungent, skunk-like odor, giving this species its common name. Distinctively shaped green to yellow flowers and large net-veined leaves make it relatively easy to identify. Neither this nor the related water arum (*Calla palustris*) has a true stem - leaves arise directly from rhizomes and are held above the water surface by long petioles.

Leaf: Shiny, oblong to elliptic leaves, up to 1.5 m long, with a strong midvein which grades into a stout petiole, 5--40 cm from basal clusters up to 1 meter tall.

Stem: No true stem; leaves emerge directly from rhizomes.

Flower: Greenish or creamy yellow spathe surrounds a central spadix bearing many small true flowers; up to 20 cm long. Spadix is initially shorter than spathe, becoming longer with elongation of stipe as fruit forms. True flowers are greenish yellow and bloom in late winter or early spring.

Fruit: Red, pulpy berries surround spadix; seeds gray-brown to red-brown, 5-11 mm long.

Root: Erect rhizome, 2.5-5 cm diameter.

Propagation: Seeds and rhizomes.

Importance of plant: Stems and rhizomes eaten by bears, elk and raccoons. Emergency food sources by Native Americans, but contains poisonous compounds that must be neutralized prior to consumption. Skunkcabbage was used medicinally and its large leaves were used for food preparation, serving and storage.

Distribution: Skunkcabbage is native to Western U.S. and British Columbia; known in Alaska's south coastal ecoregion.

Habitat: Wet meadows, wooded swamps, bogs, margins of lakes and streams.



May be confused with: Neither species is likely to be mistaken for other plants when in bloom. Water arum (*Calla palustris*) has much smaller leaves and rhizomes, as well as, a distinctive white spathe. The cultivated calla-lily (*Zantedeschia aethiopica*), is much taller with larger spathes surround a more narrow spadix, but this ornamental has not been found naturalized in Alaska.

Gary Ansell



Jamie Fonteman



Lysichiton americanus
(American skunkcabbage)

Species: *Myosotis scorpioides* L., (Synonym: *M. palustris*), true forget-me-not
Family: Boraginaceae

This low-growing herbaceous plant is often found growing along wet banks or in shallow waters of ponds and lakes. Stems are weak, often bent at the base, with alternately arranged willow-like leaves. Tiny blue flowers are located along the upper end of the stem which unfurls in a “fiddleneck” fashion.

Leaf: Long, narrow alternate leaves (2.5-8 cm long, 7-20 mm wide) are attached directly to the stem and have pointed or rounded tips with a prominent mid-vein.

Stem: Weak and trailing at the base; 15-60 cm tall, often forms roots and new plants at the nodes (stolons).

Flower: Tiny, short-stalked flowers (5-10 mm wide) have 5 blue petals with a yellow center and are arranged along the outside of the coiled stem tip. The base of the petals forms a tube longer than the length of the petal lobes.

Fruit: Shiny, brown to black “nutlets” in clusters of 4 per flower; 2-2.5 mm long.

Root: Fibrous roots develop along the creeping stem of common forget-me-not.

Propagation: Seeds; common forget-me-not forms new plants at the nodes of creeping stolons.

Importance of Plant: Sold as an aquatic garden plant.

Distribution: European species, widespread through much of North American; recorded in Alaska’s interior boreal and south coastal ecoregions.

Habitat: Moist open areas; margins of ditches, ponds, and lakes; and sometimes in shallow water.

May be confused with: Alaska’s state flower, the alpine forget-me-not (*M. asiatica*), generally is not found growing in water and typically has multiple stems arising from the base, where the introduced common forget-me-not has just one. Common forget-me-not also has creeping horizontal stems (stolons) and more intense blue flowers, when compared to the sky-blue alpine species. It may also be confused with popcorn flowers (*Plagiobothrys* spp.) which has longer, narrower leaves and white flowers.



- INVASIVE -
Report this plant!

Gary Ansell



Myosotis scorpioides



Myosotis scorpioides
(true forget-me-not)

Species: *Rorippa nasturtium-aquaticum* (L.) Hayek (Synonyms *Nasturtium officinale* Ait. f.), watercress

Family: Brassicaceae

This emergent perennial herb is typically observed as a tangle of stems and leaves growing in cold, flowing water. Usually the ends of the stems and leaves are held above the water. The leaves are compound, each consisting of a central stalk with several round leaflets that have smooth or slightly wavy edges. Leaves have a strong peppery taste. The small flowers each have 4 white petals and are clustered at the ends of the stems.

Leaf: Older leaves are compound, with each leaf consisting of 3 to 11 smooth or wavy-edged, oval or lance-shaped leaflets growing from a central stalk. The entire leaf measures 4 to 12 cm long, with the end leaflet usually larger than the others. Young leaves are simple, not compound.

Stem: The trailing, fleshy stem is 10-60 cm long, breaks easily, and is upright at the ends. It forms roots at the lower nodes.

Flower: White flowers appear above the water from March through October. The flowers are clustered at the ends of the stems on short stalks. The 3-5 mm long flowers have 4 white petals.

Fruit: Thin, slightly curved, cylindrical pods are 10-25 mm long and about 2 mm wide, on stalks 8-12 mm long. Seeds are small (1 mm), round, and arranged in four rows inside the pods.

Root: Thin and fibrous. Roots often grow from the nodes of trailing stems.

Propagation: Rooting stem fragments and seeds.

Importance of Plant: Eaten by ducks, muskrats, and deer. Widely used as a salad herb for its spicy, peppery flavor, it is grown commercially in the U.S. and often harvested from the wild. It also contains high concentrations of vitamins and minerals. Water cress has a long history of medicinal use for a variety of ailments and was used during Roman times.

Distribution: Introduced from Europe. Widespread in North America, Europe, Asia, and South America. Isolated populations in Alaska's interior boreal ecoregion.

Habitat: Flowing streams and other shallow freshwater areas; prefers cold slow-moving water; common in highway ditches.

May be confused with: Bog yellowcress (*Rorippa palustris*) has vivid yellow flowers and longer, deeply cleft, saw-toothed leaves; American yellowrocket (*Barbarea orthoceras*) also has yellow flowers and grows upright from a single taproot.

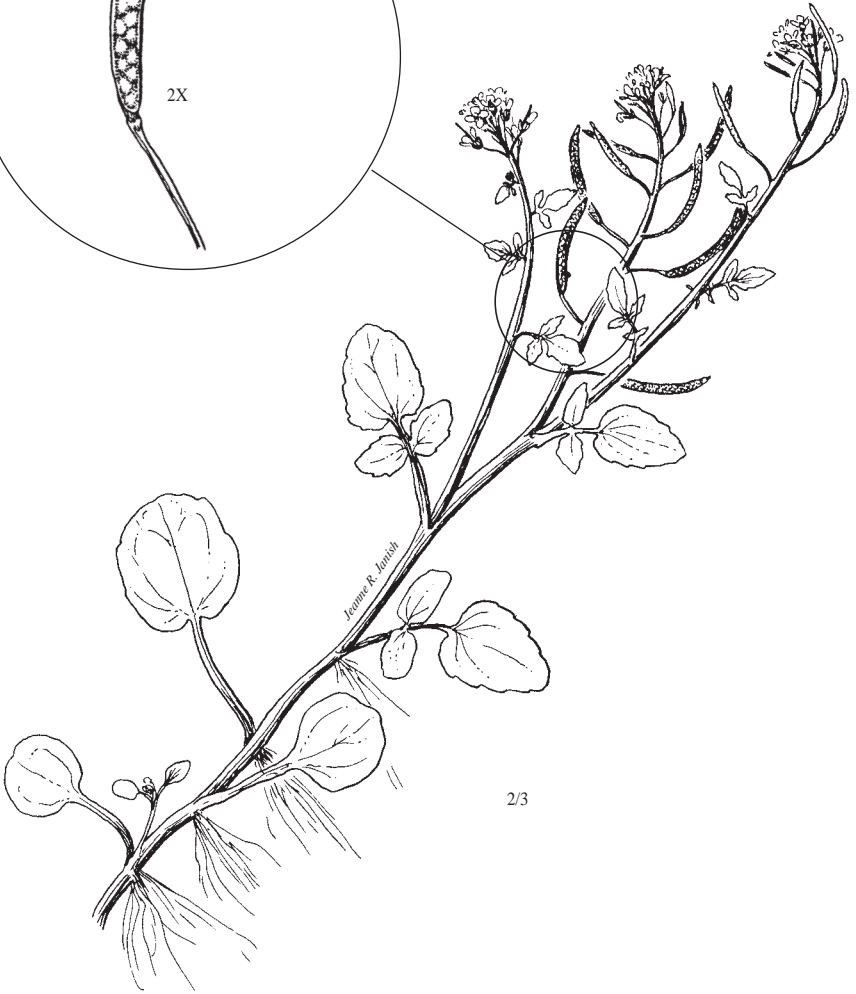
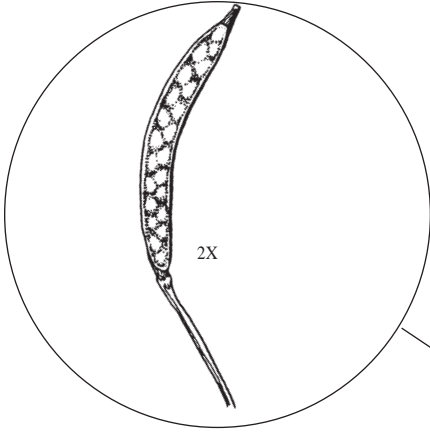


- INVASIVE -
Report this plant!

Clayton Amiteau



Rorippa nasturtium-aquaticum



Rorippa nasturtium-aquaticum
(watercress)

Species: *Butomus umbellatus* L., flowering rush

Family: Butomaceae

Flowering rush is a perennial rush-like species from Eurasia, often used as an ornamental pond plant for its showy flowers. Where it has escaped cultivation, it is found growing both emergent along shorelines and also submersed in several feet of water. Flowering rush is highly cold tolerant, but does die back to the ground each year, and regrowing from tough fleshy rhizomes. Triploid populations known in western states flower infrequently, often with just one flowering stalk for every 1,000 to 10,000 leaves and only when growing as an emergent.

Leaf: Erect to floating. Leaves arise from base; three-angled, fleshy, and often twisted towards the end; growing up to 2.7 m long and may emerge up to 100 cm above the water. Submersed leaves are long and thin.

Stem: No true stem since leaves emerge directly from the rhizome at the base of the plant; grows up to 1.5 m tall.

Flower: Numerous (20-25) white, pink or purple-tinged flowers form an umbel; individual flowers 2 to 2.5 cm across, three petals born on long pedicles (4-10 cm). Flower in the summer to fall; inconsistent and dependent on water-level - rarely flowers when submersed.

Fruit: Beaked, dark brown fruits, 1 cm long.

Root: Rhizomes

Propagation: Floating seeds and rhizome fragments dispersed by water and ice. Muskrats use some parts of the plant and may contribute to secondary spread once initially introduced.

Importance of plant: Used as an ornamental pond plant. Highly invasive plant where introduced to in natural areas, displacing native riparian vegetation and impeding boating and other recreational uses.

Distribution: Native to Europe and Asia; introduced in the Great Lakes and Pacific Northwest regions. **Not currently known in Alaska.**

Habitat: Shorelines of lakes and slow-moving margins or backwaters of rivers; intolerant of brackish water.

May be confused with: Difficult to identify when not flowering. May appear similar to bur-reeds (*Sparganium* spp.), but flowering rush has basal leaves compared to the alternate arranged leaves of bur-reeds. Also similar to floating leaves of arrowheads (*Sagittaria* spp.) which can have leaves with triangular stalks, but often have arrowhead-shaped leaves.



- INVASIVE -

Report this plant!

Ben Leger



B. umbellatus flower umbel

Alvin Mitchell



B. umbellatus individual flower

Peter Rice



B. umbellatus infestation, Flathead Lake, Montana

Butomus umbellatus
(flowering rush)

Species: *Carex* L., sedges, swamp grasses

Family: Cyperaceae

Sedges are grass-like, fibrous-rooted plants often found growing in marshy areas. A common phrase, “sedges have edges,” helps identify these plants, and refers to the fact that most members of this genus have three-sided stems that are triangular in cross-section. Most inhabit wet areas, although some species are found on dry sites. At the tips of their stems, sedges typically have erect or drooping brown or green flower spikes. More than 155 sedge species occur in Alaska; some are considered critically imperiled or rare. Because there are so many species and their flower parts are tiny, sedges are difficult to identify to species; “Wetland Sedges of Alaska” (Tande & Lipkin 2003) provides a good reference.

Leaf: Long, thin, grass-like leaves are arranged in 3 columns up the stem. Look straight down on the plant to observe this.

Stem: The stem is usually triangular in cross-section, but can sometimes be round. Stems are not hollow, but are filled with pith.

Flower: Tiny individual flowers, greenish to brown, lack sepals and petals. Each consists of a single dry scale and either anthers (male flower parts) or a pistil (female flower part). The pistil is always enclosed within a specialized sac-like bract (perigynium). Flowers are arranged in compact or loose spikes at the ends of stems, with male and female flowers in separate sections of the same spike, on separate spikes, or on separate plants.

Fruit: Small brown achenes.

Root: Fibrous; sometimes rhizomatous.

Propagation: Seeds and vegetatively by rhizomes.

Importance of plant: Used by Native Americans for weaving baskets and mats. Seeds, leaves eaten by a variety of animals; leaves used for nesting material; mat forming species provide nesting and protection from predators. Stabilizes shorelines.



Distribution: Worldwide; all ecoregions of Alaska. Certain species are imperiled, rare or uncommon in Alaska.

Habitat: Moist or wet places, estuarine to freshwater systems. Some species occur in dry to semiarid habitats.

May be confused with: Grasses, which generally have hollow stems; rushes (*Juncus* spp.), which have round stems; spike-rushes (*Eleocharis* spp.), which are in the same family as sedges, but are distinguished by their smaller, more compact flower spikes at the ends of leafless stems; and bulrush (*Schoenoplectus* spp.), which have cylindrical stems and lack the perigynium.



HEC

Carex sp.

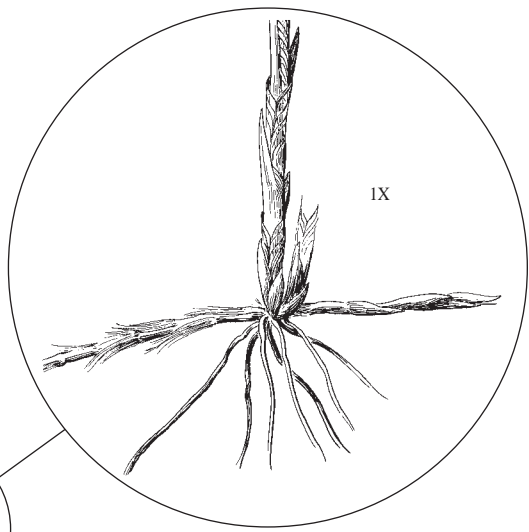


HEC

Carex sp.



Carex sp.
(sedges)



Species: *Dulichium arundinaceum* (L.) Britton, dulichium, three-way sedge

Family: Cyperaceae

This tall, perennial grass-like plant has stems that arise singly or in small patches from creeping rootstocks. Leaves are arranged in three vertical rows along the upper stem, giving the plant a symmetrical appearance. This can be observed by looking straight down on the plant. *Dulichium* is a member of the sedge family, which includes the more common genus *Carex*. Unlike *Carex*, the stems of dulichium are hollow and only vaguely, if at all, triangular.

Leaf: The narrow, alternate grass-like leaves are 3-8 mm wide and 2-9 cm long. They are rather stiffly pointed upwards and spirally arranged in 3 rows around the upper part of the stem. The lower leaves are reduced to bladeless, sometimes brown-tinged sheaths.

Stem: Stems are round or sometimes slightly triangular. They are hollow between the leaf nodes, jointed, and range from 30 cm to 1 m in height. They arise from extensive underground rhizomes.

Flower: Flowers are arranged as 7 to 10 spikelets growing from the bases of upper leaves. These spikelets are 0.5-2.5 cm long with several greenish scales arranged in 2 rows along a central stalk. Scales conceal inconspicuous bisexual flowers.

Fruits: The flattened, linear, yellow achenes are 2.5-3 mm long and are tipped with spines; 6-9 minutely barbed bristles are attached to the base of each achene.

Root: Fibrous and arising from rhizomes.

Propagation: Seeds and rhizomes.

Importance of Plant: The achenes are eaten by waterfowl. Rhizomatous growth also may help stabilize shorelines.

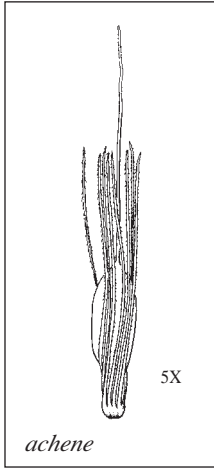
Distribution: North America; considered critically imperiled in Alaska, where limited collections have only been documented in the southeastern portion of the south coastal ecoregion..

Habitat: Wet meadows, bogs, margins of lakes, ponds, and streams. More common in coastal areas and less so inland.

May be confused with: Grasses and other members of the sedge family. Grasses have leaves in 2 vertical rows instead of 3. Sedges of the genus *Carex* have unisexual flowers with the female flowers enclosed in a sac (perigynium), whereas dulichium flowers are bisexual, lack a perigynium, and flowers are arranged in 3 vertical rows on the stalk.



Jeanne R. Janisch



5X

achene

Clayton Antreau



Dulichium arundinaceum



1/6

Jeanne R. Janisch

Dr. Patrick Warrington



Dulichium arundinaceum



2X

Dulichium arundinaceum
(dulichium, three-way sedge)

Species: *Eleocharis acicularis* (L.) R. & S., needle spikerush
Eleocharis palustris L. (L.) Roemer & J.A. Schultes, common spikerush
(Synonyms: *Eleocharis macrostachya* Britt., *Eleocharis smallii* Britt. & others)
Family: Cyperaceae

These green, grass-like perennial herbs can be recognized by the oval-shaped, brownish-flowering spikes at the tips of smooth, round stems. Spikerush species grow either individually or in clumps along shorelines or in shallow water, sometimes forming turf-like mats. Needle spikerush often looks hair-like when growing underwater while common spikerush is a much larger, mat-forming species. While several other spike-rush species also occur in Alaska, the two described here are the most common.

Leaf: Small, inconspicuous leaves are located at the stem base. Needle spikerush: several needle-like square-tipped leaves with pale reddish basal sheaths. Common spikerush: firm, distinctly oblique reddish to blackish basal sheaths.

Stem: Round, green, solid (not hollow) stems turn brown in fall. Needle spikerush: stems measure 2-15 cm tall. Common spikerush: stems measure 10-100 cm tall.

Flower: In ovoid to lanceoloid spikelets at the tips of stems. Each individual flower is protected by a scale-like bract. Needle spikerush: 2-8 mm long; flower scales are green down the center and brown on the sides with 4-25 flowers per spikelet. Common spikerush: 5-25 mm long, light to dark brown or chestnut, >30 flowers per spikelet.

Fruit: Egg-shaped achenes. Needle spikerush: 1 mm long, round to three-angled, pale yellow to brown with small conical tubercle. Common spikerush: 1.6-1.9 mm long, yellowish-brown with long (0.4-0.7 mm) tubercle of variable shape.

Root: Needle spikerush: slender (0.25–0.5 mm) branching rhizomes and stolons. Common spikerush: thick (1.5–4.5 mm) brownish-black rhizomes

Propagation: By seeds and division of plants connected by rhizomes.

Importance of Plant: Seeds and stems are important food for waterfowl and mammals. Spikerushes provide habitat for amphibians and fish and help stabilize shorelines.

Distribution: Both species are found across much of the Northern Hemisphere and are known from all ecoregions of Alaska.

Habitat: Needle and common spikerush are both found in areas of fluctuating water levels including marshes, shallow water of lakes, ponds, and stream banks. Common spikerush may tolerate slightly brackish waters as well.

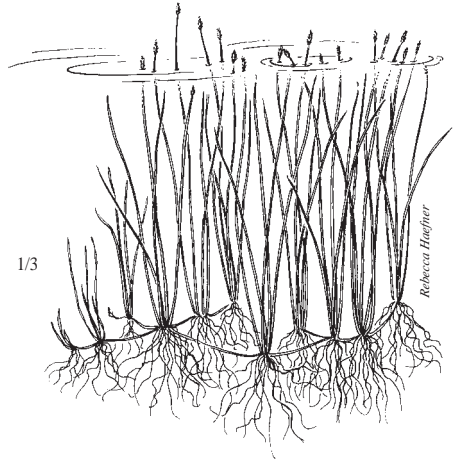
May be confused with: Other spikerush species; refer to technical keys to distinguish species of *Eleocharis*. Spikerush species may also be confused with grasses and small rushes (*Juncus* spp.) or sedges (*Carex* spp.) which all lack the solitary flower spikes at the stem tips. Sedges also generally have wedge-shaped stems.



Gary Larson



Eleocharis acicularis



Eleocharis acicularis
(needle spikerush)

Steve Hirst

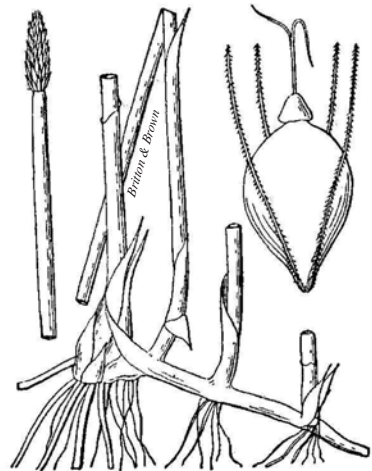


E. palustris achenes

Fred Weinmann



Eleocharis palustris
(common spikerush)



Species: *Schoenoplectus tabernaemontani* (C.C. Gmel.) Palla
(Synonym: *Scirpus tabernaemontani*), softstem bulrush
Scirpus microcarpus J. Presl & C. Presl, panicled bulrush
Family: Cyperaceae

Softstem bulrush and panicled bulrush are tall, stout, perennial plants with well-developed rhizomes from two closely related genera in the Cyperaceae family. Softstem bulrush's round, olive green stems have drooping brown flower clusters near the stem tips, and few inconspicuous leaves at the stem bases. Panicled bulrush is a coarse, plant with grass-like leaves off the stems which may grow singly or a few together and are obscurely three-sided. Sometimes called tules, both are important food and habitat plants for waterfowl and aquatic mammals.

Leaf: Softstem: Located at stem bases; clasping sheaths with no or small leaf blades. Panicled: grass-like, flat, with prominent midrib; 0-30 cm long, 8-15 mm wide; sheaths tinted with reddish-purple.

Stem: Softstem: olive green, round stems are 2-3 cm wide at the base and taper to 2-4 mm near the pointed tip; up to 3 m tall, fresh plants easily crushed with fingers. Panicled: one to several bright green arising from rhizome; obscurely triangular in cross-section.

Flower: Tiny, lack petals. Each concealed by spirally arranged overlapping scales forming flower spikelets clustered at stem tips. Softstem: 1-3 reddish-brown spikelets per cluster, about 4-13 mm long; scales to 3 mm long, awns on the scales < 1mm. Panicled: numerous terminal spikes (4-8 mm long) of small, stalked clusters forming a rounded umbel. Several conspicuous involucre bracts (10-30 cm) appear leaf-like just below the umbel.

Fruit: Tiny seed-like achenes. Softstem: 1.5-2.5 mm long, usually completely hidden by scales. Panicled: 1-1.5 mm long, egg-shaped, usually blackish or greenish-black, but largely translucent, sometimes appearing pale or white.

Root: Horizontal rhizomes from which roots and multiple stems arise.

Propagation: Seeds, rhizomes.

Importance of Plant: Native Americans used roots, pollen, and flowering spikes as food. Stems were used to construct baskets, temporary shelters, and household items. Provides food, cover, and nesting habitat for waterfowl and other birds. Currently used for bank stabilization and to treat contaminated water.

Distribution: Softstem: found nearly worldwide. Panicled: Much of N. America. Both are found recorded in Alaska's interior boreal and south coastal ecoregions.

Habitat: Marshes, swamps and wet meadows. Softstem: up to 1.5 m deep; tolerates alkaline conditions. Panicled: low to moderate elevations, preferring nitrogen rich soils.

May be confused with: Softstem bulrush could be mistaken for hardstem bullrush (*S. acutus* var. *acutus*) which is uncommon in Alaska; a detailed examination of flower clusters is required to distinguish them. Even then, identification is complicated by hybrids and some botanists combine them into one species complex called *Schoenoplectus lacustris* (L.) Palla.





Jeanne R. Jamish



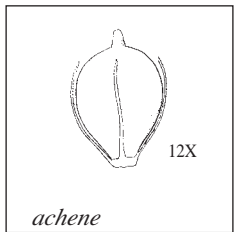
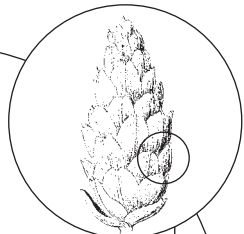
Vanessa Morgan

Schoenoplectus tabernaemontani



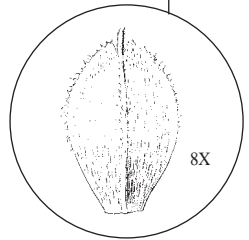
Jamie Fenneman

Scirpus microcarpus



achene

12X



8X

Schoenoplectus sp.
(bulrush)

Species: *Equisetum fluviatile* L., water horsetail

Equisetum variegatum Schleich. ex F. Weber & D. Mohr., variegated horsetail

Family: Equisetaceae

Horsetails are perennial, rhizomatous plants, often growing in dense colonies in wet areas like shorelines, roadside ditches, and meadows. They are often called scouring rushes. Lacking flowers and true leaves, horsetails can be recognized by their hollow, rough-textured, corrugated, jointed stems. Water horsetail has simple or branched stems with whorls of tiny, black-tipped scales at each joint. Variegated horsetail is unbranched, shorter and scales with white margins.

Leaf: Reduced to sheaths at regular joints along the stem. Water horsetail: green sheaths with brown or black teeth (1.5-3.0 mm long). Sometimes produces whorls of thin, green branches. Variegated horsetail: green sheaths; teeth mostly black, with white or transparent margin.

Stem: Water horsetail: 1 m tall, 1 cm diameter with 9-25 longitudinal ridges; readily pulls apart at joints. Wide central cavity, usually 0.9 times the stem diameter. Variegated horsetail: 10-50 cm tall, 2-4 mm diameter with 3-14 longitudinal ridges. Narrow central cavity, usually 0.3 times the stem diameter.

Flower: No flowers; instead, cone-like spore-producing structures develop at the ends of fertile stems. Water horsetail: 10-20 mm long, rounded on the top. Variegated horsetail: 5-7 mm long, pointed at the top.

Fruit: Produces spores instead of fruit.

Root: Creeping rhizomes, often with deep roots.

Propagation: Mainly spreads by rhizomes; spores are also produced.

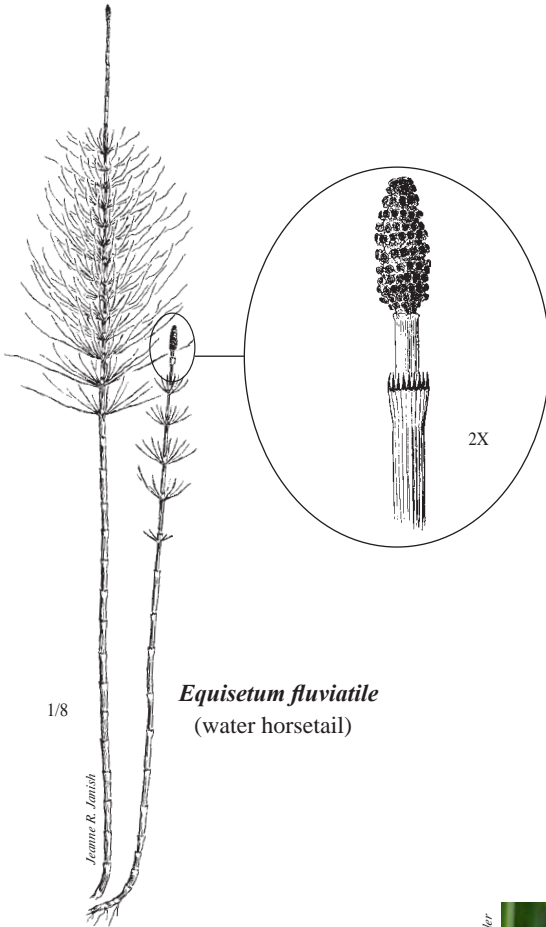
Importance of Plant: Historically used by both Europeans and Native Americans for scouring, sanding, and filing because of the high silica content in the stems. Early spring shoots were eaten. Medicinally it was used to treat kidney ailments. Rootstocks and stems are eaten by waterfowl. Horsetails absorb heavy metals from soil, and are often used in bioassays for metals.

Distribution: Both species are circumpolar and found in all ecoregions of Alaska.

Habitat: Wet areas including marshes, bogs, ditches, and lake/stream shorelines. Water horsetail usually grows in deeper water than other horsetails.

May be confused with: Horsetails are distinct from other plants, but various species are often difficult to tell apart. Diagnostic characteristics typically include presence/absence of branches and details of the joints, central and peripheral cavities. Water horsetail has similar fertile and sterile stems, while other species can have two different stem types; most often confused with marsh horsetail (*E. palustre*), which has fewer (5-10) stem ridges. Variegated horsetail may be confused with dwarf scouringrush (*E. scirpoides*) which grows in drier habitats and only to 25 cm tall.

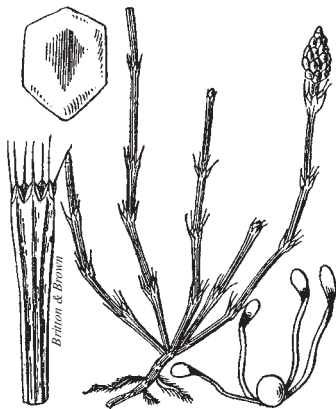




Equisetum fluviatile
(water horsetail)



Equisetum fluviatile



Equisetum variegatum
(variegated horsetail)



Equisetum variegatum

Species: *Myriophyllum aquaticum* (Vell.) Verdc. (Synonym: *M. brasiliense* Cambess)
parrot feather watermilfoil, parrot's feather

Family: Haloragaceae

Parrot feather watermilfoil is an easily recognized member of the watermilfoil family because its stiff, bright green leaves rise above the water like a forest of tiny fir trees. These emergent leaves have a feather-like shape and are arranged in whorls around the stiff stem. Introduced from South America, parrot feather watermilfoil has become a nuisance in many parts of the world, often creating dense mats on the surface of shallow water or on wet soil. It has not been found in Alaska, but could become established if introduced.

Leaf: Two types, both feather-like and finely divided. Emergent leaves: the stiff 2-5 cm long leaves are arranged in whorls of 3-6 leaves around the stem. Each leaf is divided into 12-36 leaflet pairs. Underwater leaves are often decayed, but if present, they are limp, 1.5-3.5 cm long, and are divided into 10-15 leaflet pairs per leaf.

Stem: Sturdy, sparsely branched stems grow up to 2 m long and 5 mm in diameter. They sprawl along the water surface or wet soil and rise up to 30 cm above the water.

Flower: Tiny (0.5 mm) flowers with 4 white sepals occur individually on short stalks at the base of emergent leaves. Male and female flowers are on separate plants, but only female plants occur in North America.

Fruit: Because only female plants occur in North America, fruits are not produced here.

Root: Many, thin, from rhizomes.

Propagation: Spreads by rhizomes. Fragments easily root to colonize new areas.

Importance of Plant: Parrot feather is an escaped ornamental and water garden plant and often invasive where introduced. This hardy plant will survive summer droughts and winter freezes.

Distribution: Native to South America, but introduced nearly worldwide including higher latitude areas like Northern Ireland. Widespread in North America, including British Columbia and much of the Pacific Northwest. **Not currently known in Alaska**, but likely tolerant of conditions in the south coastal ecoregion.

Habitat: Slow-moving rivers, ditches, and shallow freshwater lakes and ponds. Will grow on wet soil along shorelines. Prefers nutrient-rich conditions.

May be confused with: Submersed leaves are easily confused with other watermilfoil species; however, the stiff, finely divided feather-like emergent leaves are distinctive.

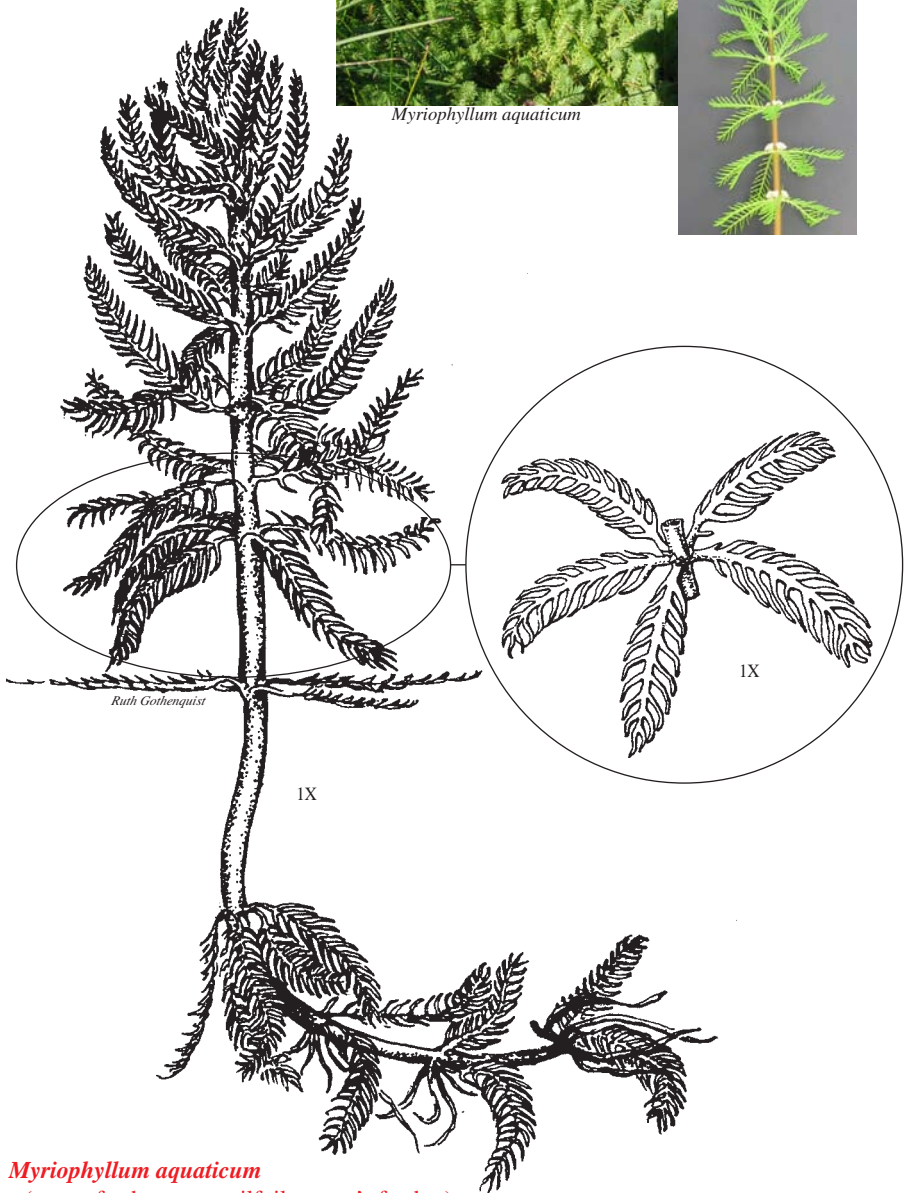


- INVASIVE -
Report this plant!

Vanessa Morgan



Myriophyllum aquaticum



Myriophyllum aquaticum
(parrot feather watermilfoil, parrot's feather)

Species: *Hippuris montana* Ledeb., mountain mare's-tail

Family: Hippuridaceae

Mountain mare's-tail is found in wet meadows, streams, ponds and seeps in subalpine to alpine climates. This genus is characterized by unbranched stems, abundant whorled leaves, and inconspicuous flowers. Mountain mare's-tail is a semi-aquatic plant, often more terrestrial and much smaller than common mare's-tail.

Leaf: Arranged in whorls; 5-8 smooth-margined leaves per whorl; pointed at end; 2-6 mm long and 0.5-1 mm wide. Emergent leaves are stiffer, and smaller than submersed leaves.

Stem: Simple hollow stems, 0.5 mm diameter and up to 10 cm tall. The stem is erect when emergent; limp when submersed; and can form creeping rhizomes.

Flower: Small, inconspicuous flowers are at the leaf bases. The flowers, which lack petals and sepals, are reduced to a tiny rim; anthers to 0.5 mm long.

Fruit: Tiny, nut-like; mature fruit are reddish to green and about 1 mm long.

Root: Fibrous. Arising from lower portion of stems and rhizomes.

Propagation: Seeds and rhizomes. Will regrow from stem cuttings.

Importance of Plant: Seeds and sometimes vegetation eaten by waterfowl and shorebirds. Provides shelter for small animals.

Distribution: Occurs in eastern Asian, Alaska, western Canadian provinces and south to Washington's Olympic Mountains. In Alaska, scattered populations known from the interior boreal ecoregion, but more commonly known in south coastal areas.

Habitat: Sunny banks of ponds, wet to moist meadows, stream banks and seepage areas at high elevations (to 2600 m).

May be confused with: Horsetails (*Equisetum* spp.) have corrugated, distinctly jointed stems compared to the smooth stems of mountain mare's-tail and other *Hippuris* spp.. Mountain mare's-tail is smaller than other mare's-tail species, has a more slender stem and is found at higher elevations. Submersed mare's-tail plants could be confused with members of the Hydrocharitaceae family, but mare's-tail has more leaves per whorl.



Ben Legler



Ben Legler



Hippuris montana
(mountain mare's-tail)

Hippuris montana

Species: *Hippuris vulgaris* L., common mare's-tail
Hippuris tetraphylla L. f., fourleaf mare's-tail
Family: Hippuridaceae

Mare's-tail looks like a robust green bottle-brush growing in patches, primarily in shallow areas of streams, ponds, and lakes or on wet muddy shores when water levels drop. This genus is characterized by unbranched stems, abundant whorled leaves, and inconspicuous flowers. Leaves and stems vary in form depending on whether they are growing underwater or are emergent. The underwater plant portions are limp, flexible, and have very long leaves. Emergent portions are stiff and erect, with short narrow leaves.

Leaf: Smooth-margined leaves arranged in whorls; two types: submersed leaves are soft, pale green to brown. Emergent leaves are dark green, stiffer, and smaller. **Common:** 8-12 leaves, pointed at tip; 6-35 mm long and 1-2 mm wide; in deeper water, only the submersed leaf form may be present. **Fourleaf:** 4-8 leaves, rounded end; 6-15 mm long and 2-8 mm wide.

Stem: Simple hollow stems, 1.5-5 mm diameter, forming roots at the nodes. The stem is erect when emergent; limp when submersed; and can form creeping rhizomes. **Common:** up to 1 m long, occasionally branching from lower nodes. **Fourleaf:** 10-40 cm long.

Flower: Small, inconspicuous flowers are at the leaf bases. The flowers, which lack petals and sepals, are reduced to a tiny rim. **Common:** anthers to 1.2 mm. **Fourleaf:** anthers to 0.5 mm.

Fruit: Tiny, nut-like. **Common:** 2-2.5 mm. **Fourleaf:** 2.0 mm.

Root: Fibrous. Arising from lower portion of stems and rhizomes.

Propagation: Seeds and rhizomes. Will regrow from stem cuttings.

Importance of Plant: Seeds and sometimes vegetation are eaten by waterfowl and shorebirds. Provides shelter for small animals. Sometimes used in ornamental ponds or cool-water aquariums.

Distribution: Occur in cooler regions of North and South America, Eurasia, and Australia. **Common:** all ecoregions of Alaska. **Fourleaf:** Alaska's south coastal ecoregion.

Habitat: At the edges of lakes, ponds, and streams in fresh, usually shallow water. One of the few aquatic plants found in Arctic pools and lakes. **Common:** Streams, ponds and shallow lakes, generally partially emerged, but will grow in water up to 2 m deep. **Fourleaf:** brackish to fresh waters, coastal regions.

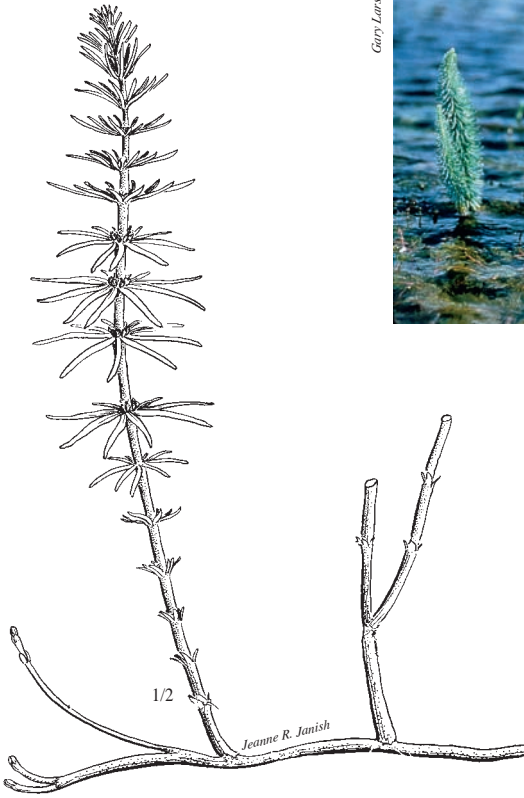
May be confused with: Horsetails (*Equisetum* spp.) and parrot feather (*Myriophyllum aquaticum*), an ornamental pond plant invasive in the Lower 48. Horsetails have corrugated, distinctly jointed stems. Parrot feather has divided feather-like leaves rather than simple, narrow leaves. Submersed mare's-tail plants may be confused with members of the Hydrocharitaceae family, but mare's-tail has more leaves per whorl.



Gary Larson



Hippuris vulgaris



Hippuris vulgaris
(common mare's-tail)

John M. Gilbert



Hippuris tetraphylla
(fourleaf mare's-tail)

Hippuris tetraphylla

Species: *Juncus* L., rushes

Juncus supiniformis Engelm (Synonym: *J. oreganus* S. Wats.), hairyleaf or spreading rush

Family: Juncaceae

Rushes are grass-like plants frequently found in wet places, including shorelines of lakes, ponds, and streams. Few rushes, like hairyleaf rush (*Juncus supiniformis*) grow into deeper water. Rushes usually have round green stems, with clusters of brown, papery flowers appearing to come from the top or side of the stem. Identification of rush species can be difficult and often requires knowledge of the plant's habitat and details of the roots, flowers, and fruits.

Leaf: Round or flattened leaves usually grow from the plant base with a sheath at the leaf base. Hairyleaf rush: to 30 cm long. Sometimes hair-like when submersed, with crosswalls.

Stem: Usually round, (sometimes flattened) with pith-filled stems. Hairyleaf rush: round, floating to erect; commonly forming new plants at nodes.

Flower: Minute, papery, greenish to brownish flowers each have 3 sepals and 3 petals (tepals). Occur in clusters at the stem tips, although on several species a stem-like bract causes flowers to appear to emerge from the side of the stem.

Fruit: Capsule containing many tiny seeds. Seeds often pointed at one or both ends. Hairyleaf rush: capsules longer than tepals.

Root: Fibrous, emerging at the plant base from partially or fully buried rhizomes.

Propagation: Seeds and rhizomes.

Importance of Plant: Nesting material, food, and shelter for many insects, birds, and mammals. Historically, rushes were used in weavings, and peeled stems soaked in grease were used as candles. Rushes continue to be used for making mats and woven furniture in Asia.

Distribution: Rushes are known worldwide. In Alaska, certain species are considered critically imperiled, rare or uncommon according to current collections. Hairyleaf rush is found in Alaska's south coastal and interior boreal ecoregions.

Habitat: Moist to wet places, although some rush species will grow on dry sites.

May be confused with: Spikerushes (*Eleocharis* spp.), sedges (*Carex* spp.), and various grasses. Among these plants, only rushes have flowers with 3 sepals and 3 petals. Also, stems of most sedges are triangular, whereas rushes are round. Hairyleaf rush could be easily confused with bulbous rush (*J. bulbosus*), a nonnative plant with smaller tepals (known in British Columbia, Washington, and Oregon, but not Alaska). When not flowering, submersed hairyleaf rush plants may be confused with swaying bulrush (*Schoenoplectus subterminalis*), which usually has much longer leaves.





Juncus supiniformis
(hairyleaf rush)

Clayton Antleau



Juncus sp.



Juncus sp. (rushes)

Jamie Fenneman



Juncus supiniformis

Species: *Lysimachia thyrsiflora* L., tufted loosestrife
Lysimachia vulgaris L., garden loosestrife
Family: Primulaceae

Tufted loosestrife and garden loosestrife are perennial shoreline plants that can be easily distinguished from other shoreline plants by their leaves and yellow flowers. Tufted loosestrife has willow-like stalkless leaves in an opposite arrangement. The flowers grow in clusters on stalks originating from the leaf bases. The non-native, garden loosestrife has leaves on short stalks with an irregular arrangement. Flowers grow at the tip of the plant and from the bases of the upper leaves. Garden loosestrife has escaped cultivation and is considered noxious in some states.

Leaf: Tufted loosestrife: the opposite stalkless leaves are several times longer than wide (5-12 cm long), have tiny dark dots, and taper to a pointed tip. Garden loosestrife: the 8-12 cm long leaves may appear opposite, alternate, or in whorls; are on short stalks; have soft hairs beneath; and tiny dark dots.

Stem: Leafy, erect, and unbranched. Tufted loosestrife: 20 to 80 cm long and without hair. Garden loosestrife: up to 1 m long with short soft hairs.

Flower: Yellow, 5 petals. Tufted loosestrife: compact bottle-brush-like clusters of small flowers originate from lower leaf bases; petals have small purple dots or streaks. Garden loosestrife: showy flowers 12-15 mm wide in spikes at the plant tip and on stalks from the base of the upper leaves.

Fruit: The egg-shaped capsule contains few seeds.

Root: Roots arise from creeping stems that grow partly or completely underground (rhizomes).

Propagation: Seeds and rhizomes.

Importance of plant: Garden loosestrife, currently not known in Alaska, is a noxious weed in certain states. It has been used medicinally in Asia for high blood pressure.

Distribution: Tufted loosestrife: Native to North America and Eurasia; in Alaska, found in all ecoregions south of the Brooks Range. Garden loosestrife: Eurasia, and introduced in North America; **currently unknown in Alaska**.

Habitat: Marshes, shorelines of lakes and ponds. Occasionally along streams.

May be confused with: Purple loosestrife (*Lythrum salicaria*) if not blooming, but purple loosestrife has square stems.



- INVASIVE -
Report this plant!
(*L. vulgaris* only)

Grace Parrick



Lysimachia thyrsiflora

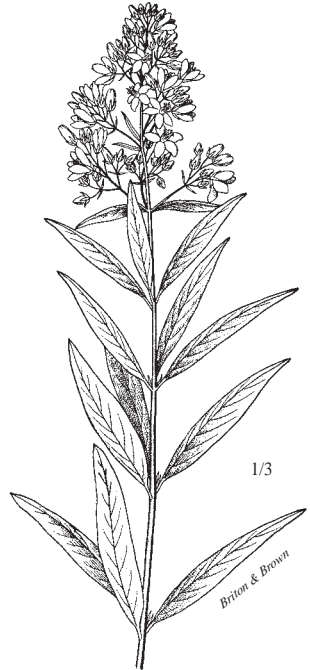
Fred Weiman



Lysimachia vulgaris



Lysimachia thyrsiflora
(tufted loosestrife)



Lysimachia vulgaris
(garden loosestrife)

Species: *Lythrum salicaria* L., purple loosestrife

Family: Lythraceae

Purple loosestrife has vivid purple-pink flowers and blooms in summer and early fall. This erect, robust, square-stemmed, perennial crowds out native wetland species to form dense stands in shallow water and wet soil throughout many wetlands of North America. It is important to recognize this invasive, rapidly spreading European species because every effort needs to be taken to control its spread to new areas.

Leaf: The narrow leaves are stalkless, lance-shaped, 3-14 cm long, heart-shaped at the base, and sometimes covered with fine white hairs. They are opposite or whorled, and sometimes alternate on the upper portion of the stem.

Stem: The erect stem is usually square in cross-section, 0.5-2 m tall, and often branched. May be covered with fine whitish hairs.

Flower: Showy purple-pink flowers occur in erect spikes at the stem tops. The stalkless flowers have 5 sepals and 5-7 delicate wrinkled petals (7-14 mm long).

Fruit: Egg-shaped capsule (3-4 mm) has many tiny seeds. A single plant may produce up to 2.7 million seeds a year.

Root: Woody taproot and fibrous rhizomes.

Propagation: Tiny, lightweight seeds are readily spread by waterfowl and other animals. Vegetative reproduction by shoots and rhizomes.

Importance of Plant: A European species introduced to North America in the mid 1800s. It was distributed as an ornamental, but has become a serious pest plant across many continents. It is known as the “purple plague” because it displaces native wetland species and can dramatically reduce food, shelter, and nesting sites for a wide range of wetland-dependent species. This is a listed noxious weed species in Alaska.

Distribution: Native to Eurasia, but introduced nearly worldwide. Recently escaped cultivation in the interior boreal ecoregion (near Anchorage); intensive removal and monitoring efforts are underway to prevent further spread.

Habitat: Marshes, lake shores, ponds, stream banks, and ditches. Occasionally grows in upland areas.

May be confused with: Fireweed (*Chamerion angustifolium*), a perennial herb that inhabits dry, often disturbed sites such as clear-cuts and roadsides. Fireweed flowers have 4 rounded petals. Also confused with hardhack (*Spiraea douglasii*), which is a native woody shrub rather than a perennial herb. Neither of these species have square stems.



- INVASIVE -
Report this plant!

Russ Jolley



Lythrum salicaria

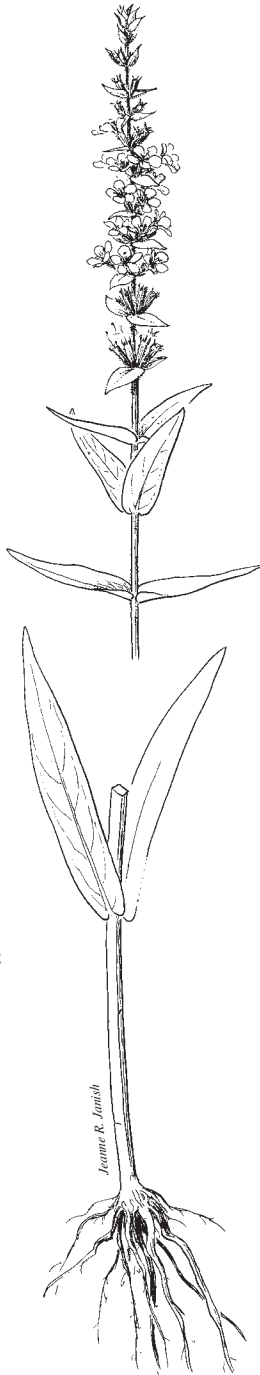
Lynnda Moore



Lythrum salicaria

1/2

Jeanne R. Jamish



Lythrum salicaria
(purple loosestrife)

Species: *Menyanthes trifoliata* L., buckbean, bogbean

Family: Menyanthaceae

The somewhat bean-like, three-lobed leaves held above the water by long, fleshy stalks make buckbean relatively easy to identify. During summer, buckbean produces spikes of showy pink or white tubular flowers with distinctively fringed petals. The flowers' rank smell attracts flies and beetles, as well as bees, for pollination. This medium-sized plant commonly sprawls with sphagnum moss in shallow acidic waters of bogs or in freshwater lakes.

Leaf: Large, alternately arranged leaves have 3 oblong to oval, smooth-edged or slightly toothed leaflets (2-12 cm long and 1-5 cm wide). Leaves arise on long stalks (5-30 cm) from the plant base. Winglike appendages (stipules) are found at the base of the leaf stalks.

Stem: Stems run horizontally as spongy thick rhizomes, either on boggy soil or sprawling near the water surface. Old leaf bases are often visible.

Flower: White or pink-tinged flowers are funnel-shaped with 5 fringed petals and 5 sepals. They are arranged in spikes of 10-20 flowers on leafless stalks 20-40 cm long.

Fruit: Capsule contains many shiny yellow-brown buoyant seeds.

Root: Thick and somewhat spongy roots arise from rhizomes and may be hanging in the water.

Propagation: Seeds and creeping rhizomes.

Importance of Plant: Buckbean had many historical medicinal uses by Native Americans and Europeans, and it is still used by modern herbalists. Some Native Americans used it as an emergency food supply. Occasionally sold as an ornamental pond plant. Leaves sometimes used as a hops substitute for brewing beer.

Distribution: Temperate Northern Hemisphere. All ecoregions of Alaska.

Habitat: Ponds, bogs, wet meadows, seeps, and lake margins. Neutral to acidic water, often growing with sphagnum moss.

May be confused with: When in bloom, buckbean is unlikely to be confused with other Northwest aquatic plants. Leaves could be confused with purple marsh locks (*Comarum palustre*), which usually has more than 3 distinctly toothed leaflets per leaf. Deercabbage (*Nephrrophyllidium crista-galli*), a related species with heart or kidney-shaped leaves, is found on the Kenai Peninsula and the southeastern and south central regions of Alaska.



Grace Patrick

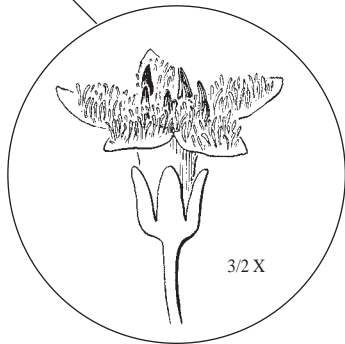


Menyanthes trifoliata



Jeanne R. Jansh

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3/2 X

Menyanthes trifoliata
(buckbean, bogbean)

Species: *Myrica gale* L. (Synonym: *Gale palustris* Chev.), sweetgale

Family: Myricaceae

Sweetgale is a perennial native deciduous shrub common in bogs and along the edges of streams and lakes. Its pleasantly fragrant leaves and stems have been used medicinally, as a beer flavoring, and as an insect repellent.

Leaf: Leathery leaves, widest toward the tip, which is usually rounded and has small serrations along the margin; 1.5-6.5 cm long and 0.5-1.5 cm wide. Top leaf surface blue-green to dark-green, bottom leaf surface pale green; smooth to hairy with irregular yellow to orange glands dotting the surface.

Stem: Highly branched, growing 1-1.5 m tall. Branches purple, reddish-brown to black and with brownish-yellow glands.

Flower: Greenish-yellow to red catkins form before leaves emerge, on year-old, bare wood in late spring to early summer. Flowers are unisexual with male (staminate) flowers, 6-10 mm long, and female (pistillate) flowers, 7-10 mm long, mostly found on separate plants.

Fruit: Beaked nutlets (2-3 mm) which are compressed and enclosed at the base by buoyant, spongy small bracts.

Root: Rhizomes contain nitrogen-fixing nodules.

Propagation: Seed and rhizomes.

Importance of Plant: Used for as an ornamental plant and for teas, scented wax, flavoring beer, repelling insects and various medicinal purposes. Provides cover and food for some songbirds; stems favored by beaver.

Distribution: Higher latitudes of the northern and western Europe as well as North America. In Alaska, found in all ecoregions south of the Brooks Range

Habitat: Found in bogs, fens, swamps and upper reaches of salt marshes.

May be confused with: Willows (*Salix* spp.) which have alternate, rather than spirally, arranged leaves that often bear very obvious stipules at the leaf base.





Myrica gale



Myrica gale
(sweetgale)

Species: *Calamagrostis canadensis* (Michx.) Beauv., bluejoint, bluejoint reedgrass
Family: Poaceae

Bluejoint is a tall, clump-forming, grass native to Alaska and much of North America. Quick to colonize in a wide variety of habitats, bluejoint is a long-lived perennial valued for its ability to stabilize soils and provide forage to large game and waterfowl.

Leaf: Blue-green leaf blades are smooth to rough, without hairs; up to 30 cm long, and 3-8 mm wide.

Stem: The stem is unbranched, smooth and erect to slightly nodding, with distinctly blue joints; 1-2 m tall.

Flower: Each flower group (spikelet) has a single flower. Many spikelets, each 40-45 mm long, are arranged in a panicle, up to 10-25 cm long. Panicles are variable in form - open to dense; they appear purple-tinted when younger and mature to a tan color. Blooms June through August.

Fruit: Dry and smooth, yellow brown; approximately 1-1.5 mm long.

Root: Rhizomes are extensive, fibrous, and shallow.

Propagation: Seeds and rhizomes.

Importance of plant: This widespread native species serves as forage for big game, such as bison, deer, and elk as well as livestock and some waterfowl. Bluejoint's strong rhizomes provide bank stabilization, making a valuable component for revegetation projects. Occasionally considered weedy since it grows rapidly and can exclude other desirable vegetation.

Distribution: Native to North America in all but the extreme southeastern U.S. and Mexico. Widely distributed throughout all ecoregions in Alaska.

Habitat: Wet meadows, pastures, lakes margins, and ditches. Prefers moist soils, but drought resistant once established.

May be confused with: Other native shoreline grasses, such as American managrace (*Glyceria grandis*), which has bright green leaves and 4-7 flowers in each spikelet; tall fescue (*Festuca arundinacea*), which does not form rhizomes. Similar non-natives include: reed canarygrass (*Phalaris arundinacea*) which has distinctly reddish rhizomes and a one-sided panicle; and orchardgrass (*Dactylis glomerata*), which has flower clusters attached to only one side of the flowering stems, is not rhizomatous and usually grows on dryer sites.



Clayton Antieau



Calamagrostis canadensis

University of Tennessee Herbarium, Knoxville



C. canadensis spikelets

Jamie Fenneman



C. canadensis inflorescence

Calamagrostis canadensis
(bluejoint, bluejoint reedgrass)

Species: *Phalaris arundinacea* L., reed canarygrass

Family: Poaceae

Reed canarygrass is a tall, coarse looking, perennial grass that commonly forms extensive single-species stands along the margins of lakes and streams and in wet open areas. Stems can reach two meters in height. Leaf blades are blue-green when fresh and straw-colored when dry. Flowers are borne on the stem high above the leaves and are pinkish at full bloom. Some populations from remote regions of Alaska may be native while others, often associated with human disturbances, are considered introduced and invasive.

Leaf: Flat, blue-green leaves are rough to the touch, to 30 cm long, and relatively wide (to 17 mm).

Stem: The hollow round stem is covered with a waxy coating and is up to 1 cm in diameter.

Flower: Each flower group (spikelet) has 3 flowers. These spikelets are located in dense clusters that are 2-40 cm long and to 11 cm wide. Blooms June through August.

Fruit: Dry and one-seeded, with a conspicuously glossy tan surface; 1.5-2 mm long and less than 1 mm wide.

Root: Long and fibrous. Emerging from the nodes of long, stout, scaly, pinkish rhizomes.

Propagation: Seeds and rhizomes.

Importance of plant: Introduced as for forage and soil stabilization, but now invasive in wetlands, where it out-competes native species. Dense stands cause flooding in streams and ditches. Eaten by only a few wildlife species, it grows too densely to be used as cover for waterfowl. A major pollen contributor during allergy season.

Distribution: Native to Eurasia. Introduced to North America in all but the extreme southeastern U.S. and Mexico. Scattered populations known in Alaska's south coastal and interior boreal ecoregions.

Habitat: Wet meadows, marshes, pastures, lakes margins, and ditches. Tolerates short-term flooding.

May be confused with: Other shoreline grasses, such as American mannagrass (*Glyceria grandis*), which has less dense and more open diffuse flower clusters; tall fescue (*Festuca arundinacea*), which has narrower leaves (4 to 10 mm wide) and a non-rhizomatous habit; and the introduced orchardgrass (*Dactylis glomerata*), which has flower clusters attached to only one side of the flowering stems, is not rhizomatous and usually grows on dryer sites.



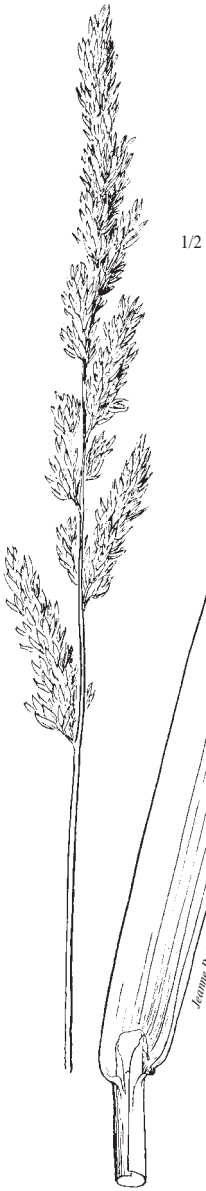
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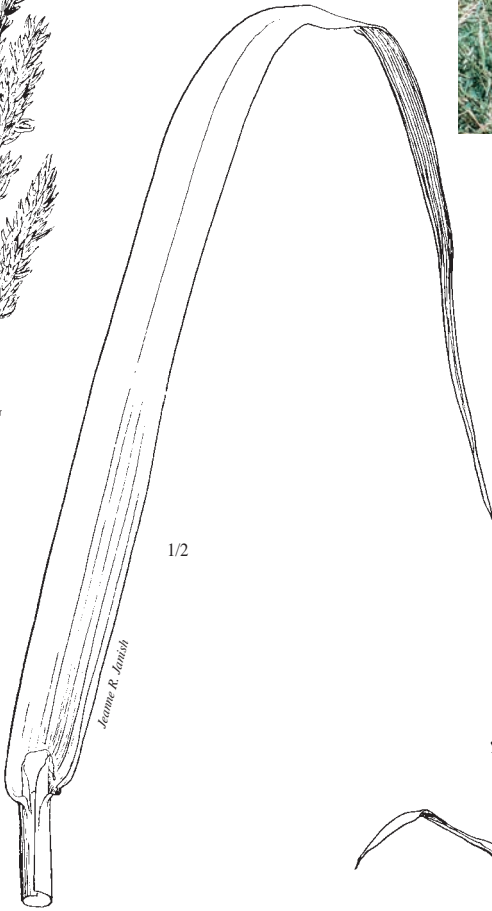
Christopher W. Wright



Phalaris arundinacea



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1/2

Lynne R. Jansh



1/2

Phalaris arundinacea
(reed canarygrass)

Species: *Polygonum amphibium* L. (Synonym: *Persicaria amphibia*), water smartweed
Polygonum persicaria L. (Synonyms: *Persicaria maculosa* Gray), spotted
ladysthumb
Family: Polygonaceae

The native, perennial water smartweed and the introduced, annual spotted ladysthumb are sprawling to erect herbaceous plants with willow-like leaves and clusters of small flowers. Flower clusters of water smartweed are compact and oblong, while spotted ladysthumb flowers are cylindrical. Water smartweed may form mats along lake margins; spotted ladysthumb is more common in areas with natural or human-caused disturbance is considered a nuisance species in other areas of the United States.

Leaf: Alternate, floating or upright with papery sheaths (stipules) at the base. Water smartweed: Large shiny leaves (less than 35 cm long, 6 cm wide, but commonly smaller) with a rounded or pointed tip; leaf stalk < 7 cm long. Spotted: 3-10 cm long, narrowly lance-like, tapering to a sharp point, often with a purple blotch mid-leaf; leaf stalks < 0.8 cm.

Stem: Water smartweed: Jointed, stout (to 1 cm diameter) often reddish sprawling above ground stem, usually lying flat but sometimes erect; up to 2 m long. Spotted: Arising singular or branched from taproot, 30-100 cm long.

Flower: Small, 5-lobed flowers. Water smartweed: pink flowers, 4-5 mm long, forming 1 to 2 terminal compact, oblong clusters (10-150 mm long, 8-20 mm wide). Spotted: pink, purple (rarely white) flowers, 1.5-3.5 mm long, form numerous terminal or axillary cylindric spikes (10-45 mm long, 7-12 mm wide)

Fruit: Dry, hard, shiny brown achene contains one seed. Water smartweed: 2.5-3 mm, round and flattened. Spotted: 2-3 mm, three-sided or rounded.

Root: Water smartweed: Fibrous, arising from rhizomes and stem joints in contact with ground or water. Spotted: Tap-rooted

Propagation: Seeds; roots from trailing stems.

Importance of Plant: Seeds provide food for waterfowl and other birds. Important medicinal plants, especially water smartweed, which was used as an antiseptic and as a poisoning cure.

Distribution: Found nearly worldwide. In Alaska, water smartweed is found mostly in the interior boreal ecoregion, with scattered populations elsewhere; Spotted ladysthumb has been recorded in in Alaska's south coastal and interior boreal ecoregions.

Habitat: margins of lakes, ponds, and streams. Water smartweed: also in deeper water, sometimes forming extensive mats. Spotted: commonly in disturbed areas, including gardens, fields, or roadsides.

May be confused with: Other plants lack the swollen joints and sheathing stipules of smartweed. However, there are many other *Polygonum* species in Alaska, some of which may grow in wet conditions. Refer to technical keys to be sure of species.



- INVASIVE -
Report this plant!
(*P. persicaria*
only)



Polygonum amphibium
(water smartweed)

Ross Jolley

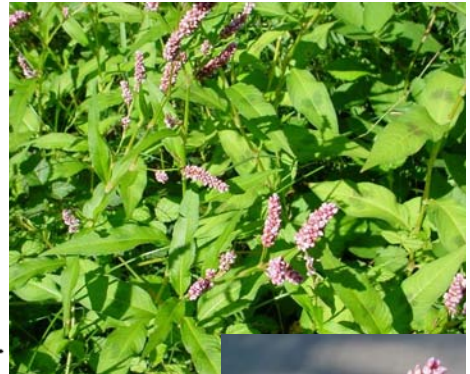


Polygonum amphibium



Polygonum persicaria
(spotted smartweed)

Richard Old, www.xidbervices.com



Polygonum persicaria



Species: *Ranunculus repens* L. (Synonym: *R. repens* var. *degeneratus*, *R. repens* var. *erectus* and others), creeping buttercup

Family: Ranunculaceae

Creeping buttercup is a non-native, herbaceous perennial that roots at nodes as its stolons creep along the ground and form large, dense patches. This species was likely introduced as an ornamental plant and easily establishes across variable conditions, producing conspicuous, yellow flowers.

Leaf: Alternate, compound deep green, hairy (sometimes smooth) leaves, divided into three 3-lobed, triangular to egg-shaped leaflets; margins are coarse to irregularly serrated. Upper surface of basal leaves often have scattered pale silver markings. Leaves up to 10 cm wide; leaf stalks up to 15 cm.

Stem: Creeping, hairy stolons up to 50-100 cm long.

Flower: Glossy or waxy looking petals (5-9 per flower; 8-15 mm long) are bright golden-yellow. Flowers 10-35 mm in diameter, atop long stalks. Blooms May to early August.

Fruit: Globe-shaped heads contain a cluster of 12 to 50 achenes, each is 2.5-3.5 mm long, slightly hairy, and with a short curved-tipped beak (0.7-1.2 mm long).

Root: Slender, fibrous roots at basal portion of plant and at adventitious roots at nodes along the stolon.

Propagation: Stolons, rhizomes and seed.

Importance of Plant: Previously used as an ornamental and may serve as a food source for geese and other birds. Increasingly recognized as an invasive which may out-compete native plants

Distribution: Native to Eurasia; introduced and naturalized in New Zealand, Australia, southern Africa, and in North, Central and South America. Documented in Alaska's south coastal and arctic alpine ecoregions.

Habitat: Common weed in gardens, lawns, pastures and other disturbed ground; prefers moist to wet soils and freely grows at the edges of ponds, rivers, alder forests and ditches. Tolerant of mildly saline conditions, sometimes at beaches and in salt marshes.

May be confused with: Generally, *R. repens* can be distinguished from other buttercups by its horizontal habit, rooting nodes and large petals. May be mistaken for largeleaf avens (*Geum macrophyllum*) which has leaflets along the length of the leaf stalks, lacks pale silver markings on the leaf surface and has a tall flower stalk. Tall buttercup (*Ranunculus acris*) is another introduced species known scattered locations across the South-Coastal region of Alaska, but is taller than *R. repens* and has deeply lobed leaves.



- INVASIVE -
Report this plant!

Merel R. Black, University of Wisconsin-Madison

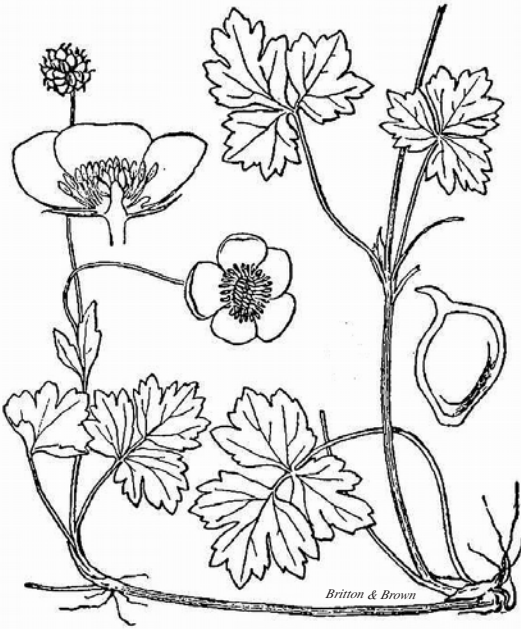


Ranunculus repens

Steve Hirst



Ranunculus repens seeds



Ranunculus repens
(creeping buttercup)

Species: *Comarum palustre* L. (Synonym: *Potentilla palustris* (L.) Scop.), purple marshlocks, marsh cinquefoil

Family: Rosaceae

Purple marshlocks is a low-growing, sprawling, emergent perennial with reddish trailing stems and reddish-purple flowers. Flowers produce a foul odor that attracts flies for pollination. Plant stems can be as much as 1 m long, with 3-7 leaflets per leaf. Leaves and upper part of the stem are often hairy, although individual plants vary in the amount of leaf hair. Purple marshlocks is common from sea level to subalpine zones, and usually grows as an open sprawling mat along the water's edge.

Leaf: The compound leaf is composed of 3-7 sharply toothed leaflets on a long leaf stalk that forms a sheath around the stem. Leaflets are typically 2-8 cm long, smooth and light green on the upper surface, and covered with short, stiff, white hairs on the under surface. Leaflets have a pinnate to subpalmate arrangement (see glossary for definitions).

Stem: The up to 1 m long stem (stolon) is usually reddish and floats in shallow water or sprawls along the shoreline. The upper part of the stem rises above the water surface 20-50 cm, is frequently hairy, and supports flowers.

Flower: The flower is 1.2-2.4 cm across and has 5 deep red petals (2-6 mm long) that turn purple late in summer. The 5 reddish sepals are much longer than the petals. Blooms June through August.

Fruit: Purple marshlocks has smooth, brownish-purple, clustered egg-shaped achenes, about 1.5 mm long.

Root: Roots from the nodes of stolons.

Propagation: Seeds and stolons.

Importance of plant: Leaves and seeds are eaten by browsing animals and waterfowl. Roots were used by Native Americans as a medicinal plant for dysentery and stomach cramps.

Distribution: Northern North America; widely distributed throughout all ecoregions of Alaska.

Habitat: Purple marshlocks grows in bogs, marshes, wet meadows, creek banks, and lake margins. It is always associated with fresh, non-brackish water.

May be confused with: Pacific silverweed (*Argentina egedii* ssp. *egedii*) or silverweed cinquefoil (*Argentina anserina*), both of which have cream-colored to yellow flowers and are tolerant of brackish water.



Clayton Antleau

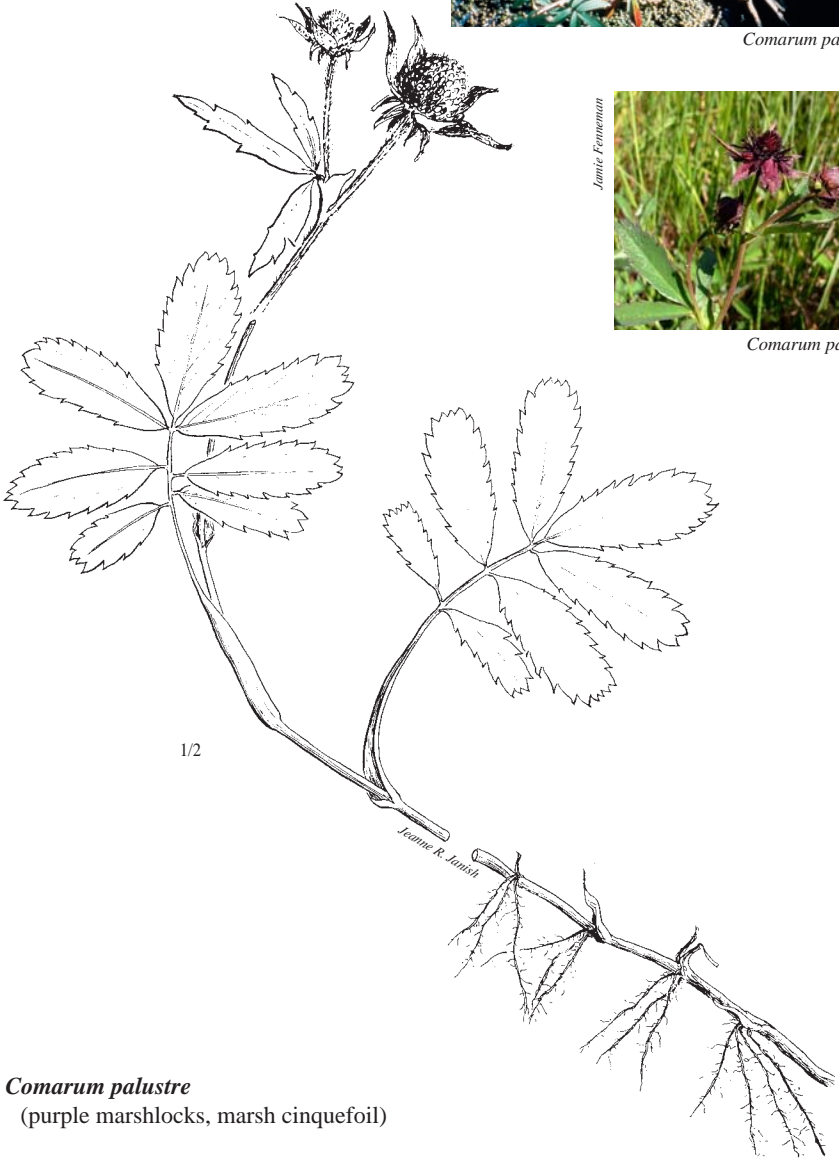


Comarum palustre

Jamie Fenneman



Comarum palustre



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Jeanne R. Jansish

Comarum palustre
(purple marshlocks, marsh cinquefoil)

Species: *Typha latifolia* L., broadleaf cattail

Family: Rosaceae

Broadleaf cattail forms dense stands in areas with shallow or seasonal water; in areas with deeper water, this tall emergent perennial may grow in narrow bands along the shore. Its distinctive flower structure consists of many individual flowers, clustered into a dense sausage-shaped spike that forms atop a single stem.

Leaf: Basal, erect flat leaves are 6 - 30 mm wide and 1-3 meters tall; “D” shaped in cross-section and pale greyish-green. Many leaves arise from each shoot, but typically do not extend above the flowering spike.

Stem: Round, stout and unbranched; 1 - 2 cm wide at middle and tapering towards the spike base; typically equal or slightly taller than leaves.

Flower: Dense cylindrical spike (spadix) at terminal end of tall stem; green when young and maturing to a dark brown or reddish brown. Male flowers positioned above female flowers, with no (or a small) gap between them. Flowers form May-June.

Fruit: Small, tufted nutlet (up to 1 cm long) with bristly hairs that aid in wind dispersal.

Root: Thick, long rhizomes; 0.6 to 3 cm diameter grow as deep as 10 cm below the surface.

Propagation: Produces prolific amounts of viable seed which may be moved by wind, water or in soil; vegetative reproduction from clone expansion and rhizome fragments.

Importance of plant: The many human uses of cattail include: as a food source (pollen, rhizomes and young shoots or spikes); woven into mats for roofs, bedding, chairs and hats; used for torches and tinder; and as a stuffing for pillows and diapers. Cattails also provide important food and cover for wildlife, including deer, muskrats, geese and other birds.

Distribution: Widespread through much of North America, Europe, Asia and Africa; in Alaska, known in the interior boreal and south coastal ecoregions.

Habitat: Wetland soils that are saturated or flooded during the growing season; common in marshes, meadows, pond/lake margins, roadside ditches and backwaters of streams.

May be confused with: Other species of *Typha*, none of which are known in Alaska. May be confused for larger species of ornamental iris, such as the non-native yellowflag iris (*Iris pseudacorus*) which has shorter, broader leaves and bright yellow flowers. Sweetflag (*Acorus americanus*) is pink to red near the leaf base, with 2-6 major leaf veins and a shorter spadix.

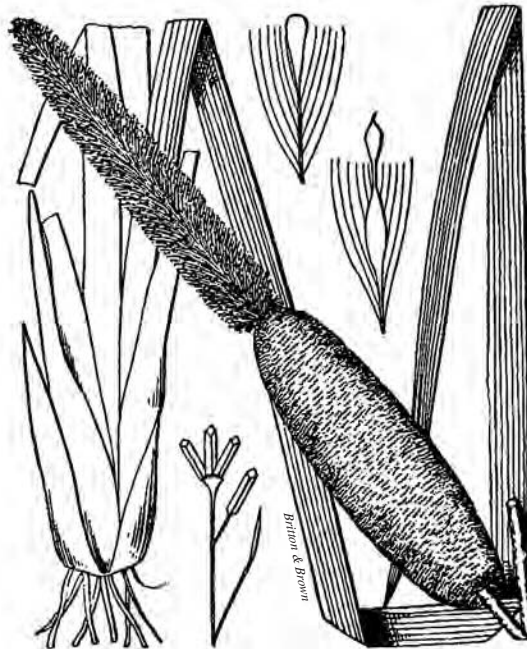


Leslie Bliss-Kerchum



Typha latifolia

Leslie Bliss-Kerchum



Typha latifolia
(broadleaf cattail)

Species: *Sparganium angustifolium* Michx (Synonym: *Sparganium multipedunculatum*)
narrowleaf bur-reed

Family: Sparganiaceae

Round, bur-like flower heads and strap-like leaves distinguish bur-reeds. Spiny flower heads grow on the sides of flowering stems that bend at each point of attachment giving them a zigzag appearance. Narrow leaf bur-reed is highly variable with leaves ranging from ribbon-like underwater or floating leaves to stiff emergent leaves.

Leaf: Long, narrow leaves grow 2-8 mm wide and 20-80 cm in length (sometimes up to 120 cm); alternately arranged with parallel veins and spongy toward the base; submersed, floating or sometimes emergent.

Stem: Submersed, floating, or emergent 1-2 m long; usually not branched; emergent growth 30-40 cm tall.

Flower: Floating or emergent on slender, round stems. 2-5 small male flower heads are located above the 2-4 female heads. Female flower heads are spiny, round balls that turn from green to brown as they mature and are usually on short stalks. Blooms July to August at higher latitudes.

Fruit: Spiny brown balls holding clusters of hard, dry 1-seeded achenes (3-5.5 mm) that are often constricted at the middle, red to brown in color and with a pointed beak (2 mm).

Root: Rhizome partially or fully underground.

Propagation: Rhizomes, seeds.

Importance of Plant: Excellent food and habitat for waterfowl and wildlife. Stem base and tubers are edible.

Distribution: Widespread in Northern Hemisphere; in Alaska, scattered populations documented in the interior boreal and south coastal ecoregions.

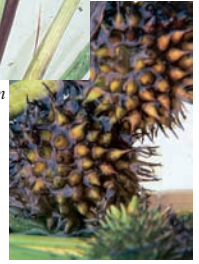
Habitat: Water up to 2.5 m deep in streams, lake margins and ditches.

May be confused with: Flower characteristics and seed shape are most helpful to distinguish between other bur-reed species. Submersed leaves of duck potatoes (*Sagittaria* spp.) or water plantains (*Alisma* spp.), but leaves of these 2 groups all arise from the plant base. Small bur-reed (*S. natans*), which is smaller with only 1 male flower head, and floating bur-reed (*S. fluctuans*), which has a strongly curved beak on the achene. Emergent leaves of bur-reed could be confused with immature cattail (*Typha* spp.) if not blooming.





Sparganium angustifolium



Sparganium angustifolium
(narrowleaf bur-reed)

Species: *Sparganium hyperboreum* Laestad., northern bur-reed
Sparganium natans L. (Synonym: *Sparganium minimum*), small bur-reed
Family: Sparganiaceae

Round, bur-like flower heads and strap-like leaves distinguish bur-reeds. Spiny flower heads grow on the sides of flowering stems that bend at each point of attachment giving them a zigzag appearance. Northern bur-reed and small bur-reed both have slender grass-like leaves. Their leaves, stems and flowers are typically found floating at the water surface, but will grow upright if stranded on the shoreline. Small bur-reed has thinner leaves that are often more translucent and less yellowish than northern bur-reed.

Leaf: Limp, long, narrow leaves, alternately arranged with parallel veins and spongy toward the base; yellowish color. Northern: floating, sometimes emergent, 10-80 cm long, 1-5 cm wide. Small: floating, 40-60 cm long, 2-8 cm wide.

Stem: Typically floating. Northern: sometimes submerged or emergent; to 1 m long; usually not branched. Small: 0.2-0.6 m long.

Flower: Emergent on slender, round stems. Female flower heads are spiny, round balls that turn from green to brown as they mature. Small male flower heads are located above female heads. Blooms July to August at higher latitudes. Northern: 1-4 female flower heads, lower female flower heads usually on long stalks; 1 (rarely 2) male flower heads. Small: 1-3 female flower heads; just 1 male flower head, usually unstalked.

Fruit: Spiny brown balls holding clusters of hard, dry 1-seeded achenes. Northern: brown to yellowish, 2-5 mm long, no beak or small beak (<0.5 mm). Small: dark green to brown, 2-4 mm long, with curved beak (0.5-1.5 mm), often constricted at the middle.

Root: Rhizome partially or fully underground.

Propagation: Rhizomes, seeds.

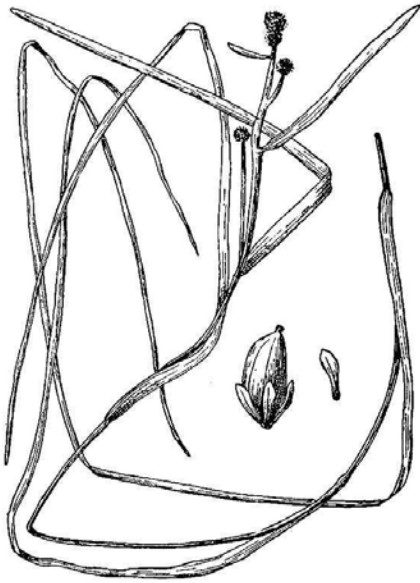
Importance of Plant: Excellent food and habitat for waterfowl and wildlife. Stem base and tubers are edible. Native Americans used giant bur-reed for medicinal purposes.

Distribution: Both are circumboreal species. Known in all ecoregions of Alaska.

Habitat: Shallow water (sometimes up to 0.6 m deep) including ponds, lake shores and slow-moving streams.

May be confused with: Flower characteristics and seed shape are most helpful to distinguish between other bur-reed species. Submersed leaves of duck potatoes (*Sagittaria* spp) or water plantains (*Alisma* spp.), but leaves of these 2 groups all arise from the plant base, rather than off the stem.





Alexey Shiganov



Sparganium hyperboreum

Sparganium hyperboreum
(northern bur-reed)

Jamie Finneman



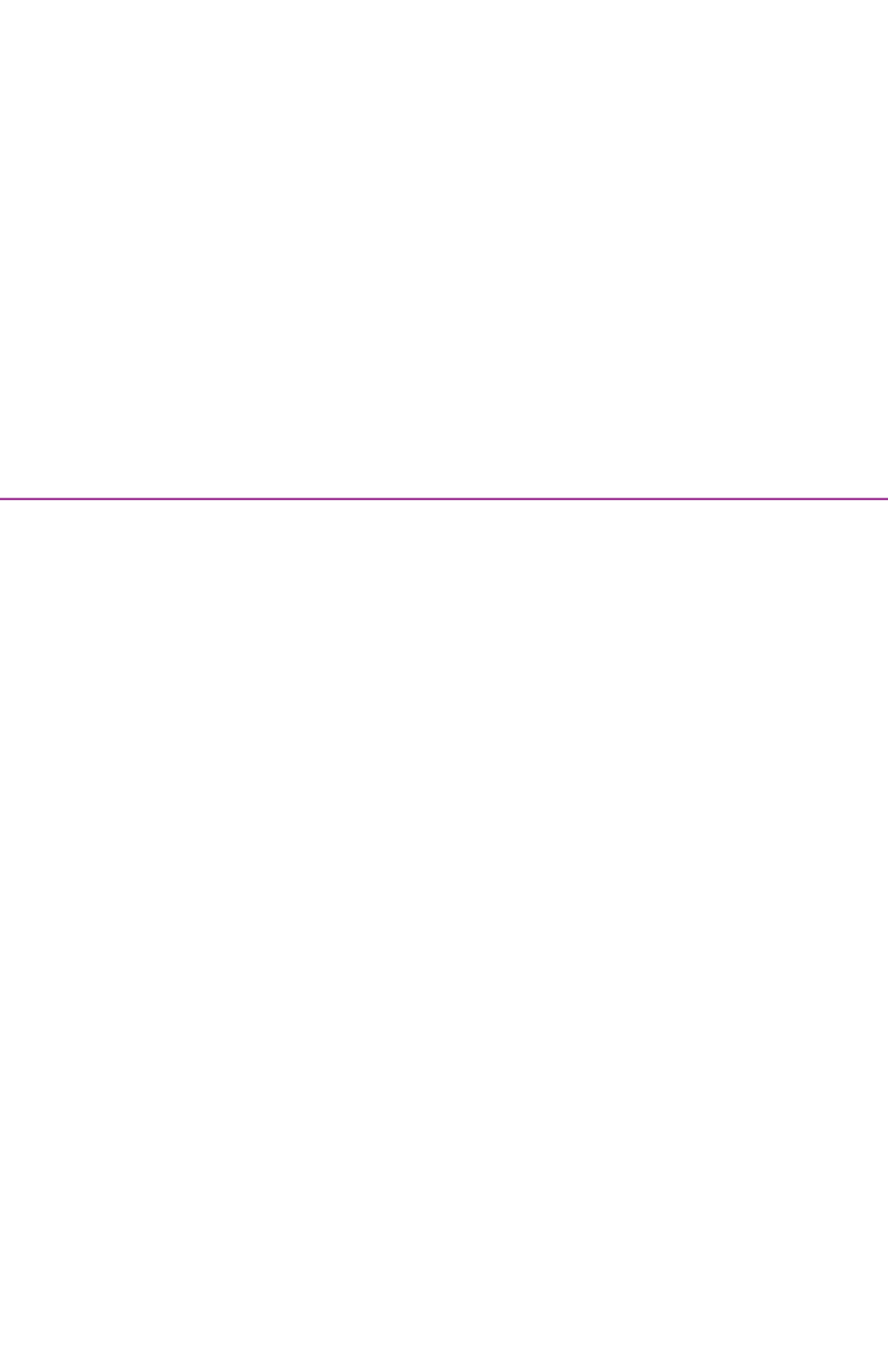
S. natans

Sparganium natans
(small bur-reed)

Jamie Finneman



S. natans fruit



CHAPTER 2

FLOATING LEAVED
ROOTED PLANTS

Species: *Brasenia schreberi* Gmel. water-shield, dollar bonnet, water target

Family: Cabombaceae

Water-shield is identified by the long, reddish leaf stalks that are attached to the centers of floating oval leaves, giving them an umbrella-like appearance. A thick gelatinous coating covers the young stems, buds, and undersides of leaves. Water-shield flowers are small, purplish, and rise slightly above the water, but are not particularly showy. Some taxonomists consider water-shield to be in the waterlily family (*Nymphaeaceae*) due to the floating leaves and lily-like flowers.

Leaf: Oval leaves (4-12 cm long and 3-8 cm wide) float on the water surface. The leaves have purple undersides with long, centrally attached leaf stalks up to 2 m long. A slimy gelatinous substance usually covers the stalks and underside of young leaves and stems.

Stem: Arise from submersed, branching, reddish creeping rhizomes.

Flower: The 5-20 cm long flower stalks each bear a single purplish flower with 3 sepals and 3 (4) similar-looking petals. Each flower measures up to 2.5 cm across and is elevated slightly above the water surface. Blooms May to September.

Fruit: Each flower produces 4-18 separate narrowly egg-shaped, leathery fruits between 6-8 mm long. Each fruit usually contains 2 seeds. They ripen underwater and decay to release seeds.

Root: Slender, branched, creeping rhizomes.

Propagation: Rhizomes, seeds and winter buds.

Importance of plant: The rhizomes and leaves have been used for food and medicinal purposes by Native Americans. The Japanese use young leaves and stems in salads. Provides habitat for fish and aquatic insects; seeds and vegetation are eaten by waterfowl.

Distribution: Throughout most of the U.S., including south coastal portions of Alaska, and southern Canada. Also occurs in Central America, Cuba, Africa, East Asia, and Australia.

Habitat: Shallow ponds, lakes, and slow-moving streams. It grows in water 0.5-3 m deep.

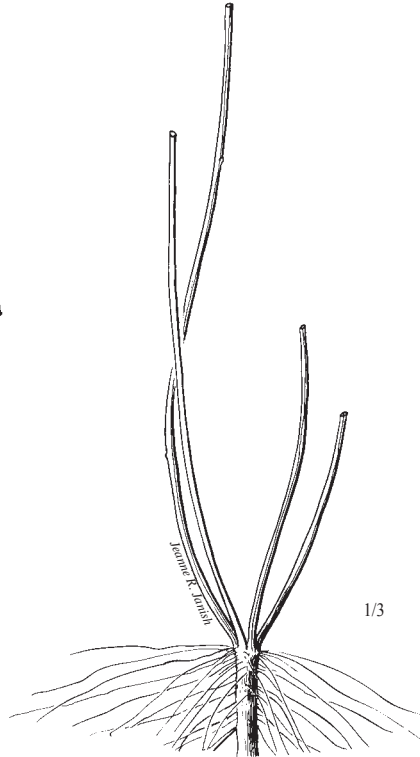
May be confused with: Fragrant waterlily (*Nymphaea odorata*), or some floating-leaved pondweeds (*Potamogeton* spp.), but only water-shield is covered by a slimy coating with the stem attached at the center of an oval leaf. Water-lilies have showy white or pink flowers and leaves cleft to the stalk. Floating-leaved pondweeds have the stem attached at the leaf edge.



Grace Patrick



Brasenia schreberi



Brasenia schreberi
(water-shield, dollar bonnet, water target)

Species: *Nymphoides peltata* (S. Gmelin.) Kuntze, yellow floating-heart, water fringe

Family: Menyanthaceae

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 surface. A native to Europe, yellow floating-heart has been introduced widely as an ornamental pond plant in the U.S. and Canada and could potentially establish in southern coastal regions of Alaska.

Leaf: The heart-shaped leaves are 3 to 10 cm across and alternately arranged on the stems or oppositely arranged on the flower stalks. The leaves float on the water surface, have slightly wavy margins, and frequently have purplish undersides.

Stem: The rope-like stem grows partly underground or along the sediment surface (stolons).

Flower: Two to five flowers arise from erect flower stalks. The bright yellow flowers are 3-4 cm in diameter. Each flower has five petals arranged like the spokes of a wheel. Each petal has a distinctive fringe along the edges.

Fruit: The fruit is a long, beaked capsule (to 2.5 cm) that splits on one side. One fruit is produced from each flower. Each fruit contains few to many smooth, shiny seeds with wing-like margins.

Root: Short, thick clusters of roots originate from modified stems (rhizomes) growing partly or completely below the sediment.

Propagation: Yellow floating-heart spreads by water-dispersed seeds and by stolons. Broken-off leaves with part of a stem will also form new plants.

Importance of plant: Yellow floating-heart is a popular water garden plant, but a potential weed when introduced to the wild.

Distribution: Native to Eurasia, the Mediterranean area, and introduced to North America, including eastern Canadian provinces and northeastern, midwestern, and northwestern states.

Not currently known in Alaska.

Habitat: Slow-moving rivers, lakes, reservoirs, and ponds.

May be confused with: Pond-lilies (*Nuphar* spp.), which have much larger leaves and cup-like yellow flowers without fringed petals. Water shield (*Brasenia schreberi*), which has small, oval, floating leaves often with a jelly-like covering on the undersides and small purple flowers. Also other species of *Nymphoides* (*N. aquatica* and *N. cordatum*), which are sold as ornamental plants.

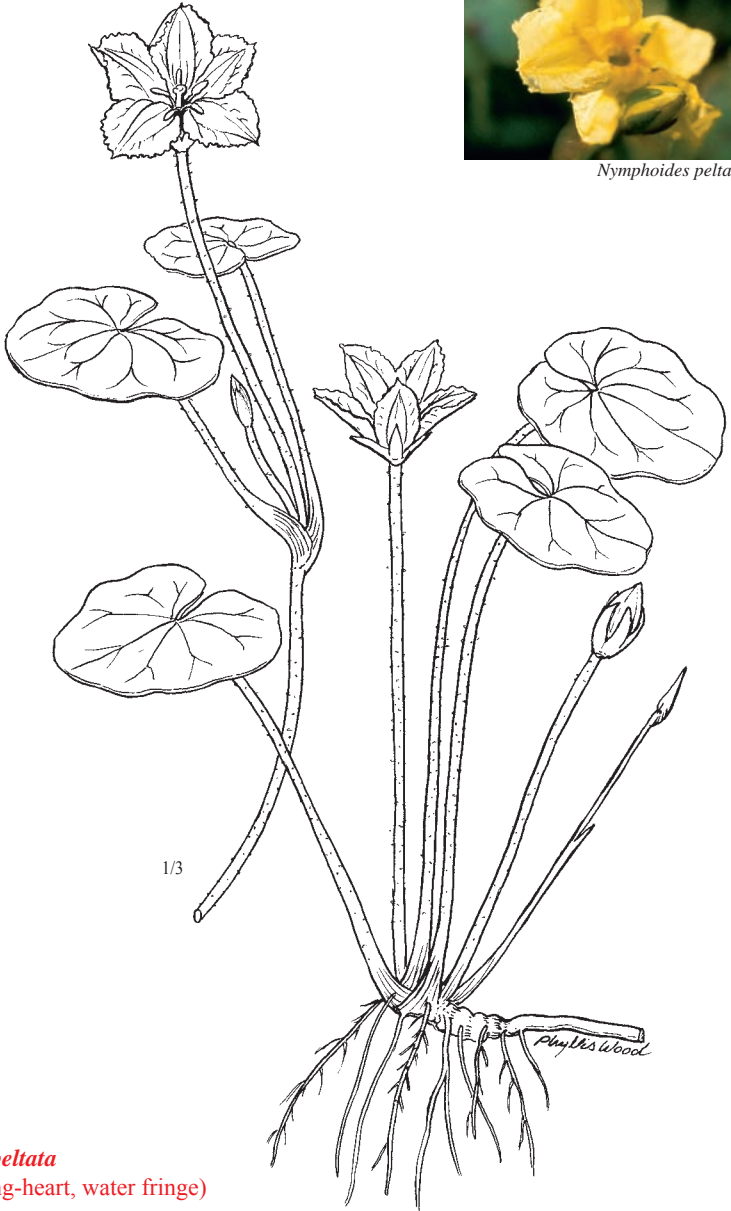


- INVASIVE -

Report this plant!



Nymphoides peltata



Nymphoides peltata
(yellow floating-heart, water fringe)

Species: *Nuphar lutea* ssp. *polysepala* (Engelm.) E.O. Beal
(Synonym: *Nuphar polysepala* Engelm.), yellow pond-lily, Rocky Mountain pond-lily, spatterdock
Family: Nymphaeaceae

Yellow pond-lily is a perennial waterlily-like plant that can form extensive stands in shallow waters of lakes and ponds. When mature, yellow pond-lily has large elephant-ear-shaped leaves and yellow flowers. Unlike the showy, many-petaled fragrant waterlily flowers, yellow pond-lily blossoms are simple yellow globes that partially open to reveal reddish poppy-like centers. Leaves and flowers float on, or stand above, the water on thick, fleshy stalks.

Leaf: Large (10-45 cm long and 7-30 cm wide) green, heart-shaped leaves have a notched base, blunt tip, prominent midvein, and leathery surface. They rise directly from the rhizome and float on or extend above the water. In early summer, yellow pond-lily has large, delicate underwater leaves that resemble lettuce or cabbage leaves.

Stem: Flower and round leaf stalks arise directly from the rhizome. The green “stems” are actually leaf and flower stalks.

Flower: Waxy and greenish-yellow globes (5-10 cm across) open to form bright yellow cup-shaped flowers that rise above the water. The 6-12 yellow “petals” are actually sepals. *N. lutea* ssp. *polysepala* typically has reddish stamens and 9 sepals. The flowers have a sweet fragrance on the first day the flower is open, but after that the odor is less pleasant. Blooms May to August.

Fruit: One urn-shaped fruit develops from each flower and contains numerous brown seeds (3-5 mm long).

Root: Fibrous roots anchor the massive, scaly, log-like rhizomes to the sediment. The rhizomes are up to 20 cm in diameter and 5 m long.

Propagation: Rhizomes and seeds.

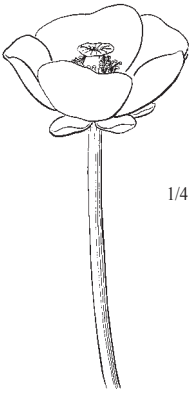
Importance of plant: Food source for mammals and waterfowl and provides spawning habitat for fish. Native Americans used the rhizomes and seeds for food. Used by several cultures for food, dyeing, tanning, and medicinal purposes.

Distribution: Western North America; widely distributed in Alaska’s interior boreal and south coastal ecoregions.

Habitat: Shallow lakes and ponds, sluggish streams, and canals.

May be confused with: White waterlily (*Nymphaea odorata*), which has cleft rounded leaves and showy, many-petaled white or pink flowers. Watershield (*Brasenia schreberi*), which has small, oval leaves with a jelly-like coating on the undersides and inconspicuous purplish flowers. Variegated yellow pondlily (*Nuphar lutea* ssp. *variegata*) is known across much of northern North America, but has not been documented in Alaska; it has yellow stamens, usually 6 sepals, and a flattened leaf stalk.

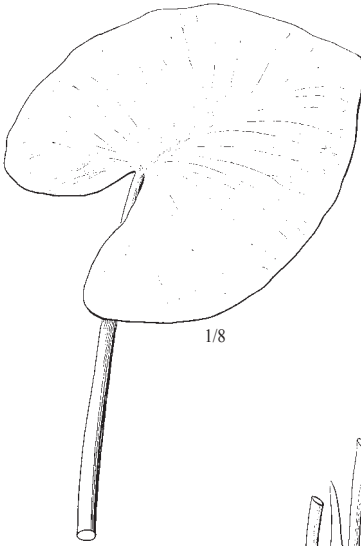




Dana Visaffi



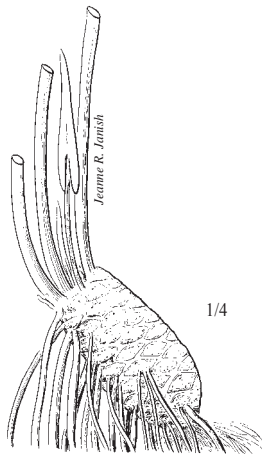
Nuphar lutea ssp. polysepala



Elleen Brown



Nuphar lutea ssp. variegata



Jeanne R. Jamish

Nuphar lutea

(yellow pond-lily, Rocky Mountain pond-lily, spatterdock)

Species: *Nymphaea odorata* ssp. *odorata* Ait., American white waterlily, fragrant waterlily

Family: Nymphaeaceae

American white waterlily is a common ornamental pond plant, native to the eastern U.S. but introduced, both intentionally and through accidental spread from residential ponds, in the Pacific Northwest. The large, round, floating leaves have a distinctive slit on one side. It can be invasive in lakes or bogs with extensive shallow areas. It commonly grows around lake and pond margins and can be recognized by the fragrant white, pink to purple, many-petaled flowers that float on the water surface. Climate comparisons with previously invaded areas suggest it could establish in southern coastal areas of Alaska.

Leaf: The round, smooth, green, leathery leaves are up to 30 cm in diameter and have a slit on one side. The underside is often red or purplish with numerous veins. The leaf stalk is attached to the leaf center at the base of the slit.

Stem: No true upright stem is present. Straight, flexible stalks attach leaves and flowers to thick, submerged rhizomes.

Flower: Large, fragrant flowers, 6-12 cm across, are at the ends of long stalks. The flowers have numerous (20-30) white, pink, or purple petals with yellow centers. After fertilization, the flower stalk curls like a corkscrew, drawing the flower underwater. Blooms June through October.

Fruit: Leathery, berry-like capsules, to 3 cm across, with numerous small seeds (2 mm).

Root: Thick rhizomes, 2-3 cm in diameter.

Propagation: Seeds and rhizomes.

Importance of Plant: Rhizomes and leaves were used by Native Americans in eastern North America as remedies for many ailments from colds to ulcers. The leaves and roots are eaten by beavers, muskrats, porcupines, and deer; the seeds are eaten by waterfowl. It can become a nuisance in shallow lakes. A favorite aquatic garden plant, many varieties have been cultivated.

Distribution: Native to eastern North America, but widely introduced in the Pacific Northwest. In Alaska, one naturalized population has been found in the south coastal ecoregion, near Sitka.

Habitat: Shallow ponds, lakes, bogs and slow streams in water 3-6 feet deep.

May be confused with: The native pygmy waterlily (*Nymphaea tetragona*), which has smaller leaves and flowers, which are only white and have fewer petals. Pond-lilies (*Nuphar* spp.) which have heart-shaped leaves and yellow, cup-shaped flowers. Watershed (*Brasenia schreberi*), which has smaller, slimy-coated leaves and leaf stalks attached to the middle of the leaves. Yellow floating-heart (*Nymphoides peltata*), which has smaller leaves and yellow flowers.

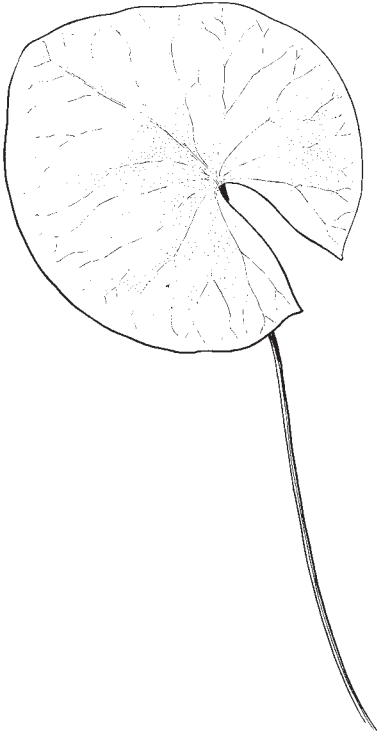


**- INVASIVE -
Report this plant!**

HEC

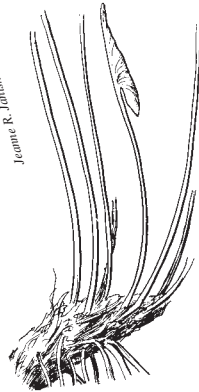


Nymphaea sp.



1/3

Jeanne R. Jantish



Nymphaea odorata ssp. *odorata*
 (American white waterlily, fragrant waterlily)

Species: *Nymphaea tetragona* Georgi, pygmy waterlily

Family: Nymphaeaceae

Pygmy waterlily is a perennial pond plant, native to Northwestern North America. The large, round, floating leaves have a distinctive V-shaped slit on one side. It grows around lake and pond margins and has white many-petaled flowers that float on the water surface.

Leaf: Smooth, leathery leaves (2-11 cm wide, 3-13 cm long) are ovate or heart-shaped with a slit on one side. The topside is green to dull purple and the underside is green; sometimes mottled with reddish or purplish brown on younger leaves. The leaf stalk is attached to the leaf center at the base of the slit.

Stem: No true stem present; straight, flexible stalks attach leaves and flowers to the thick, submerged rhizomes.

Flower: Flowers, 3-7.5 cm across, are at the ends of long stalks. The flowers have numerous (10-17) white petals, equal to the sepals in size and with yellow to orange centers. After fertilization, the flower stalk curls like a corkscrew, drawing the flower underwater. Summer blooming.

Fruit: Leathery, berry-like capsules with numerous small seeds (2-3 mm long, 1-5-2 mm wide).

Root: Thick, unbranched rhizomes.

Propagation: Seeds and rhizomes.

Importance of Plant: Rhizomes and leaves were used by Native Americans as remedies for many ailments including digestive issues and as a general tonic. The leaves and roots are eaten by beavers, muskrats, porcupines, and deer; the seeds are eaten by waterfowl.

Distribution: Circumpolar species with sporadic range across northern North America and Eurasia. In Alaska, found in the central boreal and south coastal ecoregions.

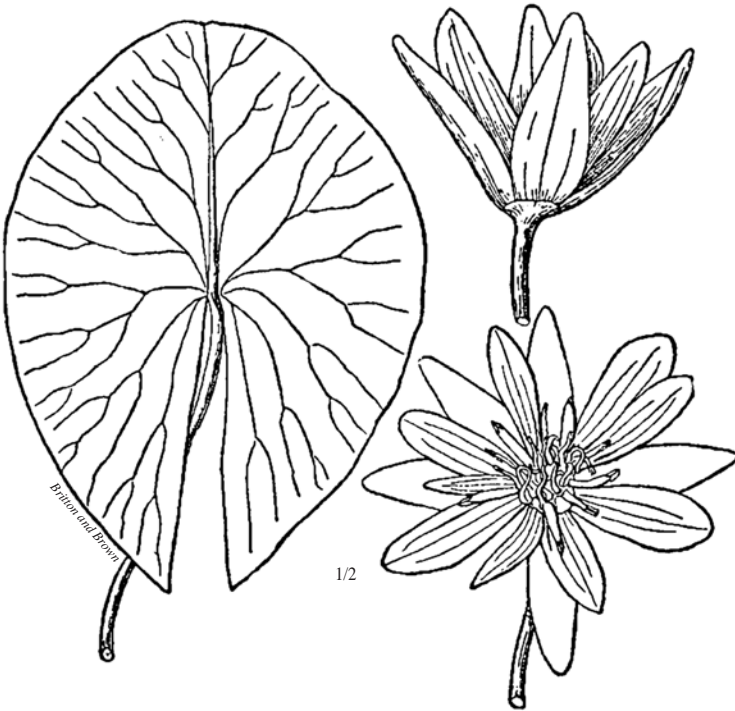
Habitat: Shallow ponds, lakes, bogs and slow streams in water.

May be confused with: American white waterlily (*Nymphaea odorata*) has larger leaves and flowers, often of different colors and with many more petals. Pond-lilies (*Nuphar* spp.), which have yellow, cup-shaped flowers and the lower leaf surface is not as purple. Watershed (*Brasenia schreberi*), which has smaller, slimy-coated leaves and leaf stalks attached to the middle of the leaves. Yellow floating-heart (*Nymphoides peltata*), which has smaller leaves and yellow flowers.





Nymphaea tetragona



Nymphaea tetragona
(pygmy waterlily)

Species: *Potamogeton alpinus* Balbis, alpine pondweed
Potamogeton gramineus L., grass-leaved pondweed
Family: Potamogetonaceae

Alpine and grass-leaved pondweed have both floating and underwater leaves. The underwater leaves of both species are long, fairly narrow, and attach directly to the stem. When present, the floating leaves of alpine pondweed are broader, but are similarly shaped to the underwater leaves, and are attached to the stem by short stalks. The floating leaves of grass-leaved pondweed are oval and on stalks that may be longer than the leaf blades. Grass-leaved pondweed is extremely variable in appearance depending on whether it is growing in deep or shallow water or stranded along shorelines by receding water.

Leaf: Alpine: submersed leaves: reddish, to 20 cm long and 1-2 cm wide, have rounded tips, usually 7 veins, and lack stalks. Transitional leaves are often present. Floating leaves: (often absent) to 6 cm long by 2.5 cm wide and on short stalks. Sheaths (stipules) are free from the leaf base, to 4 cm long, and break apart easily. Grass-leaved: submersed leaves: green-to-reddish, to 13 cm long by 1.2 cm wide, have pointed tips, 3-9 veins and no stalks. Floating leaves: 1.5-7 cm long and 1-3 cm wide and on stalks usually longer than the blades. Sheaths (stipules) to 3 cm long are persistent and free of the leaf base.

Stem: Long, forms rhizomes. Alpine: reddish, few branched. Grass-leaved: many short branches.

Flower: Small, clustered on emergent spikes, each with 4 petal-like lobes. Alpine: spikes to 3.5 cm long on stalks 6-15 cm long. Grass-leaved: spikes to 4 cm long on long stalks to 20 cm.

Fruit: Achene. Alpine: 3.5-4 mm long, sharply ridged back, curved beak. Grass-leaved: 1.5-3 mm, back slightly ridged, straight to slightly curved beak.

Root: Fibrous, from rhizomes. Grass-leaved forms long tubers.

Propagation: Seeds, creeping rhizomes, tubers (grass-leaved only).

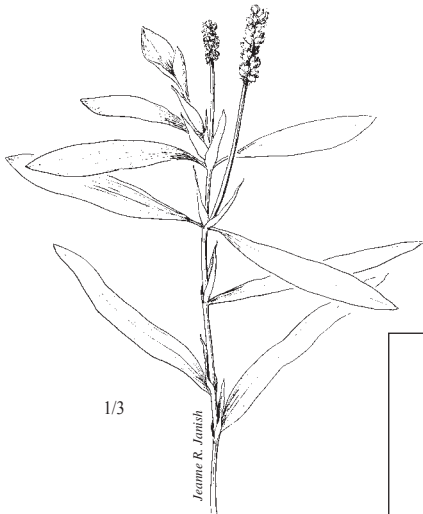
Importance of Plant: Seeds, tubers, and vegetation provide important food and cover for aquatic animals and waterfowl.

Distribution: Both occur throughout the temperate Northern Hemisphere; in Alaska, both are distributed through the arctic alpine (south of the Brooks Range), interior boreal and south coastal ecoregions.

Habitat: Alpine: shallow cold-water ponds and lakes. Grass-leaved: shallow to deep water; variable appearance depending upon growing conditions.

May be confused with: Other pondweeds with long, narrow underwater leaves. Grass-leaved pondweed is a variable species that hybridizes freely. Much disagreement and confusion exists regarding this plant among taxonomists. Each will hybridize with other *Potamogeton*, species, forming plants with intermediate characteristics.

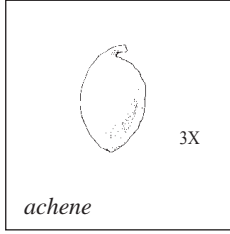




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Jeanne R. Janish

Potamogeton alpinus
(alpine pondweed)



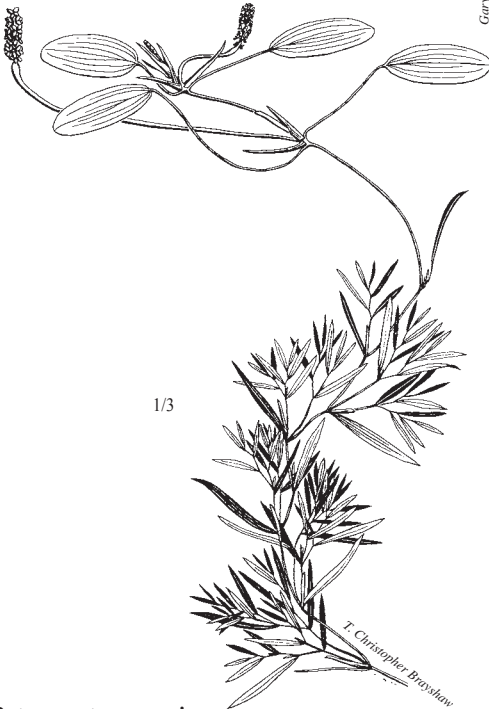
achene

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Jamie Fenneman

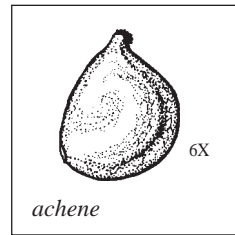
P. alpinus



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T. Christopher Bryshaw

Potamogeton gramineus
(grass-leaved pondweed)



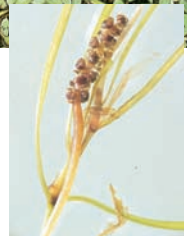
achene

6X

Gary Larson



P. gramineus



Species: *Potamogeton epihydrus* Raf., ribbon-leaf pondweed

Potamogeton natans L., floating-leaved pondweed

Family: Potamogetonaceae

These perennial pondweeds have oval floating leaves and long, narrow, underwater leaves. The ribbon-like underwater leaves of ribbon-leaf pondweed have a broad, light green central stripe, and the floating leaves are often oppositely arranged. The underwater leaves of floating-leaved pondweed are so narrow they appear to be stiff, leafless stalks. The floating leaves often have slightly heart-shaped bases.

Leaf: Ribbon-leaf: submersed leaves: alternate, limp, ribbonlike, 5-25 cm long, 0.2-1 cm wide, light-green with a light colored center stripe (1-1.5 mm broad), stalkless. They may decay later in the growing season. Floating leaves: leathery, appear opposite, 2-8 cm long, 1.5-3.5 cm wide on long, flattened leaf stalks. Transitional leaves sometimes present. Delicate sheaths (stipules) up to 4 cm long, free from leaf bases. Floating-leaved: submersed leaves: alternate, stiff, to 50 cm long, up to 2 mm wide; almost always decayed later in the growing season. Floating leaves: alternate, dark green to copper-colored, 6-11 cm long, to 6 cm wide, have slightly heart-shaped bases and stalks longer than the leaf blade. The leaf blade and the stalks form an acute angle. Persistent sheaths (stipules) 6-8 cm long, free from leaf base.

Stem: Ribbon-leaf: simple or few-branched, somewhat flattened, to 2 m. Floating-leaved: generally unbranched, nearly cylindrical, to 2 mm thick.

Flower: Small, inconspicuous, with 4 petal-like lobes. Ribbonleaf: in spikes 1-4 cm long on stalks to 16 cm long. Floating-leaved: in compact spikes less than 5 cm long on stalks to 12 cm long.

Fruit: Achene. Ribbon-leaf: 2-4 mm long, circular, flattened, ridged on back, beak inconspicuous. Floating-leaved: 3.5-5 mm, back rounded or faintly ridged with a 0.5-1 mm beak.

Root: Fibrous from rhizomes.

Propagation: Seeds, sometimes by large winter buds. Floating-leaved: sometimes produces tubers.

Importance of Plant: Provides food and cover for aquatic animals and waterfowl.

Distribution: Both found throughout much of North America; in Alaska, both are known in the south coastal and interior boreal ecoregions .

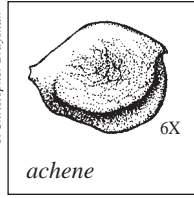
Habitat: Ponds, lakes, or slowly flowing waters to 0.5-3 m deep. Floating-leaved tolerates brackish water.

May be confused with: Ribbon-leaf: flat-stem pondweed (*P. zosteriformis*), which have similar underwater leaves. Look for the broadly striped leaves and roundish stem. Floating-leaved: a similar species, *P. oakesianus*, is known from southwest B.C.





T. Christopher Bryysban



Potamogeton epihydrus
(ribbon-leaf pondweed)



Dona Viscelli



Potamogeton natans
(floating-leaved pondweed)

Potamogeton natans

Species: *Trapa natans* L., water chestnut

Family: Trapaceae

Water chestnut has broad, toothed, diamond-shaped upper leaves that form tight floating rosettes. The leaves connect to the stem by swollen stalks just below the leaf blades. The thin limp stems give rise to long, narrow or feather-shaped underwater leaves and are rooted in the sediment. The fruit is a hard, woody nut with two to four sharp spines. Water chestnut is an annual plant that was introduced from Asia and has become abundant in the eastern U.S. where it creates a nuisance. It out-competes native plants, and the mature nuts drift to shore where the sharp spines hurt bare feet.

Leaf: Upper leaves are diamond-shaped with toothed edges and are shiny on the upper side and dull with fine hairs underneath. They are alternately arranged on inflated, spongy stalks and occur in clusters up to 50 cm across. Opposite submersed leaves are long and narrow. Green feather-like structures often replace the linear underwater leaves.

Stem: The submersed, long and limp stem is up to 5 m long.

Flower: Small, solitary flowers have 4 white or light-purple petals on short, thick stalks that float among the upper leaves. The 4 sepals turn into the spines of the fruit.

Fruit: Large (2.5 cm), variously shaped nuts are swollen at the middle and have 2-4 sharp spines. Each nut contains a single, fleshy seed.

Root: Develops on shoots. Lower roots are unbranched and threadlike, while upper roots are sparsely branched and fibrous.

Propagation: Seeds.

Importance of plant: People eat the seeds in Asia; however, the water chestnut commonly eaten in North America is actually the tuber from a different plant. Water chestnut plants are a nuisance in the eastern U.S.

Distribution: Native to Asia. Introduced into eastern North America. **Currently not known in Alaska**, but could potentially become established in south coastal areas if introduced.

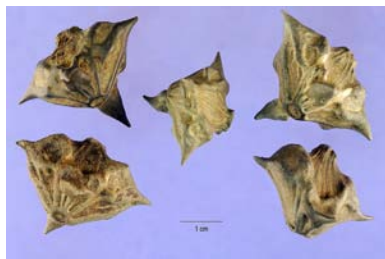
Habitat: Lakes, ponds, canals, and slow water.

May be confused with: Easily distinguished by clusters of toothed, diamond-shaped floating leaves.



- INVASIVE -
Report this plant!

Steve Hurst

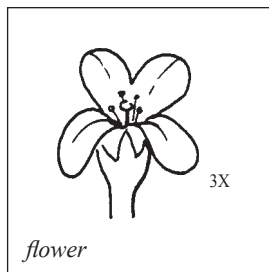
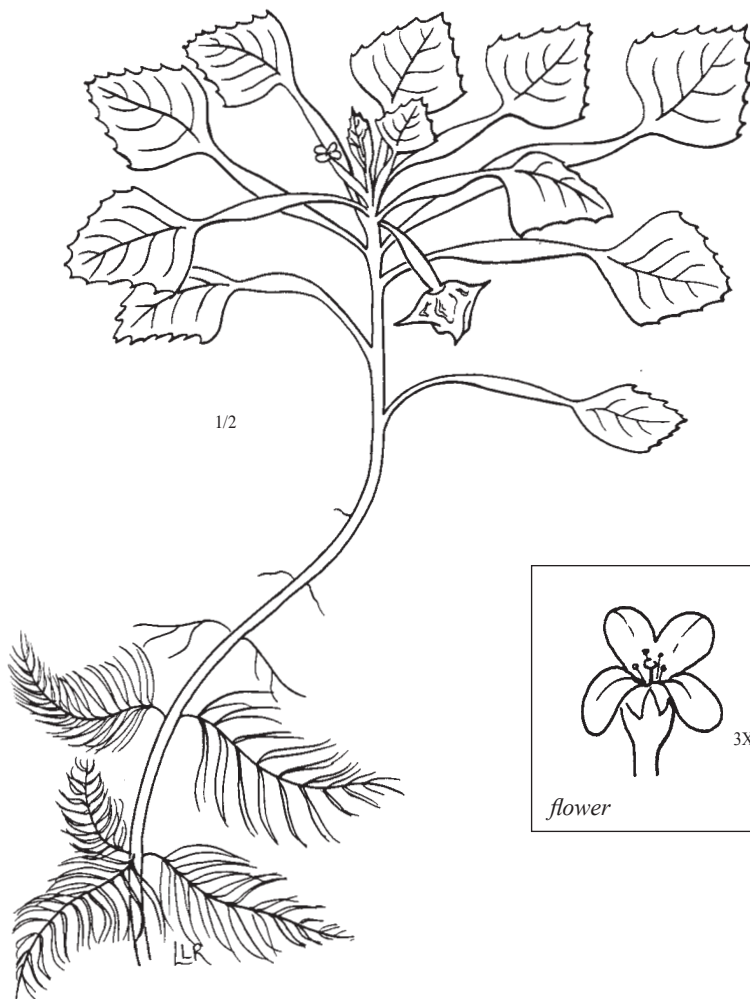


Trapa natans seeds

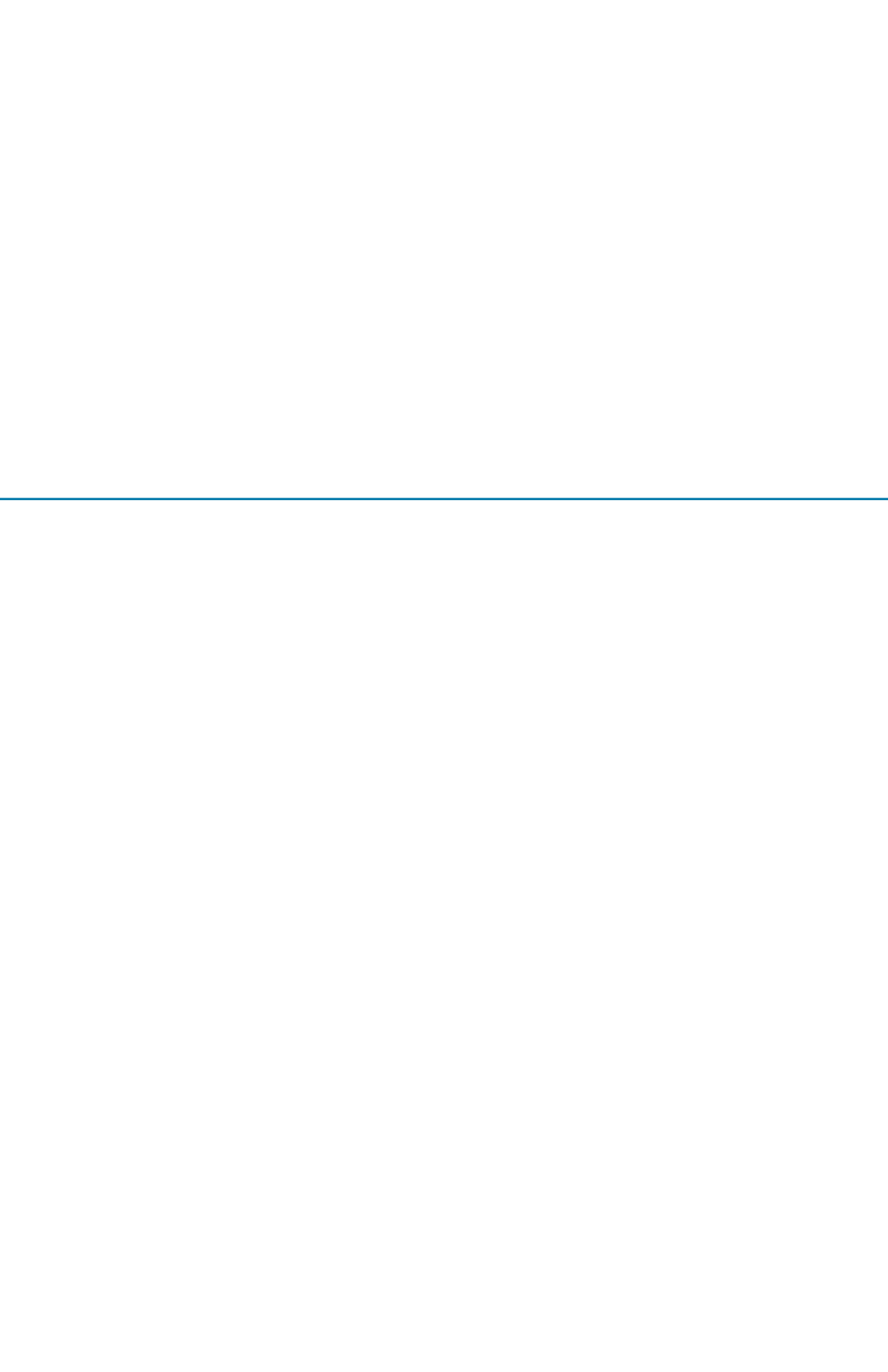
Leslie J. Mehrhoff



Trapa natans rosettes



Trapa natans
(water chestnut)



CHAPTER 3

FREE FLOATING
PLANTS

Species: *Azolla filiculoides* Lam., Pacific mosquitofern, Pacific azolla, water-fern

Family: Azollaceae

Mosquitoferns are small, flat, compact, moss-like plants that float freely on the water surface, often forming extensive reddish to green mats. Young plants are generally bright green, becoming pink, red, or dark brown as the plant matures and when exposed to strong sunlight. Upon close examination, these floating mats consist of many tiny ferns with multiple pairs of individual overlapping scale-like leaves that resemble a cedar leaf. Each plant may have a branching stem with several pairs of leaves, but only a single dangling root. Pacific mosquitofern is cold-tolerant, surviving under thin ice layers.

Leaf: Leaves are green to reddish, small (0.8-1 mm) and overlapping with each leaf consisting of 2 unequal lobes. The larger lobe is submerged and keeps the plant afloat. The smaller lobe remains above the water and contains chambers of blue-green algae (cyanobacteria).

Stem: The inconspicuous, branched stem is 1-3 cm (sometimes up to 6 cm) long and generally hidden by overlapping leaves.

Flowers: None produced.

Fruit: No fruit produced; instead sexual reproduction occurs by spores located in a chamber on the lower submerged leaf-lobe; spore production irregular/uncommon.

Root: The single root is on the underside of the plant.

Propagation: Spores and fragmentation of individual plants.

Importance of plant: Cyanobacteria in the leaves can absorb (fix) nitrogen from the air, something plants cannot do. This provides nutrients for the plant, while the plant provides shelter and minerals for the cyanobacteria. Mosquitofern is used as green fertilizer in rice paddies because of its nitrogen fixing ability. It also provides food for waterfowl and cover for small invertebrates.

Distribution: Western North America including Alaska, although ranges are unclear and complicated by identification issues. Other similar species of water-fern are found nearly worldwide.

Habitat: Sheltered water like sloughs, ditches and marshes. Occasionally found stranded on wet soil when water levels drop.

May be confused with: Other small floating plants like duckweed (*Lemna* sp.) are brighter green, do not become red when exposed to full sun, and don't have the compact overlapping leaf arrangement of mosquitoferns. Two other species of mosquitofern (*A. carolinia* and *A. mexicana*) are known in British Columbia, but have not been documented in Alaska. A scanning electron microscope is required to positively distinguish species of *Azolla*.



Hanessa Morgan



Hanessa Morgan



green and red colorations of Azolla sp.

Azolla filiculoides
(Pacific mosquitofern, Pacific azolla, water-fern)

Species: *Lemna minor* L., common or lesser duckweed

Family: Lemnaceae

Duckweeds are among the world's smallest flowering plants. Individual common duckweed plants are tiny, round, bright green disks, each with a single root. They are found scattered among emergent plants or massed together in floating mats. A single common duckweed plant can reproduce itself about every 3 days under ideal conditions in nutrient-rich waters.

Leaf: No true leaves; the leaf-like body is called a thallus. Nearly circular to oval, 2-5 mm in diameter; occur as single plants or up to 5 plants may be connected.

Stem: None.

Flower: Tiny, rarely seen. Arises from a pouch in the thallus.

Fruit: Inconspicuous, usually 1 seeded.

Root: Single short rootlet hangs from the underside of each plant.

Propagation: New plants bud from pockets on either side of the parent plant and eventually break apart. Overwinters as winterbuds on the lake bottom, but rarely reproduces from seeds. Distributed by wind and on the bodies of birds and aquatic animals.

Importance of plant: Food for fish and waterfowl and habitat for aquatic invertebrates. Because of its high nutritive value, duckweeds have been used for cattle and pig feed in Africa, India, and Southeast Asia. Sometimes used to remove nutrients from sewage effluent.

Distribution: Throughout much of the temperate and subtropical regions of the world. In Alaska, common duckweed is known from the south coastal and interior boreal regions.

Habitat: Still and slow-moving waters in many freshwater habitats. Often found along the shoreline after water levels have dropped.

May be confused with: Mosquitoferns (*Azolla* spp.) are darker green to red or purple and have overlapping leaves along a central stem. Another duckweed species, turion duckweed (*Lemna turionifera*), also occurs in Alaska, but is difficult to differentiate from common duckweed; turion duckweed is reddish on the under surface, produces overwintering turions, and has a slightly different vein pattern than *L. minor*. Common duckmeat (*Spirodela polyrrhiza*) has numerous roots arising from each thallus; it is currently undocumented in Alaska, but is known throughout much of Canada and the Lower 48.



Clayton. Anticam

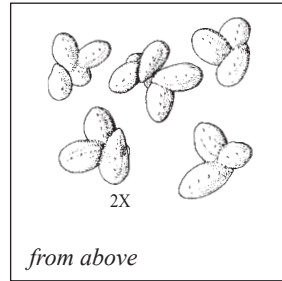
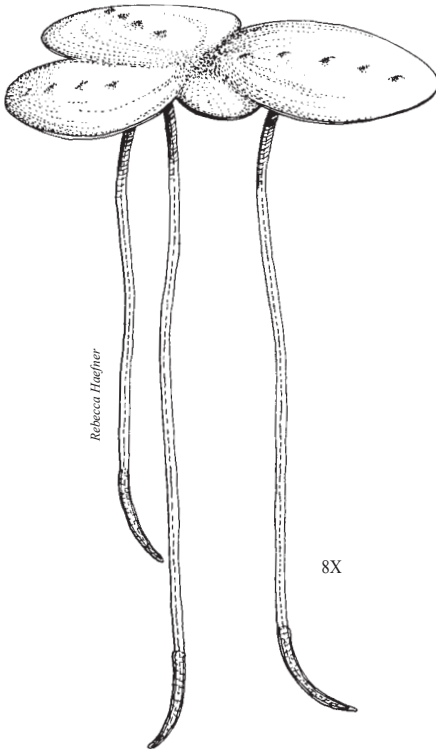


Lemna minor

NYDEC



Lemna minor



Lemna minor
(common or lesser duckweed)

Species: *Riccia fluitans* L., slender riccia
Ricciocarpus natans (L.) Corda, purple-fringed riccia
Family: Ricciaceae

Slender riccia and purple-fringed riccia are small leaf-like plants found floating on still water, often with duckweeds (*Lemna* sp., *Spirodela* sp.) and watermeal (*Wolffia* spp.). Slender riccia is found in tangled masses just below the water surface. It is narrow and flattened with forked, ribbon-like branches. A few white, root-like structures sometimes appear on its underside. Purple-fringed riccia is a green, lumpy, fan-shaped plant with scalloped edges and numerous dangling purple root-like structures (rhizoids). It floats on the water surface unless stranded along shorelines.

Both plants are liverworts. Liverworts are different from most other plants described in this manual in that they lack vascular tissues for transporting water and nutrients within their bodies. They are small, and lack stems, flowers, and roots.

Leaf: Green, leaf-like plant body (thallus). Slender riccia: flat, branched, and ribbon-like, up to 2 cm long and 0.5-1 mm wide, growing in fibrous-looking clumps. Few or no white root-like structures. Purple-fringed riccia: approximately 1 cm long, fan-shaped grooved lobes with fluted or scalloped edges. Many brownish-purple root-like structures (rhizoids) on the underside of the thallus. The upperside has a roughened texture with many tiny bumps.

Fruit: None. Microscopic spores are produced in tiny spore-producing organs embedded within the thallus.

Root: Fine, root-like structures (rhizoids) absorb water and nutrients, and sometimes anchor the plants. Slender riccia: few if any, white rhizoids. Purple-fringed: numerous brownish-purple rhizoids.

Propagation: Spores and budding (a new plant forms from a vegetative outgrowth of a mature plant).

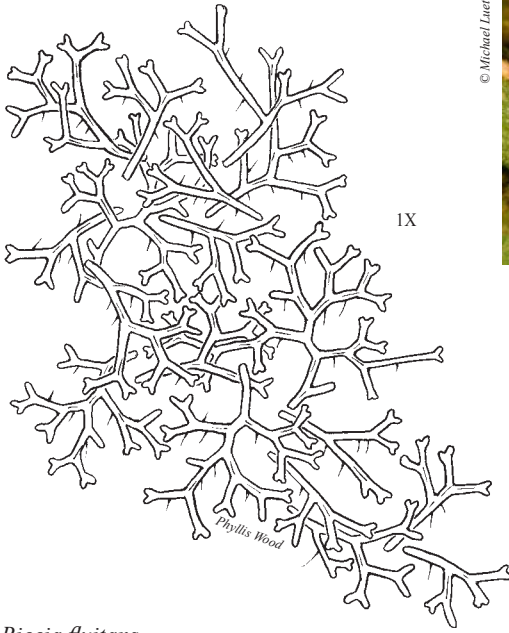
Importance of plant: Food for ducks and birds; provides habitat for aquatic insects and invertebrates.

Distribution: Both occur nearly worldwide; unknown range in Alaska; probably restricted to south coastal ecoregions.

Habitat: Mostly floating in sheltered shallow water of ditches, ponds, pools, and swamps that tend to be warm or nutrient enriched. Sometimes stranded and anchored along shorelines. Often found growing with duckweeds (*Lemna* spp.) and mosquitofern (*Azolla* spp.).

May be confused with: Duckweeds (*Lemna* spp.) and Pacific mosquitofern (*Azolla filiculoides*). These species do not have the twice-branched, ribbon-like leaves of slender riccia, or the purple rhizoids of purple-fringed riccia.





© Michael Luerth



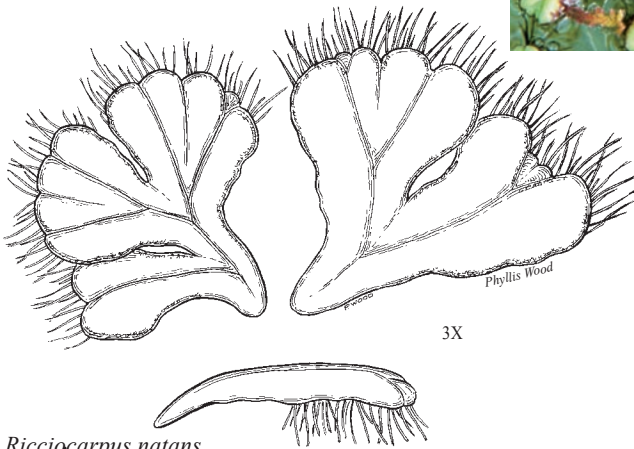
Riccia fluitans

Riccia fluitans
(slender riccia)

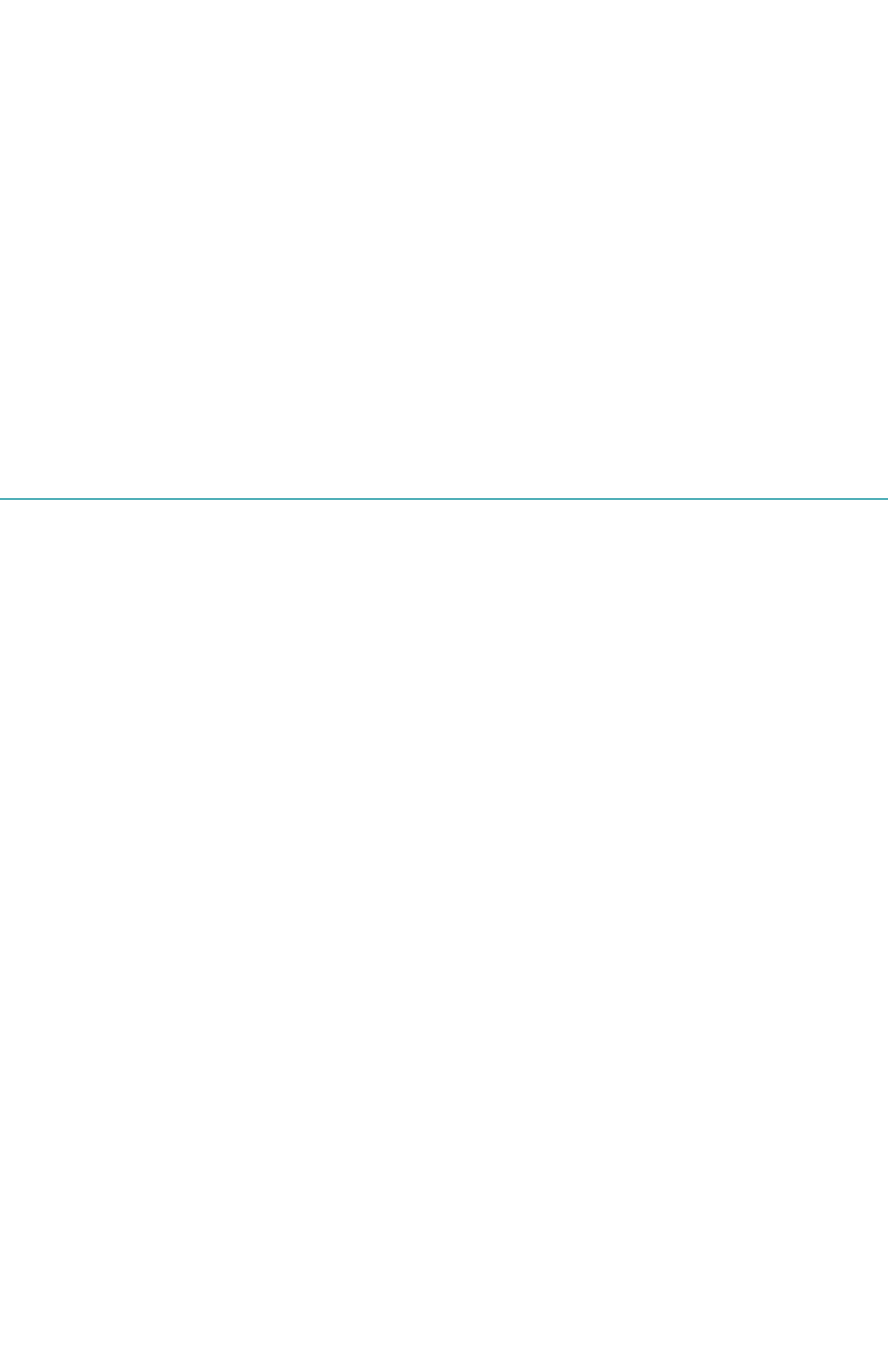
Clayton Anteaun



Ricciocarpus natans



Ricciocarpus natans
(purple-fringed riccia)



CHAPTER 4

SUBMERSED PLANTS

Species: *Cabomba caroliniana* Gray, fanwort

Family: Cabombaceae

Fanwort has fan-shaped, deep green or reddish, delicately divided, opposite underwater leaves. Most of the plant is underwater, but oblong floating leaves sometimes occur on the water surface, usually when the plant is flowering. Fanwort is commonly sold as an aquarium plant. While native to the southeastern U.S., fanwort is considered a weed in some regions. It has been introduced to the western U.S. and is increasing its range in the northeastern U.S. While currently not known in Alaska, it could be introduced via improper aquarium disposals.

Leaf: Two types: submersed and floating. Fan-shaped submersed leaves are opposite, up to 6 cm across, and finely divided on leaf stalks up to 3 cm long. Floating leaves usually develop when the plant is flowering and are alternate, narrowly diamond or arrowhead shaped and up to 2 cm long with centrally attached leaf stalks.

Stem: Up to 2 m long, slender, and sometimes covered with gelatinous slime.

Flower: Approximately 1-2 cm across with 3 white petals and 3 similar looking sepals. The 3 petals are yellow near the base. The yellow color directs insect pollinators to the nectaries. Flower stalks originate at the base of the upper leaves.

Fruits: 2-4 leathery pods per flower; each 2-3 cm long and 1 mm wide, usually containing 3 seeds each.

Root: Long and thin. Plants usually rooted in the sediments, but can continue to grow if uprooted.

Propagation: Seeds, rhizomes, and stem fragments.

Importance of Plant: When introduced to water outside its native southeastern U.S. its dense growth can reach nuisance proportions.

Distribution: Primarily eastern U.S., but has been found Washington, Oregon, California and elsewhere outside its historic range. Probably introduced to the Northwest by improper disposal of aquarium plants. **Currently not known in Alaska.**

Habitat: Favors ponds, lakes, and quiet streams with low pH. Commonly roots in 1-3 m of water.

May be confused with: Other submersed plants with finely divided leaves such as white water-buttercup (*Ranunculus* sp.), which has alternate leaves; coontails (*Ceratophyllum* spp.), which lack roots and have whorled leaves; or the water-milfoils (*Myriophyllum* spp.), which have whorled, feather-shaped leaves.



**- INVASIVE -
Report this plant!**

Leslie J. Mehrhoff



Cabomba caroliniana



2/3

Rebecca Haefner



2/3

Cabomba caroliniana
(fanwort)

Species: *Callitriche heterophylla* Pursh., two-headed or different-leaved water-starwort
Callitriche palustris L., (Synonym: *C. verna*), vernal or spring water-starwort
Family: Callitrichaceae

Water-starworts are small, delicate plants usually found in shallow water. All species in Alaska and the Northwest are loosely rooted to the bottom with narrow underwater leaves and/or broadened floating leaves arranged in pairs along thin stems. Characteristics of water-starworts are quite variable and depend upon growing conditions. To be sure of their identification to species, the surfaces of mature fruit need to be examined under 10-20x magnification. Two-headed and vernal water-starwort have narrow underwater leaves, and both can have spoon-shaped floating leaves that form rosettes on the water surface.

Leaf: Opposite. 2 types: submersed and floating leaves. Two-headed: narrow submersed leaves are 0.5-2.5 cm long with two rounded leaf-tip lobes; oval floating leaves (to 1 cm wide) are sometimes present and form rosettes on the water surface; leaf bases are joined by a wing-like ridge. Vernal: narrow, pale-green, submersed leaves are 0.5-2 cm long and to 1 mm wide with a slight indentation at the tip; spoon-shaped floating, emergent, or terrestrial leaves are sometimes present, up to 4 mm wide, one rounded tip per leaf, with the leaf bases joined by a wing-like ridge.

Stem: The thread-like, branched, vertical-to-trailing stem is usually less than 50 cm long.

Flower: Small flowers are located at leaf bases. They lack sepals or petals; instead 2 small whitish bracts serve as “petals.”

Fruit: Four tiny, nut-like fruits per flower; each containing one seed. Two-headed: heart-shaped, with no narrow margin, 0.6-1.4 mm across. Vernal: narrow margin all around; tiny pits create vertical lines on surface, 0.9-1.4 mm long, 0.8-1.3 mm wide, generally wider above middle.

Root: Fibrous, from plant base, and loosely anchoring plants to the bottom.

Propagation: Plant fragments and seeds.

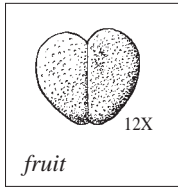
Importance of Plant: Provides forage and habitat for aquatic insects and fish. Ducks eat foliage and seeds.

Distribution: Two-headed: North and South America; in Alaska, known from the south coastal and interior boreal ecoregions. Vernal: Northern Hemisphere, known in all ecoregions of Alaska.

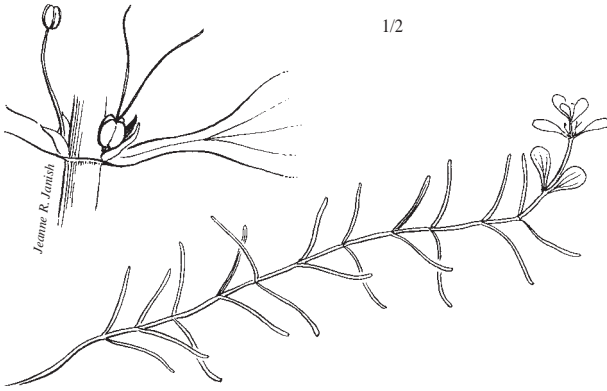
Habitat: Lake margins and slow streams. May carpet the mud when water levels drop.

May be confused with: Other water-starworts. Not all water-starworts in the Northwest are included in this book. Refer to technical keys for additional descriptions. Also, floating leaves may at first resemble free-floating duckweeds (*Lemma* spp.). When not in fruit they can be confused with other delicate opposite-leaved shoreline plants like waterworts (*Elatine* spp) which are known in British Columbia and elsewhere in North America.





Callitriche palustris



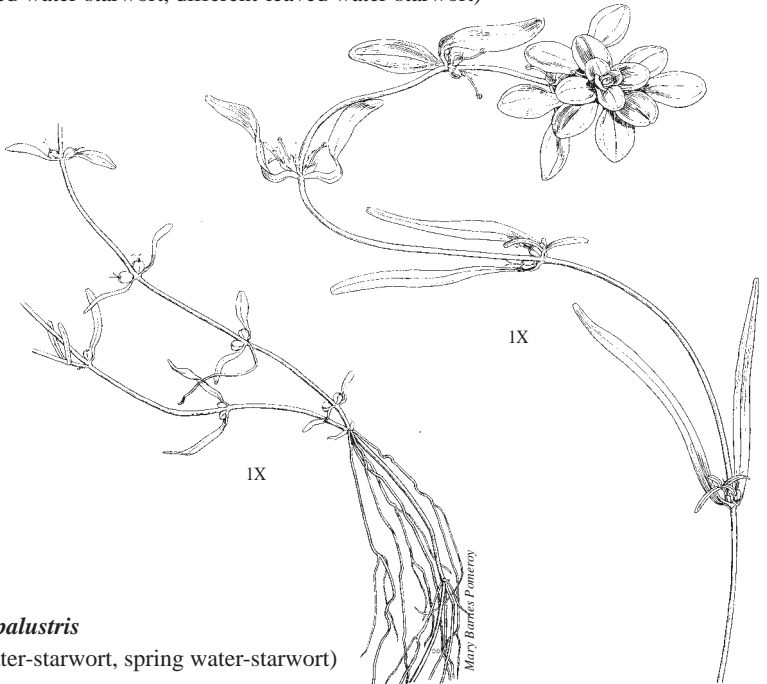
© Susan McDougall



Callitriche palustris

Callitriche heterophylla

(two-headed water-starwort, different-leaved water-starwort)



Callitriche palustris

(vernal water-starwort, spring water-starwort)

Species: *Callitriche stagnalis* Scop., pond water-starwort
Callitriche hermaphroditica L., northern or autumnal water-starwort
Family: Callitricaceae

Water-starworts are small, delicate plants usually found in shallow water. All species in Alaska and the Northwest are loosely rooted to the bottom with narrow underwater leaves and/or broadened floating leaves arranged in pairs along thin stems. Characteristics of water-starworts are quite variable and depend upon growing conditions. To be sure of their identification to species, the surfaces of mature fruit need to be examined under 10-20x magnification. Pond water-starwort usually has spoon-shaped floating leaves crowded at the stem-tip, whereas northern water-starwort has only narrow, underwater leaves.

Leaf: Opposite. **Pond:** narrow submersed leaves (up to 10 mm wide) with one rounded leaf tip are sometimes present. Oval or spoon-shaped floating leaves are up to 10 mm wide and are joined by tiny ridges at the base. **Northern:** all leaves are submersed, narrow and flat, 5 to 20 mm long, with inconspicuous white margins. Leaf tips have two lobes forming a U-shape; leaf bases clasp the stem but are not joined by ridges.

Stem: Usually branched, rising to surface or sprawling.

Flower: Tiny flowers lack sepals and petals and are located at leaf bases on minute stalks. **Pond:** 2-4 tiny, whitish bracts emerge from the flower base. **Northern:** bracts absent.

Fruit: Small, located at leaf bases. Four compartments, each containing one seed. **Pond:** oval, 1.2-1.8 mm long, 1.2-1.7 mm wide, narrow margin all around (wing), bracts at base. **Northern:** 1.1 to 1.6 mm long, 1.2 to 1.8 mm wide, no margin, fruit without bracts.

Root: Fibrous, from plant base or sprouting from stem joints.

Propagation: Plant fragments, seeds.

Importance of Plant: Provides forage and cover for young fish and aquatic insects. Ducks eat seeds and foliage.

Distribution: **Pond:** Introduced from Europe; widespread in North America, but **currently unknown in Alaska**. **Northern:** Widespread North America, except southern states; in Alaska, documented in all ecoregions.

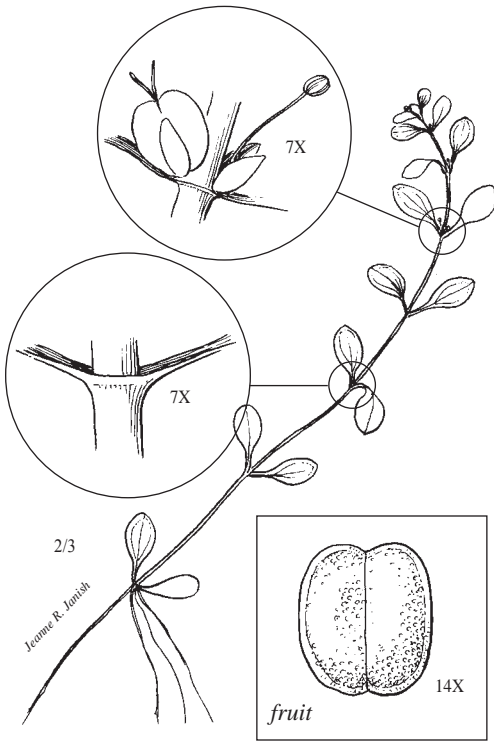
Habitat: Shallow water of lake margins and streams.

May be confused with: Confused with other opposite-leaved delicate plants when not in fruit, such as horned pondweed (*Zannichellia palustris*), or waterworts (*Elatine* spp.) which are known in British Columbia and elsewhere in North America, though not in Alaska.



- INVASIVE -

Report this plant!
(*C. stagnalis* only)



Clayton Antreau



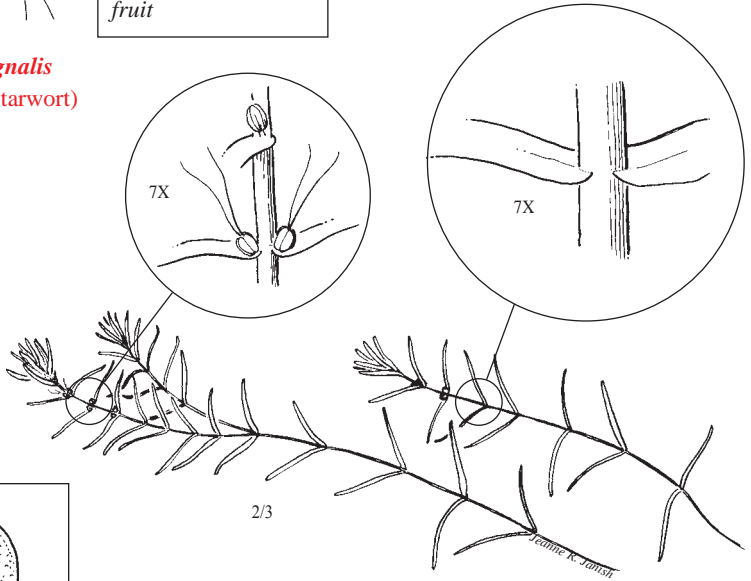
Callitriche stagnalis

Gary Larson



Callitriche hermaphroditica

Callitriche stagnalis
(pond water-starwort)



Callitriche hermaphroditica
(northern water-starwort, autumnal water-starwort)

Species: *Ceratophyllum demersum* L., coontail, coon's tail, hornwort

Family: Ceratophyllaceae

This underwater rootless perennial plant has branched stems with stiff whorls of forked olive-green to almost black leaves. Leaves are sometimes coated with lime, giving them a crunchy feel. Coontail refers to the thick and bushy growth of leaves (similar in appearance to a raccoon's tail) that occurs at the stem tips. In nutrient-rich water, coontail tends to form dense colonies either anchored in the mud or floating freely near the surface.

Leaf: The 1.5-4 cm long leaves are forked into 2 (sometimes 4) flattened or linear segments with small teeth along one margin. Leaves are often somewhat stiff or crunchy; even on the same stem some leaves may be fine and thin while others are quite thick. They are arranged in whorls of 5 to 12 leaves with the whorls becoming dense toward the stem tip.

Stem: The easily broken, freely branching stem is up to 3-4 m long.

Flower: Tiny, submersed flowers are located at leaf bases. Petals are tiny green scales. Male and female flowers occur separately on the same plant. Male flowers occur in pairs on opposite sides of the stem while female flowers are solitary. Flowering occurs from June through September.

Fruit: The small (4-7 mm), hard, one-seeded, egg-shaped fruit has 3 long spines (to 12 mm): 1 spine at the fruit tip and 2 at the base.

Root: Lacks roots. Floats freely below the surface, or is sometimes anchored to the bottom by modified leaves, especially in flowing water.

Propagation: Plant fragments and seed.

Importance of Plant: An important habitat plant for young fish, small aquatic animals, and aquatic insects. Some waterfowl eat the seeds and foliage, although coontail is not considered an important food source. Often used in cool water aquaria and pools.

Distribution: Common worldwide; known from interior boreal ecoregion of Alaska, but considered critically imperiled in Alaska.

Habitat: Inland and coastal ponds, lakes, and slow moving streams and rivers. Tolerant of hard water (high calcium content) and low light levels.

May be confused with: Less common, non-weedy spineless hornwort (*Ceratophyllum echinatum*), known in British Columbia, Washington and Oregon is more delicate, bright green, usually grows in deeper water, and has 3-5 lateral spines on the fruit. Also similar to other bushy submersed plants such as: muskgrasses (*Chara* spp.), which are large algae and produce a skunk or garlic-like odor when crushed; waterweeds (*Elodea* spp.), which have whorls of broad flat leaves; and milfoils (*Myriophyllum* spp.), which have feather-like leaves.



Vanessa Morgan

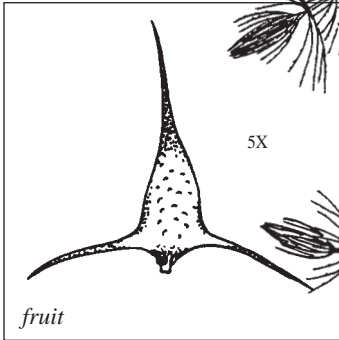
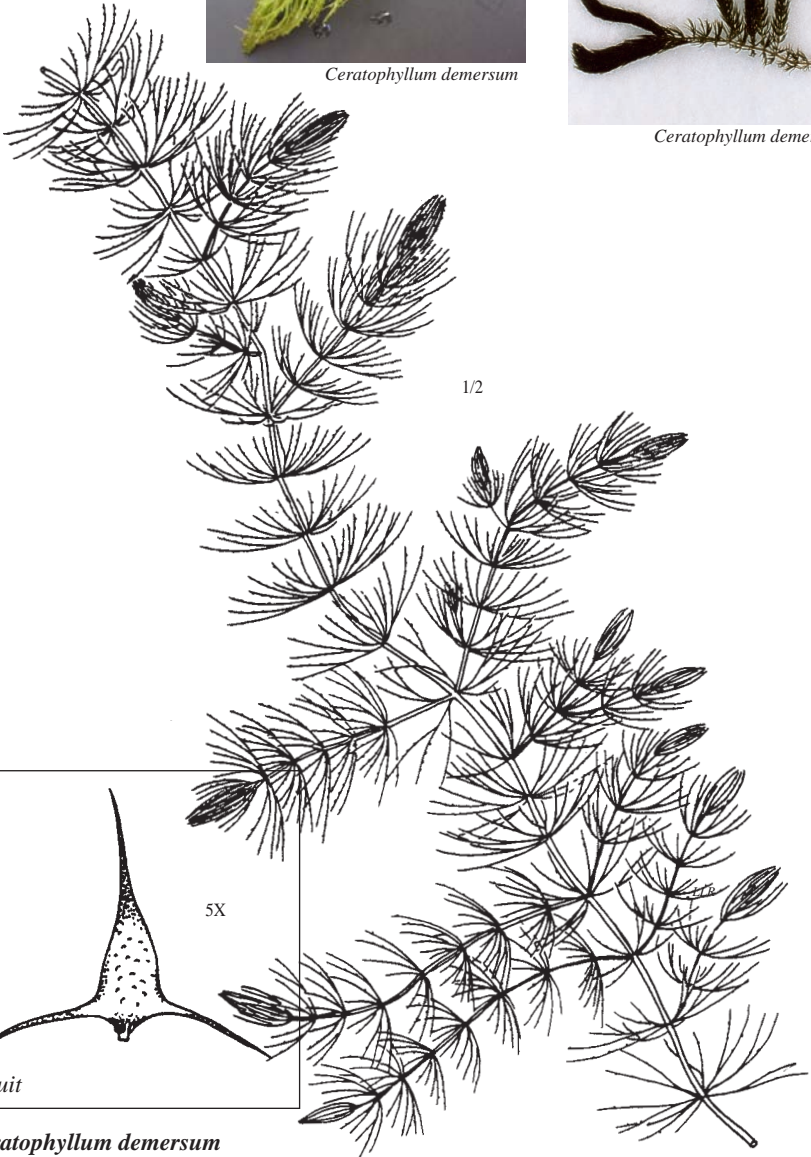


Ceratophyllum demersum

Clayton A. Arfieri



Ceratophyllum demersum



fruit

Ceratophyllum demersum
(coontail, coon's tail, hornwort)

Species: *Egeria densa* Planch. (Synonym: *Elodea densa* (Planchon) Caspary)
Brazilian waterweed, Brazilian elodea, anacharis
Family: Hydrocharitaceae

This nonnative plant is commonly sold as an aquarium plant in most of the U.S. and Canada. Brazilian waterweed is an underwater and sometimes floating perennial that can form tangled masses near the water surface. Densely packed green leaves are arranged in whorls of 4-8 around the stem.

Leaf: Bright to dark green leaves, 2-4 cm long and 2-5 mm wide, have minutely toothed edges (requiring magnification). Whorls are tightly spaced and typically have 4 leaves, but some “double nodes” may appear to have 6-8 leaves per whorls. At the stem base, whorls are more widely spaced sometimes with just 3 leaves.

Stem: Up to 3 m in length. Leaves occur along the entire length of the stem.

Flower: Fragrant white flowers have a yellow center with three, 7-9 mm long petals. Flowers float on the water surface and are attached at the base of leaf whorls by long slender stalks (to 6 cm). Two to three flower stalks may arise from the same whorl. Male and female flowers are produced on separate plants, but only male plants are found in the U.S. The plant flowers from late spring to early fall.

Fruit: Fruits and seeds have not been observed outside of its native range.

Root: Fibrous. Can produce white adventitious roots along the stem.

Propagation: Because only male plants are found here, propagation is from stem fragments and by collapsed stems that sprout roots and form the base of new plants. Dormant shoots develop in fall and overwinter in the sediment.

Importance of plant: Displaces native species. Eaten by wildlife, although not preferred forage.

Distribution: South American native. Introduced via the aquarium trade and widely distributed in North America; **not currently known in Alaska.**

Habitat: Lakes, ponds, sloughs, streams.

May be confused with: Common waterweed (*Elodea canadensis*) and hydrilla (*Hydrilla verticillata*), both non-native invasive species with few or no known populations in Alaska. Common waterweed has smaller leaves in whorls of 3. Hydrilla has tubers and leaves usually in whorls of 5, with spiny margins visible without magnification.

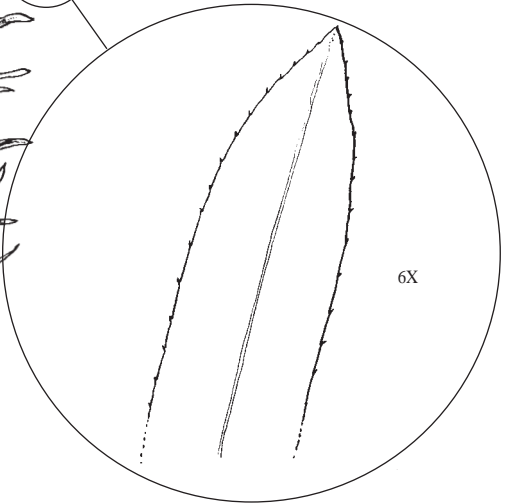
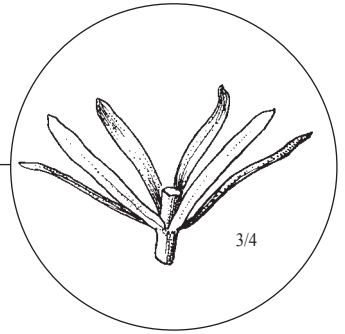


- INVASIVE -
Report this plant!

Clayton Artificau



Egeria densa



Egeria densa

(Brazilian waterweed, Brazilian elodea, anacharis)

Species: *Elodea canadensis* Rich., common waterweed, Canadian waterweed

Family: Hydrocharitaceae

Common waterweed is an underwater perennial plant that sometimes forms tangled masses in lakes, ponds, and ditches with long, trailing stems and green, somewhat translucent leaves arranged in whorls of 3 around the stem. Individual plants vary in appearance depending on growing conditions; some are bushy and robust, others have few leaves and weak stems.

Leaf: Mostly arranged in whorls of 3 (occasionally 4), but sometimes opposite on the lower portions of the stems. Leaves (6-15 mm long, 1.5-4 mm wide) are very finely toothed along the edges, but evident only with magnification. Leaf tip tapered to a blunt point.

Stem: Long, slender, generally branched.

Flower: Often does not produce flowers. Small (8 mm across), white flowers occur at the ends of long, thread-like stalks. Male and female flowers occur on separate plants, but male flowers are rarely produced. Female flowers have 3 petals (2-3 mm) and usually 3 greenish sepals (2-3 mm); male flowers have 3 petals (4.5-5 mm) and 3 sepals (3.5-5 mm). Blooms from July to September.

Fruit: Capsules approximately 6 mm long, seeds about 4 mm long, but because of a shortage of male plants, seeds are seldom produced.

Root: Tufts of fibrous roots from nodes along the stem.

Propagation: Stem fragments, overwintering buds, and rarely by seeds.

Importance of plant: Food and habitat for fish, waterfowl, other wildlife. Used in cool water aquariums. Common waterweed is a nuisance in Europe and New Zealand where it is not native.

Distribution: Most of North America; in Alaska, documented in one south coastal site, near Cordova.

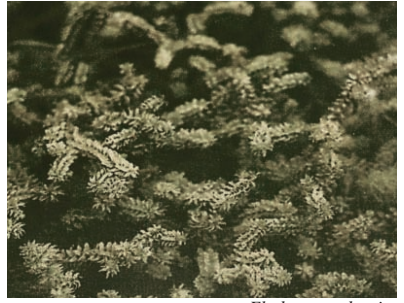
Habitat: Lakes, rivers, ponds, and ditches.

May be confused with: Brazilian elodea (*Egeria densa*), which has a similar appearance but has longer leaves in whorls of 4 to 6. Hydrilla (*Hydrilla verticillata*), which has tubers and spiny leaf edges. Coontail (*Ceratophyllum* sp.), which has forked, needle-like leaves. Also easily confused with Nuttall's waterweed (*Elodea nuttallii*) which is not known in Alaska, but is present in British Columbia; flower structure and leaf width are the most reliable distinguishing characteristics.



- INVASIVE -
Report this plant!

NYDEC

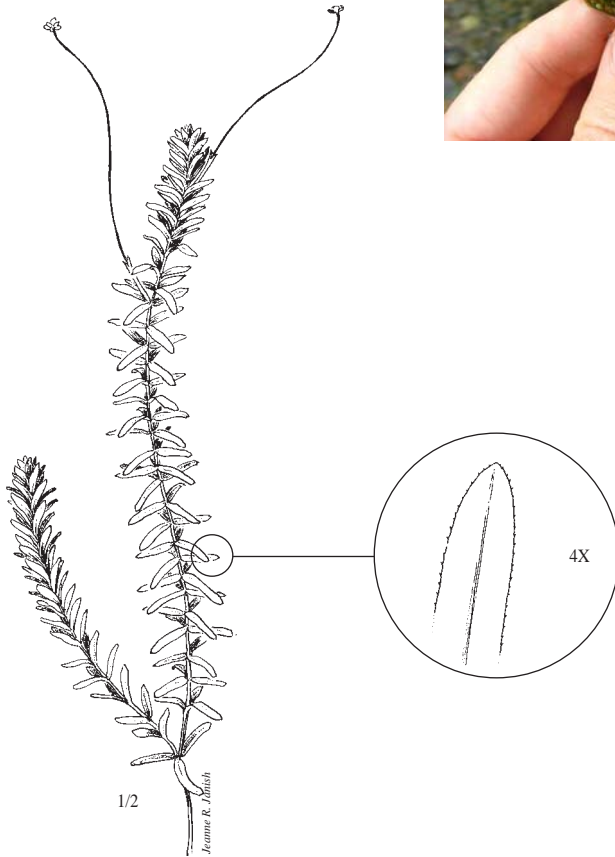


Elodea canadensis

Jamie Finneman



Elodea canadensis



Elodea canadensis
(common waterweed, Canadian waterweed)

Species: *Hydrilla verticillata* (L.) Caspary, hydrilla

Family: Hydrocharitaceae

The exotic invader hydrilla closely resembles common waterweed (*Elodea canadensis*) and Brazilian elodea (*Egeria densa*), other introduced weeds. All have bright green leaves arranged in whorls around the stem, although hydrilla leaves have small spines on the edges and at the tips which are visible without magnification. The most reliable way to identify hydrilla is to look for small peanut-like tubers attached to the roots.

Leaf: Bright green leaves are 1-5 mm wide and 6-20 mm long with sharply toothed margins (visible without magnification). The reddish midrib often has small spines. Leaves grow in whorls of 3-10 along the stem, although 5 leaves per whorl is most common. Whorls can be closely spaced and bushy, or spaced widely apart along the stem.

Stem: The monoecious variety of hydrilla recently found in Washington has a delicate sprawling growth form that freely branches at the lake bottom. The dioecious variety branches more at the water surface.

Flower: Monoecious hydrilla has male and female flowers on the same plant. The female flower has 3 small, translucent, white petals, 4-8 mm wide and 1-5 mm long, and is attached to the stem tip by a slender stalk. Male flowers are produced in the leaf axils, but detach and become free-floating. Blooms mid to late summer.

Fruit: Small, spindle-shaped fruits, 5-6 mm long. Rarely seen.

Root: Fibrous rhizomes and above ground stolons. Peanut-sized tubers on the roots.

Propagation: Fragments, tubers, seeds (rarely), and scaly overwintering buds called turions.

Importance of Plant: Because of its dense and profuse growth habit and the ability to grow in most environments, hydrilla is considered the most problematic aquatic plant in the U.S. Sightings of hydrilla should be reported immediately to the State Noxious Weed Control Board.

Distribution: Native to Africa, Australia, and parts of Asia. Introduced in southern states where it is widespread (typically the dioecious form) and to numerous sites along the east coast, as far north as Maine. In the western U.S., known in California, Idaho and one infestation (likely eradicated after 10+ years of extensive control measures) in Washington.

Not currently known in Alaska.

Habitat: Lakes, rivers, ponds, and ditches.

May be confused with: Common waterweed (*Elodea canadensis*) and Brazilian elodea (*Egeria densa*), which have similar form and leaf arrangement. With hydrilla, look for small tubers on the roots, spiny leaf edges, and a reddish midrib on leaves. *Egeria najas*, which is sold commonly worldwide as an aquarium plant, is difficult to distinguish from hydrilla.



**- INVASIVE -
Report this plant!**

Richard Old, www.stidseries.com

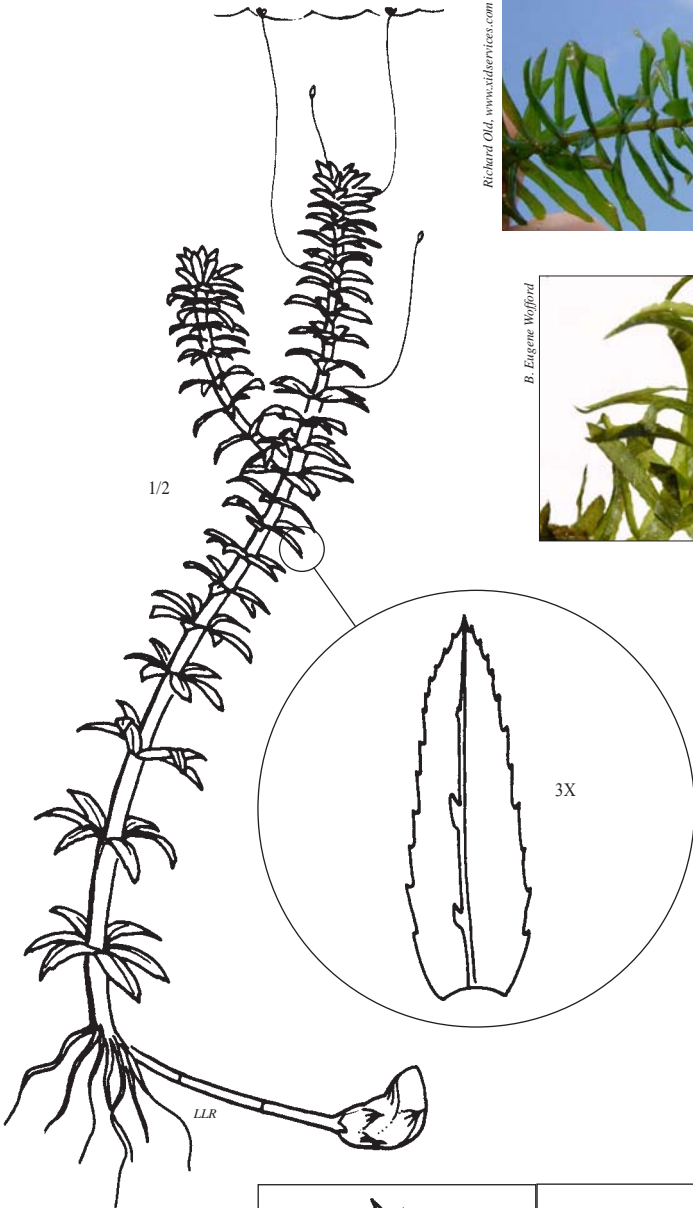


Hydrilla verticillata

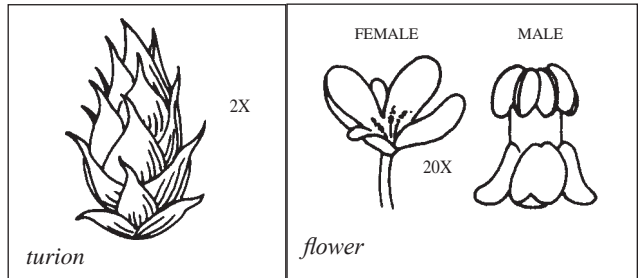
B. Eugene Welford



Hydrilla verticillata



Hydrilla verticillata
(hydrilla)



Species: *Isoetes* spp. (L.), quillworts

Isoetes tenella Léman (Synonyms: *I. echinospora* and *I. muricata*), spiny-spore quillwort

Family: Isoetaceae

Several species of quillwort occur in Alaska, found in seasonally wet to shallow aquatic habitats. Plants form clumps of 20-30 green to yellowish-green, grass-like, hollow leaves that taper to a pointed tip. Each clump arises from a bulb-like base. Leaves of the strictly aquatic underwater species are evergreen, while the wetland species have deciduous leaves. Quillworts reproduce by spores that are produced in the leaf bases. They are closely related to the primitive horsetail family (Equisetaceae). Identification of the genus is relatively easy, but distinguishing to species can be difficult. *Isoetes tenella* (spiny-spore quillwort) is the most common species although *I. occidentalis* (western quillwort) and *I. maritima* (maritime quillwort) are also documented in Alaska.

Leaf: The green, slender, hollow leaves each have a pointed tip and a spoon-like base. There are 10-30 leaves per plant, and each leaf is divided lengthwise into 4 chambers. The length varies from 2.5-10 cm. Spore cases are located in the swollen leaf bases.

Stem: Quillworts have a modified stem called a corm. It is a corky-brown, bulb-like underground structure with 2 or 3 lobes, like a tiny onion. Roots grow from the lower surface and leaves from the upper surface.

Flower: None.

Fruit: Quillworts produce spores instead of flowers or fruits. White megaspores about the size of salt grains are located in a sac within the outer swollen leaf bases. Microspores, the size of powder, are located in inner leaf bases. The spore sac is partly to completely covered by a thin flap (velum).

Root: Roots are unbranched or forked and grow in clusters from the base of the corm.

Propagation: Spores are dispersed by water or animals in late summer.

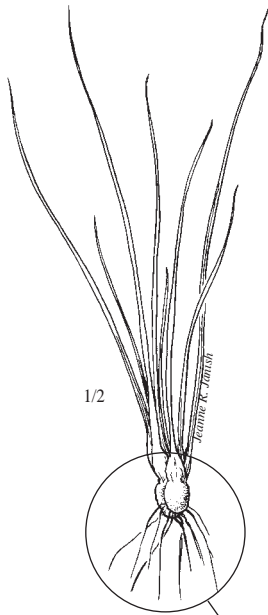
Importance of Plant: Deer feed on the leaves, and muskrats and waterfowl eat the fleshy corms. Intolerant of nutrient enrichment, quillworts can be an indicator of good water quality.

Distribution: Known in the south coastal and interior boreal ecoregions of Alaska; Certain species considered imperiled in Alaska

Habitat: Quillworts grow from shallow to moderate depths in lakes and slowly flowing rivers on sandy substrates, mud, and wet ground. Common in waters with low alkalinity.

May be confused with: Quillworts can be distinguished from spikerushes (*Eleocharis* spp.) and small sedges (*Carex* spp.) by the presence of spores and the swollen leaf bases. Quillwort species are distinguished from one another by microscopic examination of their spores, the spore sac, and velum. Identification may be further complicated since quillwort species sometimes hybridize.





1/2

Jeanne R. Janisch

Clayton Antleau



Isoetes sp.

Ben Legler

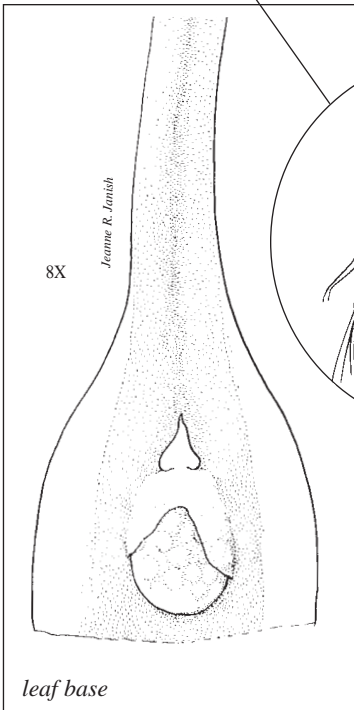


Isoetes tenella

Ben Legler



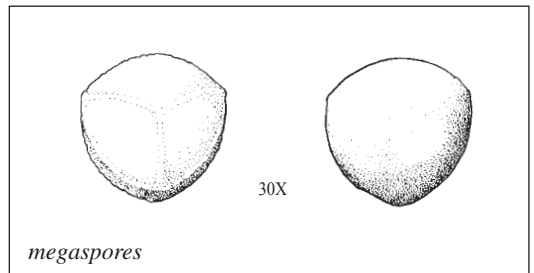
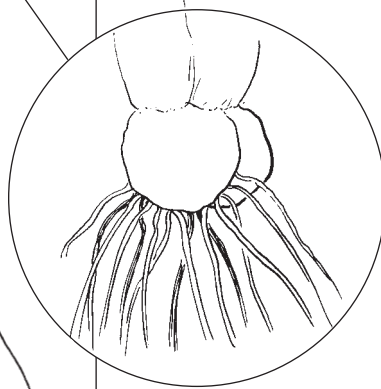
Isoetes tenella, spore sac



8X

Jeanne R. Janisch

leaf base



30X

megaspores

***Isoetes* sp.**
(quillworts)

Species: *Lemna trisulca* L., star duckweed or ivy-leaf duckweed

Family: Lemnaceae

Most duckweeds are among the world's smallest flowering plants with entire plants composed of tiny floating, round, bright green disks. Star duckweed, however, is quite different since it is truly submersed (except when flowering or fruiting). Individual nonflowering star duckweed plants are longer and narrower than common duckweed, often floating in masses beneath the water surface; flowering plants more closely resemble common duckweed.

Leaf: No true leaves; the leaf-like body is called a thallus. Two types: nonflowering plants are elongate or spatula-shaped (6-10 mm long), tapered to a stalked base, connected in branched chains of 8-30 plants, and submersed beneath the water surface. Flowering plants are more oval-shaped with a separate margin and a shorter stalk at the base; they are found floating on the water surface.

Stem: None.

Flower: Tiny, rarely seen. Arises from a pouch in the thallus.

Fruit: Inconspicuous, usually 1 seeded.

Root: Often rootless.

Propagation: New plants bud from pockets on either side of the parent plant and eventually break apart. Overwinters as winter buds on the lake bottom, but rarely reproduces from seeds. Distributed by wind and on the bodies of birds and aquatic animals.

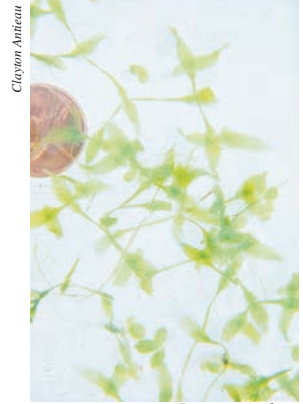
Importance of plant: Food for fish and waterfowl and habitat for aquatic invertebrates. Because of its high nutritive value, duckweeds have been used for cattle and pig feed in Africa, India, and Southeast Asia. Sometimes used to remove nutrients from sewage effluent.

Distribution: Throughout much of the temperate and subtropical regions of the world. In Alaska, star duckweed is known mostly from the interior boreal ecoregion, but with scattered other populations in the arctic alpine and south coastal regions.

Habitat: Still and slow-moving waters in many freshwater habitats. Often found along the shoreline after water levels have dropped.

May be confused with: Flowering plants could be mistaken for other floating-leaved duckweeds (*Lemna* spp.) or for mosquitoferns (*Azolla* spp.), which are darker green to red or purple and have overlapping leaves along a central stem.





Clayton Amfrenu

Lemna trisulca



Lemna trisulca
(star duckweed or ivy-leaf duckweed)

Species: *Limosella aquatica* L., water mudwort

Family: Scrophulariaceae

Mudworts are small members of the snapdragon family found in shallow water and along shorelines. Water mudwort grows in clusters of narrow leaves up to 10 cm tall with tiny flowers borne individually on short stalks. Each clump of plants is connected by horizontal runners (stolons), much the way strawberry plants are joined. Water mudwort leaves usually have a distinct flattened, spoon-shaped blade.

Leaf: Spoon-shaped to oval leaf blades are 5-30 mm long and 2-8 mm wide; leaf stalks (up to 8 cm long) are generally distinct from the blade. Leaves arise from the plant base with transparent stipules located at the base of the leaf stalks.

Stem: An upright stem is lacking. Leaf stalks may look like stems to an untrained person. Stolons connect individual clumps of plants.

Flower: Flowers occur singly on stalks much shorter than the leaves and have 5 small sepals and petals that are fused together at the base. Petals are dull white, pinkish or purplish (about 2 mm long) with pointed tips.

Fruit: The ball-shaped or oval capsule is 3-5 mm long and contains many tiny seeds.

Root: Many fibrous roots emerge from the plant base and sometimes rise above the lower leaf bases giving the plant a woven appearance.

Propagation: Seeds and stolons.

Importance of Plant: Occasionally cultivated for aquaria.

Distribution: Circumpolar species found in Iceland, Eurasia and much of North America. In Alaska, known from in the south coastal region through the interior boreal ecoregion, as far north as Denali National Park.

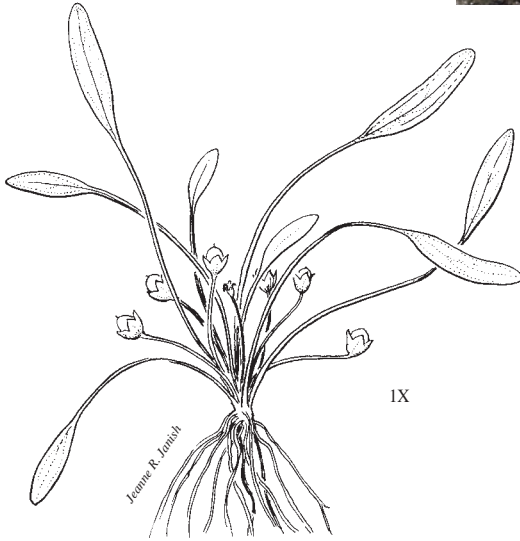
Habitat: Shallow still or slowly flowing waters. Muddy or sandy shorelines and areas with fluctuating water levels. Lakeshores subject to daily water-level fluctuations.

May be confused with: Other small tufted plants, including small spike-rush species (*Eleocharis* spp.), awlwort (*Subularia aquatica*), quillwort (*Isoetes* spp.), water lobelia (*Lobelia dortmanna*), and the salt-tolerant western grasswort (*Lilaeopsis occidentalis*). A combination of stolon presence, leaf shape, and flower characteristics distinguish them.





Limosella aquatica



Limosella aquatica
(water mudwort)

Species: *Lobelia dortmanna* L., water lobelia

Family: Campanulaceae

This perennial plant can be identified by its low growing tufts of cylindrical or somewhat flattened tubular leaves and its erect, unbranched flower-stalk. Leaves are somewhat grasslike and usually whitish at the base. Many white roots anchor it to firm sediment in shallow sandy areas of lakes and ponds. In summer, look for the small pale blue or white flowers waving above the water surface.

Leaf: Leaves originate from a central base. They are narrow, long (to 8 cm), often curved, and are made of 2 side-by-side hollow tubes that are round or slightly flattened in cross-section. A few tiny, thin, alternate leaves are sometimes present along the flower stem.

Stem: The hollow, smooth, mostly unbranched stem usually rises above the water surface. It can grow to 2 m tall and supports flowers and sometimes tiny leaves or bracts, but is often a bare stalk after the flowers and fruits drop.

Flower: White or pale blue flowers (1-2 cm long) are attached individually by short stalks to the stem. Flowers have 5 sepals, and the base of the 5 petals is fused into a tube. The 2 shorter upper petals fold up. Several well-spaced flowers grow from each stem.

Fruit: The capsule is 5-10 mm long and 3-5 mm wide. Tiny seeds (less than 1 mm) have a distinctive square base.

Root: Fibrous, whitish.

Propagation: Seeds; vegetative buds at base of old flower stems.

Importance of Plant: Stabilize sediments along sandy shorelines and nutrient poor lakes.

Distribution: Northern North America, northwestern Europe. Considered critically imperiled in Alaska; only documented in the south coastal region.

Habitat: Grows on hard, firm, sandy or gravely sediments in shallow to moderately deep slightly acidic still waters. Produces flowers in water to 2 m deep.

May be confused with: Distinctive when flowering. Without the flower stalk it looks similar to low growing grass-like aquatic plants such as quillwort (*Isoetes* spp.), water mudwort (*Limosella aquatica*), and the coastal, estuarine plant western grasswort (*Lilaeopsis occidentalis*). Look for water lobelia's slightly flattened, fleshy, curved leaves. Do not harm these rare plants; they are considered critically imperiled in Alaska and elsewhere.



Clayton Amicau

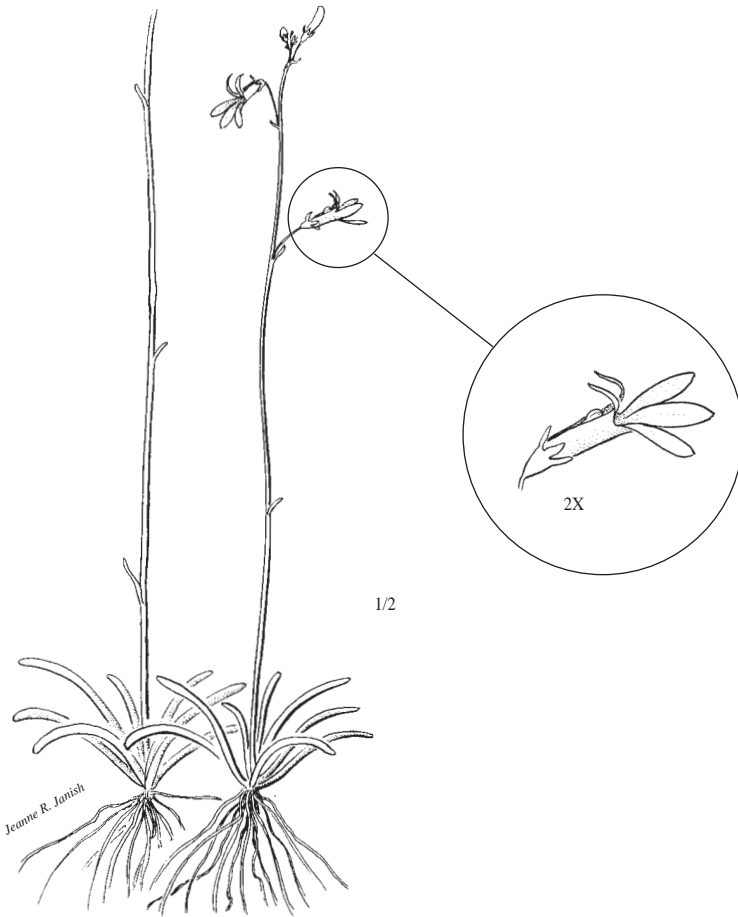


Lobelia dortmanna

Frank Koshore



Lobelia dortmanna



Lobelia dortmanna
(water lobelia)

Species: *Myriophyllum sibiricum* Komarov (Synonym: *M. exalbescens*, var./spp. of *M. spicatum*), shortspike or Siberian watermilfoil

Family: Haloragaceae

Shortspike watermilfoil is a native plant that commonly grows in lakes, rivers, and ponds throughout much of Alaska. Like other watermilfoils, it has feather-like leaves below water, and flowers and tiny leaves arranged on emergent stalks. Shortspike milfoil can closely resemble the non-native Eurasian watermilfoil, sometimes to the point where DNA analysis is required to distinguish them. In general, however, shortspike watermilfoil tends to be a more robust plant and has fewer and more widely spaced leaflet pairs than Eurasian watermilfoil. When taken out of the water, leaves on this species do not tend to collapse around the stem.

Leaf: Two types. Feather-like olive-green submersed leaves are arranged in whorls of 3-4 with fewer than 14 leaflet pairs per leaf, each leaf to 4 cm long. Leaves usually do not collapse when removed from the water. The leaflet pairs at the base of the leaf are much longer than those at the tip, giving the leaf a lance shape. Emergent leaves are located beneath the flowers on the flower stalk and are tiny (1-3 mm long). They are smooth edged to coarsely toothed and are shorter than the flowers.

Stem: The up to 3 m long stem is often reddish when fresh and usually is visible through the widely spaced leaves. Surface branching is sparse in water more than 1 m deep.

Flower: Tiny flowers occur on often red or reddish-purple emergent spikes up to 15 cm long. Female flowers lack petals; male flowers have 4 petals and 8 anthers.

Fruit: Nut-like, up to 3 mm in diameter, separating into 4 chambers, 1 seed per chamber.

Root: Fibrous, will sprout from fragments.

Propagation: From winter buds (turions), plant fragments, and seeds.

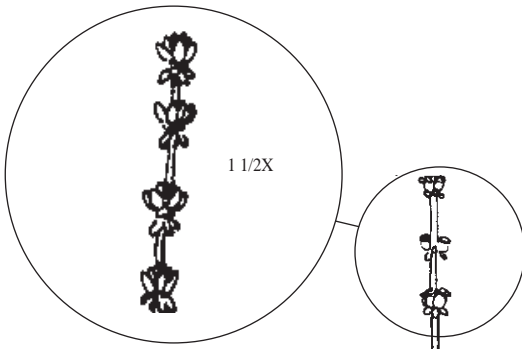
Importance of Plant: Provides cover for fish and invertebrates. Supports insects and other small animals; waterfowl occasionally eat the fruit and foliage.

Distribution: Northern half of North America, Europe, and western Asia. Widespread in Alaska.

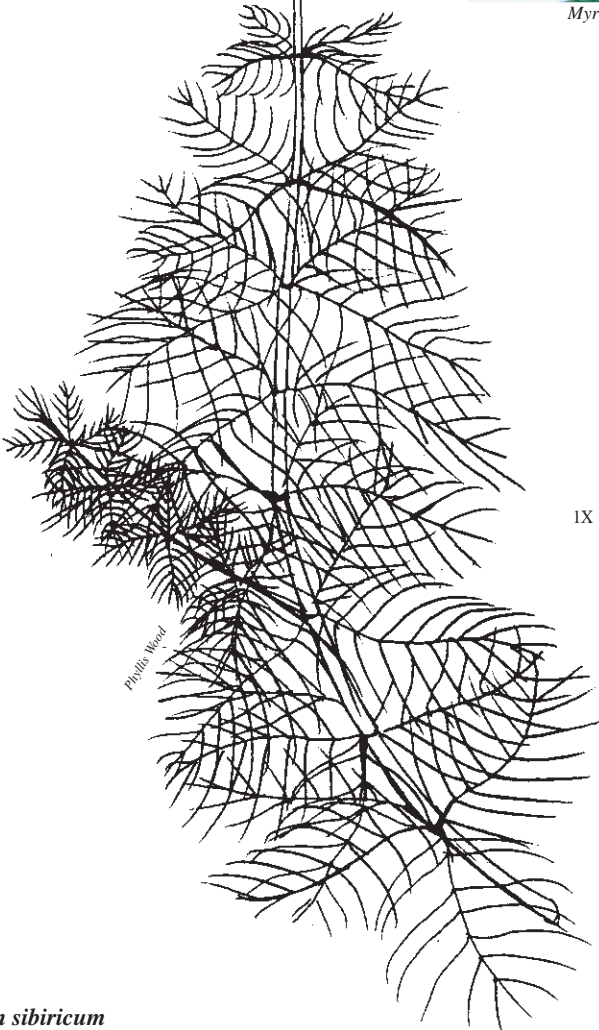
Habitat: Lakes, ponds, and rivers. Tolerant of nutrient-rich, alkaline, and brackish waters.

May be confused with: Easily confused with other milfoils when flower spikes or winter buds are absent. Most closely resembles the non-native Eurasian watermilfoil (*Myriophyllum spicatum*), which is not currently known in Alaska, but is highly invasive. Eurasian watermilfoil generally has thinner stems, more leaflets (usually more than 14 pairs per leaf), and leaflets of more uniform size producing a squarish leaf tip rather than a pointed leaf tip. Leaves of Eurasian watermilfoil are very lax, collapsing around the stem when plants are removed from the water. Correct identification of watermilfoil species is complicated by the potential for hybridization.





Myriophyllum sibiricum



Myriophyllum sibiricum
(shortspike, Siberian watermilfoil)

Species: *Myriophyllum spicatum* L., Eurasian watermilfoil

Family: Haloragaceae

Eurasian watermilfoil, an invasive nonnative plant, is one of the worst aquatic plant pests in North America. Like native watermilfoils, it has feather-like underwater leaves and emergent flower spikes. Leaf shape and size can help distinguish it from other milfoil species. However, Eurasian watermilfoil is a variable species, often making it difficult to identify without DNA analysis. Because it is an extremely invasive plant, it is important to distinguish Eurasian watermilfoil from native milfoils. Every effort should be made to prevent the spread of this plant.

Leaf: Two types. Submersed leaves: 2-4 cm long, feather-like, arranged in whorls of 4 around the stem. Leaves are often square at the tip and typically have greater than 14 leaflet pairs per leaf. On mature plants the leaflets are closely crowded along the midrib. Emergent leaves: inconspicuous (1-3 mm long), smooth edged to toothed, located on the flower spikes with one leaf beneath each flower, leaves shorter than flowers.

Stem: Long, often abundantly branched stems form a reddish or olive-green surface mat in summer.

Flower: Tiny. On reddish emergent spikes 4-8 cm long. Female flowers lack petals, 4 petals on male flowers, 8 anthers.

Fruit: Up to 3 mm in diameter, divided into 4 chambers, with 1 seed per chamber.

Root: Many, fibrous, from the plant base. Roots often develop from plant fragments.

Propagation: Plant fragments; rhizomes. Sprouting from seed is rare.

Importance of Plant: This invasive plant spreads rapidly, crowding out native species, clogging waterways, and blocking sunlight and oxygen from underlying waters.

Distribution: Native to Eurasia and northern Africa, but is a widespread, highly invasive weed in North America. Known in many lakes and rivers in the Pacific Northwest, including British Columbia. **Eurasian watermilfoil is not currently known in Alaska.** However, it could establish in the coastal, interior or arctic regions of the state, where it could hybridize with shortspike watermilfoil.

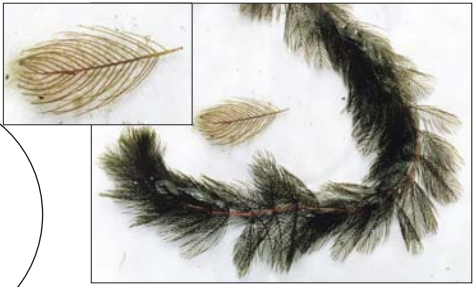
Habitat: Lakes, rivers, and ponds. Tolerates a wide range of water conditions.

May be confused with: Northern milfoil (*Myriophyllum sibiricum*), which has fewer than 14 leaflet pairs per leaf, generally has stouter stems and leaves that do not collapse when out of the water, and produces winter buds. Correct identification of watermilfoil species is complicated by the potential for hybridization.

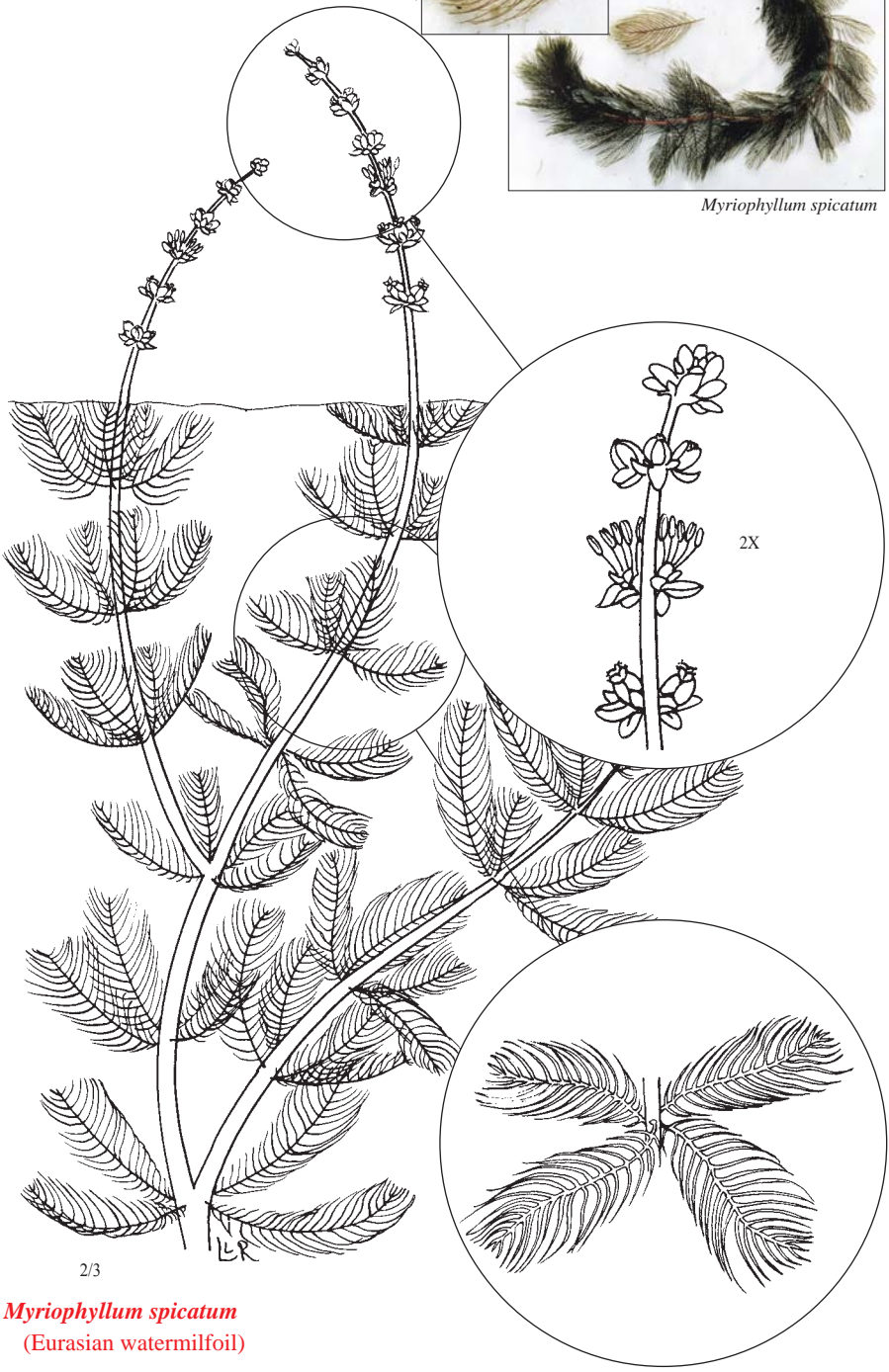


- INVASIVE -
Report this plant!

Frank Koster



Myriophyllum spicatum



23

LR

Myriophyllum spicatum
(Eurasian watermilfoil)

Species: *Myriophyllum verticillatum* L., whorl-leaf or whorled watermilfoil

Family: *Haloragaceae*

The native whorl-leaf watermilfoil is a mostly underwater plant with a flower spike that rises above the water. Like other watermilfoils, whorl-leaf watermilfoil has underwater leaves arranged in whorls around the stem. Each leaf is feather-like and consists of paired, thread-like leaflets. The above water leaves (on the flower stalks) are below each flower and are much smaller than the underwater leaves, although larger than the flowers. This species is considered rare or uncommon in Alaska.

Leaf: Two types. The feather-like submersed leaves are 0.5-5 cm long and arranged in whorls around the stem with 4-5 leaves per whorl. The thread-like, paired leaflets are up to 10 mm long and range from 7-17 leaflets per leaf. The deeply-divided emergent leaves (on the flower stalk) are arranged in whorls around the stalk and are 2-10 mm long with the lower leaves usually larger than the leaves near the tip of the stalk. Emergent leaves are longer than the flowers.

Stem: The stem is not highly branched and grows to 3 m long.

Flower: The tiny flowers have 4 petals and occur in the leaf bases on emergent stalks. The emergent flower spikes (stalks) are 5-12 cm long with male flowers located at the top of the spike, bisexual and female flowers below.

Fruit: The small fruit splits into 4 chambers with each chamber containing one seed.

Root: Rhizomes give rise to numerous, smaller, thinner roots.

Propagation: Plant fragments, rhizomes, seeds, and club shaped winter buds.

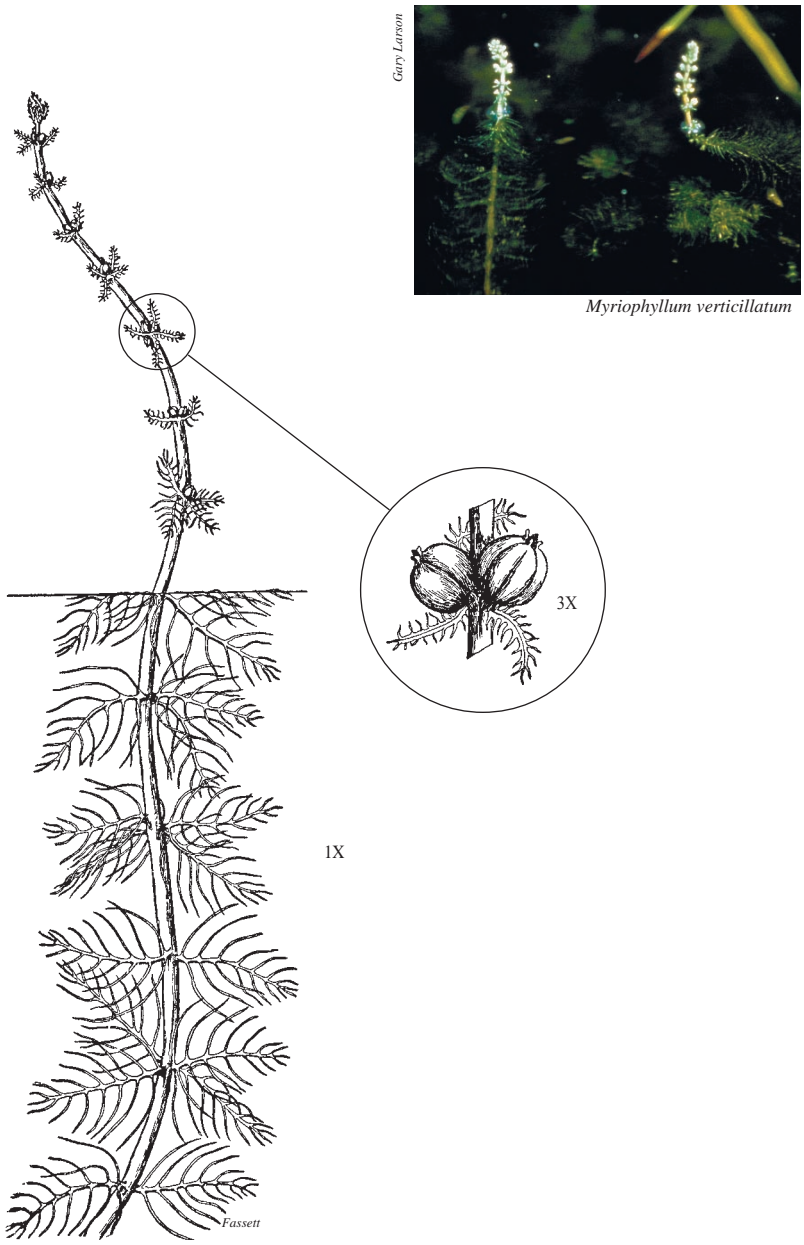
Importance of plant: Whorl-leaf watermilfoil provides habitat for aquatic invertebrates, which in turn provide food for fish and wildlife.

Distribution: North America, Europe, Asia, and North Africa. Although collected from all ecoregions of Alaska, this species is considered rare or uncommon.

Habitat: Lakes, ponds, ditches, and small streams.

May be confused with: Most other water-milfoil species. The underwater growth of whorled milfoil is easily confused with the non-native Eurasian watermilfoil (*M. spicatum*) or the native shortspike watermilfoil (*M. sibiricum*). When flowering, the size and shape of leaves on the emergent flowering stalk and presence and shape of winter buds at the end of the growing season can distinguish these milfoil species. Correct identification of watermilfoil species is complicated by the potential for hybridization.





Myriophyllum verticillatum
 (whorl-leaf watermilfoil, whorled watermilfoil)

Species: *Najas flexilis* (Willd.) Rost & Schmidt, nodding or wavy waternymph, slender naiad

Family: *Najadaceae*

Nodding waternymph is a completely submerged annual plant with opposite leaves that are clustered near the tips of the stems. Floating fragments of plants are not uncommon. The leaf base is much wider than the rest of the leaf blade, which helps to distinguish the water-nymphs from other underwater plants. These plants have inconspicuous flowers and fruits that are almost completely hidden by the leaf bases. Waternymph pollination takes place underwater.

Leaf: Glossy, green, and finely toothed leaves are oppositely arranged, but appear to be whorled near ends of the stems. Long leaves (1-3 cm long and 1-2 mm wide) taper to a long point and have broad bases that clasp the stem.

Stem: The slender, limp and branched stem is up to 2 m long and easily broken.

Flower: Inconspicuous, tiny (2-3 mm) flowers are located in clusters at the base of the leaves. Male and female flowers occur separately on the same plant. Waternymph pollen is transported by water currents.

Fruit: The small, smooth and glossy oval-shaped fruits are located in the leaf bases. Each fruit contains one seed that is about 3 mm long. Fruits are present in late summer.

Root: Fibrous.

Propagation: Seeds and plant fragments.

Importance of Plant: The entire plant is eaten by waterfowl. Waternymphs are considered to be one of their most important food sources. They also provide shelter for small fish and insects.

Distribution: Northern portions of North America and northern Europe. In Alaska, nodding waternymph is considered rare or uncommon, but has been documented in interior boreal and south coastal regions.

Habitat: Ponds, lakes, and sluggish streams to depths of 4 m. Nodding waternymph tolerates brackish conditions.

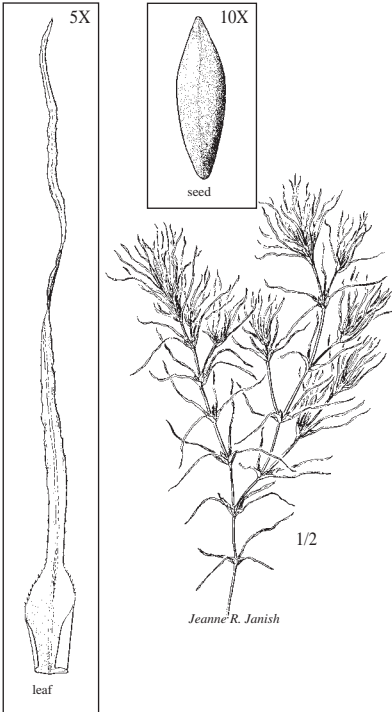
May be confused with: The broad sheathing leaf bases and the opposite leaf arrangement help to distinguish waternymphs from other submerged species such as nitella (*Nitella* spp.), water-starwort (*Callitriche* spp.), muskgrass (*Chara* spp.), and thin-leaved pondweeds (*Potamogeton* spp.).



Frank Koshore



Najas flexilis



Najas flexilis

(nodding or wavy waternymph, slender naiad)

Species: *Potamogeton crispus* L., curly pondweed, curly-leaved pondweed
Potamogeton zosteriformis Fern., flatstem or eelgrass pondweed
Family: *Potamogetonaceae*

Both curly and flatstem pondweed grow entirely underwater except for the flower stalk which rises above the water. Curly pondweed, non-native to North America, has distinctly wavy-edged, serrated olive-green to reddish-brown leaves. It usually grows early in spring and dies back in summer. Leaves of flatstem pondweed are long and narrow with smooth edges, and the sharp-edged stem is flat and about the same width as the leaves.

Leaf: Alternate, all submersed, no leaf stalks. **Curly:** oblong, stiff, translucent leaves (4-10 cm long, 5-10 mm wide) have distinctly wavy edges with fine teeth and 3 main veins. Sheaths (stipules) up to 1 cm long are free of the leaf base and disintegrate with age. **Flatstem:** smooth-edged leaves (5-20 cm long, 2-5 mm wide) have many veins. Sheaths (stipules) 2-6 cm long are free of the leaf base and become fibrous with age.

Stem: **Curly:** branched, up to 90 cm long, somewhat flattened. **Flatstem:** generally few branched, up to 2 m long, 0.7-4 mm wide, flattened, with sharp edges.

Flower: Tiny, with 4 petal-like lobes. **Curly:** in spikes 1-3 cm long on stalks up to 7 cm long. **Flatstem:** in spikes up to 3 cm long on stalks up to 10 cm long.

Fruit: Seed-like achene. **Curly:** 4-6 mm long, including 2-3 mm beak, back ridged. **Flatstem:** approximately 5 mm long, sharp ridge on back, short beak (to 1 mm).

Root: Fibrous, from slender rhizomes.

Propagation: Seeds and creeping rhizomes. **Curly:** spring-produced turions are hard, brown, and bur-like with crowded, small holly-like leaves; sprout in autumn. **Flatstem:** overwinters as leafy buds.

Importance of Plant: **Curly:** introduced to North America from Eurasia. Occasionally a nuisance, especially in the Midwest, but sometimes in the Pacific Northwest. **Flatstem:** provides wildlife food and habitat.

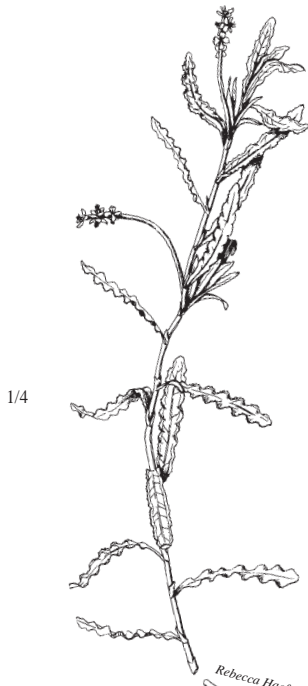
Distribution: **Curly:** nearly worldwide though **not currently known in Alaska**. **Flatstem:** widespread in temperate North America; in Alaska, most commonly reported from the interior boreal ecoregion; uncommon elsewhere.

Habitat: **Curly:** shallow to deep still or flowing water, tolerant of disturbance. **Flatstem:** ponds, lakes, 1-2.5 m deep.

May be confused with: **Curly:** Richardson's pondweed (*P. richardsonii*), which has clasping leaf bases and longer, wider leaves with more pointed tips. **Flatstem:** the distinctive broad, flattened, sharp-edged stems make this plant easy to distinguish from other submersed aquatic species.



- INVASIVE -
Report this plant!
(*P. crispus* only)



Leite, Mehrhoff



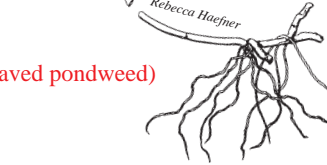
Steve Wells



turion

Potamogeton crispus

Potamogeton crispus
(curly pondweed, curly-leaved pondweed)

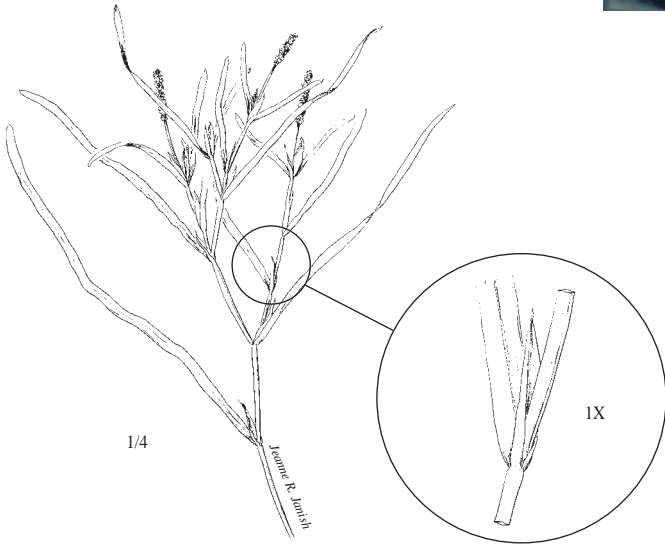


Rebecca Hoefner



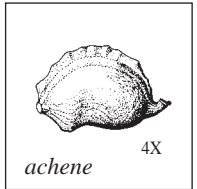
Clayton Amicau

Potamogeton zosteriformis



Jaime R. Jimish

T. Christopher Bracyshaw



achene

Potamogeton zosteriformis
(flatstem or eelgrass pondweed)

Species: *Potamogeton friesii* Ruprecht, *Fries' pondweed*, *flat-stalked pondweed*
Potamogeton obtusifolius Mert and Koch, *bluntleaf pondweed*
Family: *Potamogetonaceae*

These two pondweeds have long, narrow exclusively underwater leaves and short flower stalks. Bluntleaf pondweed is seldom seen and is included on the state rare plant list. Because of their similarity, great care must be taken when identifying these and other narrow leaved pondweeds.

Leaf: Submersed, alternate, linear, stalkless. Fries': leaves to 8 cm long, 3 mm wide have 3-5 prominent veins and tips with a tiny point. White sheaths (stipules) to 18 mm long are tubular at the base, free of the leaf base, and shred into persistent fibers. Bluntleaf: green to reddish translucent leaves to 10 cm long, 4 mm wide, have 3 veins and rounded or sometimes pointed tips. Translucent sheaths (stipules) to 3 cm long are open to the base, free of the leaf base, and shred into fibers.

Stem: Branching. Pairs of bump-like glands occur at leaf bases. Fries': slender, flattened, 1.5 m long, 0.5-1 mm wide with sphere-shaped glands. Bluntleaf: cylindrical to flattened, to 2 m long, slightly zigzag, with irregularly shaped glands.

Flower: Flat-stalked: in 2 to 4 whorls widely spaced on 1-2 cm long emergent spikes; flattened stalks to 5 cm long curve at the base. Bluntleaf: small, densely packed on spikes 1-2 cm long; straight, short stalks to 2 cm.

Fruit: Achene. Fries': 2-3 mm long, slightly ridged, curved or straight beak 0.6 mm long. Bluntleaf: 3-4 mm long, round or slightly ridged, straight beak to 0.7 mm long.

Root: Fibrous. Fries': sometimes with rhizomes.

Propagation: Seeds; dense, leafy winter buds (turions). Fries': outer leaves of winter buds (turions) with distinct corrugated base.

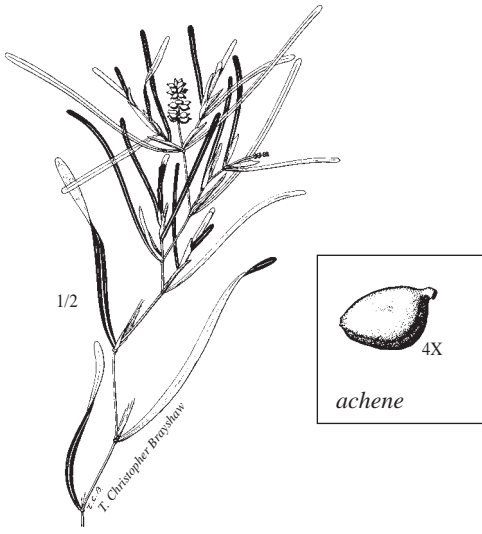
Importance of Plant: Provides food and cover for aquatic animals.

Distribution: Temperate Northern Hemisphere. Both species are known from Alaska's south coastal and interior boreal ecoregions, though bluntleaf pondweed is considered imperiled or rare here.

Habitat: Fries': fresh to alkaline or brackish water, to 3 m deep. Bluntleaf: shallow lakes and ponds.

May be confused with: Each other or other pondweeds with narrow underwater leaves. Microscopic examination of the glands at the leaf bases, sheath characteristics, and achene shape can distinguish them. They may hybridize with other pondweeds, forming plants with intermediate characteristics.





Frank Koshore



Potamogeton obtusifolius

Potamogeton obtusifolius
(Fries' pondweed, flat-stalked pondweed)



Frank Koshore



Potamogeton friessii

Potamogeton friessii
(bluntleaf pondweed)



winter bud (turion)

Species: *Potamogeton pusillus* L., small pondweed
Potamogeton foliosus Raf., leafy pondweed, closed-leaved pondweed
Family: *Potamogetonaceae*

Small and leafy pondweed grow in similar habitats and look alike. They also resemble other aquatic plants with thin leaves and delicate stems. These pondweeds have long, narrow leaves and, except for an occasional flower spike that briefly rises above the water, they remain underwater their entire lives. Because narrow leaved pondweeds look so much alike, close attention must be paid to minute details to distinguish among them.

Leaf: Submersed, alternate, stalkless. Small pondweed: linear leaves, 2-7 cm long, 0.5-2 mm wide, have pointed to rounded tips and 3 veins. Membranous tubular or open sheaths (stipules) are 1-3 cm long, free of the leaf base, and usually disintegrate before the leaves. Leafy pondweed: linear leaves, 2-10 cm long, 1-2.5 mm wide, have pointed tips and 1-5 veins. Sheaths (stipules) are free of the leaf-base with the lower portion forming a tube that eventually ruptures as new branches emerge.

Stem: Slender and profusely branched. Small pondweed: often with small paired yellowish glands at leaf base. Leafy pondweed: slightly flattened, paired glands lacking.

Flower: Small pondweed: 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. Leafy pondweed: in 2-4 whorls on an initially crowded spike (1 cm) that elongates as the season progresses; stalk 1-3 cm long.

Fruit: Achenes. Small pondweed: 1.5-3 mm long, rounded back, straight beak to 0.5 mm long. Leafy pondweed: To 2 mm long, with distinctively wavy ridged achene, beak 0.5 mm long.

Root: Small pondweed: Fibrous, from base of plant; often non-rhizomatous. Leafy pondweed: fibrous, emerging from thread-like rhizomes.

Propagation: Seeds and winter buds form at lateral branch tips and near leaf bases. Leafy pondweed also has rhizomes.

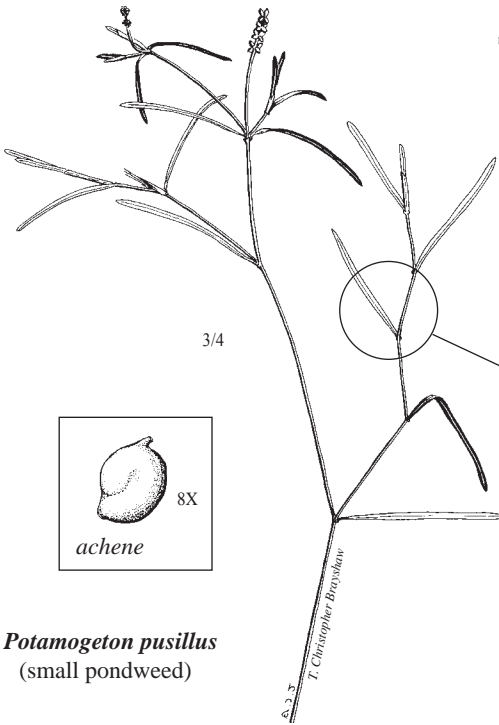
Importance of Plant: Seeds and vegetation provide cover and food for aquatic animals.

Distribution: Small pondweed: widespread in Northern Hemisphere; found in all ecoregions of Alaska. Leafy pondweed: widespread in North and Central America; known in Alaska in the interior boreal and south coastal ecoregions.

Habitat: Small pondweed: wide tolerance of habitats, including brackish conditions. Leafy pondweed: marshes and shallow standing water.

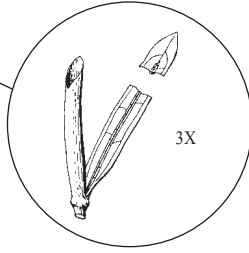
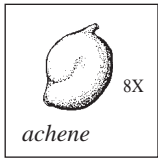
May be confused with: Each other and other narrow leaved submersed plants. Careful examination of the glands at the leaf bases, leaf characteristics, and fruits is required to distinguish them. When fruits are present, the wavy keel of the achene of leafy pondweed is particularly distinctive. Two subspecies of small pondweed are known in Alaska; *P. pusillus* subsp. *tenuissimus* is more common than *P. pusillus* subsp. *pusillus*.



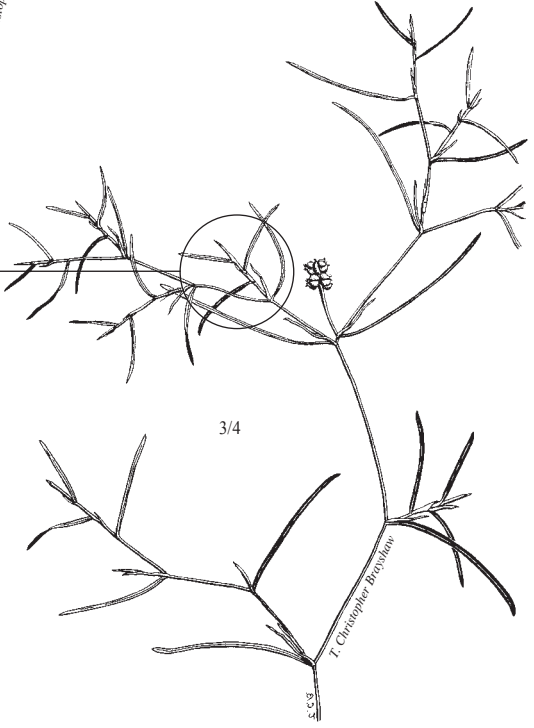
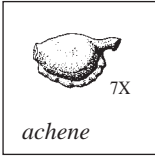
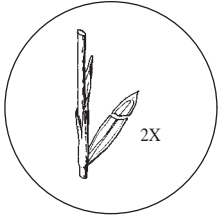


Clayton Antleau

Potamogeton pusillus



Potamogeton pusillus
(small pondweed)



Potamogeton foliosus
(leafy pondweed, closed-leaved pondweed)

Species: *Potamogeton praelongus* Wulfen, whitestem or long-stalked pondweed
Potamogeton richardsonii (A. Bennett) Rydb., Richardson's pondweed
Family: *Potamogetonaceae*

Both have broad, wavy-edged underwater leaves with leaf bases that wrap part way around the stem and no floating leaves. However, whitestem pondweed leaves have prow-shaped tips and are longer than those of Richardson's pondweed. Richardson's pondweed leaves are often green and white banded. Whitestem pondweed is often the first pondweed seen in early spring.

Leaf: Submersed, alternate, stalkless, with heart-shaped bases clasping the stem. Whitestem: shiny leaves, 5-35 cm long, 1.5-2.5 cm wide, often appear wavy or twisted, with hooded or prow-shaped leaf tips. Leaves are widest below the middle of the leaf with 5 or more distinct veins. Sheaths (stipules) are stiff, whitish, 3-10 cm long, and arise from leaf bases. Richardson's: densely spaced, lance-shaped leaves, 2-13 cm long, 1-3 cm wide, have wavy or crinkled margins often curved backwards, with 7 or more veins. Membranous sheaths (stipules) less than 2 cm long arise from leaf bases, disintegrating or becoming fibrous early in the growing season.

Stem: Whitestem: whitish, zigzag branching toward the top, to 3 m long, 2-3 mm thick. Richardson's: often branched, rarely zigzagged, to 1 m long.

Flower: Small, clustered on whorls on emergent spikes. Whitestem: in 6-12 whorls on spikes up to 5 cm long; flower stalks to 0.5 m long. Richardson's: in 4-12 whorls on short spikes 2-4 cm long; flower stalks generally just longer than the spike, but sometimes much longer.

Fruit: Achene. Whitestem: 4-6 mm long, including stout beak, ridged on the back. Richardson's: 2.5-4 cm long, including 0.5-1 mm long beak, usually not ridged.

Root: Fibrous, from stout rhizomes. Rhizomes of whitestem pondweed are brown-spotted with numerous air cavities.

Propagation: Seeds, rhizomes. Whitestem: forms winter buds.

Importance of Plant: Both provide good food and habitat for aquatic animals and waterfowl.

Distribution: Widespread in North America. Whitestem found in interior boreal and south coastal ecoregions, while Richardson's is additionally documented in some western alpine areas.

Habitat: Whitestem: deep, clear lakes, in up to 6 m of water. Richardson's: shallow to deep (0.5-3.5 m) water, often in alkaline lakes and marl encrusted.

May be confused with: Each other. Whitestem pondweed has longer leaves with hooded tips and its strongly zigzag stem is also diagnostic. Other pondweeds with broad underwater leaves have floating leaves and the leaf bases of submersed leaves do not clasp the stem. Pondweeds often form hybrids, so plants with intermediate characteristics are common.





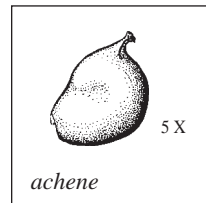
Potamogeton praelongus

Potamogeton praelongus
(whitestem pondweed, long-stalked pondweed)



Potamogeton richardsonii

Potamogeton richardsonii
(Richardson's pondweed)



Species: *Potamogeton robbinsii* Oakes, Robbins' pondweed, fern-leaf pondweed

Family: *Potamogetonaceae*

Robbins' pondweed is a stiff, robust plant with underwater leaves only. It is usually easily recognized because its dark green, closely spaced leaves are arranged in a rigid, flattened spray, giving it a palm frond or fern-like appearance. Robbins' pondweed is usually a low-growing plant and only approaches the water surface when flowering. The flowering stalks have more widely spaced leaves that are less fan-like in appearance. Like other pondweeds, Robbins' pondweed has membranous appendages (stipules) at the leaf bases. Stipules form a short sheath around the stem and are partially fused to the leaf blades causing the leaves to seem jointed or bent at the base if they are pulled from the stem.

Leaf: All leaves are submersed. The olive green to brown stiff leaves are linear, minutely toothed, and are attached about halfway along the stipular sheaths, which are then attached to the stem. Leaves measure up to 12 cm long and 6 mm wide and have many parallel veins. Leaves form a rigid flattened spray that resembles the leaf arrangement of a palm frond or a swordfern. The white sheaths (stipules) are less than 3 cm long with the lower 10-15 mm fused to the blade; the sheath tip shreds into fibers.

Stem: Stout stems up to 3 m long that often creep along the bottom and will root at the lower nodes.

Flower: Small flowers with 4 petal-like lobes occur on spikes near the water surface. The up to 2 cm long spikes occur on flat, stiff stalks with widely spaced leaves.

Fruit: The achenes are up to 4 mm long, are keeled, and have a curved beak to 1 mm long.

Root: Fibrous roots emerge from slender rhizomes and the lower stem.

Propagation: Seeds, rhizomes, winter buds.

Importance of Plant: Seeds and vegetation provide food and cover for aquatic animals and waterfowl.

Distribution: Northern North America. Uncommon in Alaska and considered critically imperiled; documented in the interior boreal ecoregion.

Habitat: Shallow to deep water, usually with low alkalinity.

May be confused with: The dark color and palm-frond-like appearance of Robbins' pondweed are distinctive. It may hybridize with other pondweeds to form plants with intermediate characteristics.





Bob Bremner



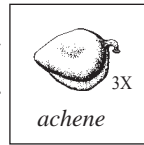
Potamogeton robbinsii

Jamie Ferneman



Potamogeton robbinsii

T. Christopher Brayshaw



achene

Potamogeton robbinsii
(Robbins' pondweed, fern-leaf pondweed)

Species: *Potamogeton subsibiricus* Hagstr. (Synonym: *Potamogeton porsildiorum* Fern.)
Yenisei River pondweed

Family: *Potamogetonaceae*

Yenisei River pondweed is another *Potamogeton* species with long, narrow leaves and short flower stalks, both of which are found exclusively underwater. Plants typically have unbranched or sparsely-branched stems. Yenisei River pondweed is rare globally and in Alaska and because of their similarity, great care must be taken when identifying these and other narrow leaved pondweeds. Close inspection of leaf veins will distinguish this species from other, more common thin-leaved pondweeds.

Leaf: Submersed, spirally arranged, stalkless. Limp, linear dark green leaves 3.5-9.5 cm long, 1.5-2 mm wide, have tapering or sometimes sharply pointed tips and 9-17 veins. Membranous tubular sheaths (stipules) are pale brown, 1-2 cm long, free of the leaf base, with rounded or blunt ends; these are often inconspicuous and/or dissintegrated. Overwintering buds (turions) are common.

Stem: Slender and flattened reaching up to 50 cm long; simple or branching occasionally towards the top.

Flower: Simple submersed cylindrical spike 10-30 mm, 3-4 whorles of flowers on flower stalk up to 3.5 cm long arising from leaf axils.

Fruit: Reddish brown achenes are oblong to obovoid (3-4 mm long, 1.5-2mm wide), with an abaxial ridge and a straight beak, 0.3-0.5 mm long. Fruiting in early to late summer.

Root: No rhizomes, fibrous roots.

Propagation: Seeds and dense, leafy winter buds (turions).

Importance of Plant: Seeds and vegetation provide food and cover for aquatic animals and waterfowl.

Distribution: Found in Siberia, Canada and Alaska, where it has been documented in the interior, south central, western and arctic regions. Documented, but rare, in all ecoregions of Alaska.

Habitat: Shallow water of ponds and lakes at low to mid elevation.

May be confused with: Other narrow leaved submersed plants. Careful examination of the leaf characteristics, especially the number of leaf veins, may distinguish them: Yenisei River pondweed has many more veins than any of Alaska's other narrow-leaved *Potamogeton* spp.



NO PHOTO OR LINE DRAWING AVAILABLE
FOR
Potamogeton subsibiricus
(Yenisei River pondweed)

Species: *Ranunculus aquatilis* L. (Synonym: *R. aquatilis* var. *diffusus* Withering p.p.), white water crowfoot, water buttercup

Ranunculus trichophyllus Chaix, threadleaf crowfoot

Family: *Ranunculaceae*

Aquatic buttercups, unlike their terrestrial cousins, are found in ponds, lake margins, ditches, and streams. Small white flowers with yellow centers rise above the water surface. White water crowfoot plants often have two distinct types of leaves (finely divided, thread-like, fan-shaped underwater leaves and floating or emerged leaves that appear scalloped) while the threadleaf crowfoot plants have just the finely divided, thread-like type. These plants sometimes form conspicuous mats on the water surface.

Leaf: Alternately arranged on the stem. White water: Submersed leaves are branched into more than 20 thread-like segments. These fan-shaped leaves are 1-4 cm wide and are attached to the stem by 1-2 cm long leaf stalks. These underwater leaves generally collapse when removed from the water. When growing on mud, more compact versions of the submersed leaf will form. Leaf form is variable depending on the season and growing conditions and floating leaves are often absent. When present, these scalloped leaves (0.5-2 cm long) are flat and have 3 to 5 main lobes. Threadleaf: all leaves are submersed and finely divided; no floating leaves.

Stem: The long, smooth, or slightly hairy stem can grow to 1 m and is weak, branched, and rooting at the lower nodes.

Flower: Single flowers on stalks (1-6 cm long) rise above the water surface. Each flower is 1-2 cm across, has a yellow center, and 5 white petals. As the fruit matures, the petals detach and the flower stalks tend to curve away from the stem.

Fruit: Clusters of 10 to 20 beaked achenes (1-2 mm long) per flower, often with cross ridges. Achenes of white water may be slightly larger than those of threadleaf, but variation may be due to environmental conditions.

Root: Fibrous roots often emerge from nodes on lower portions of the stems.

Propagation: Seeds and stem fragments.

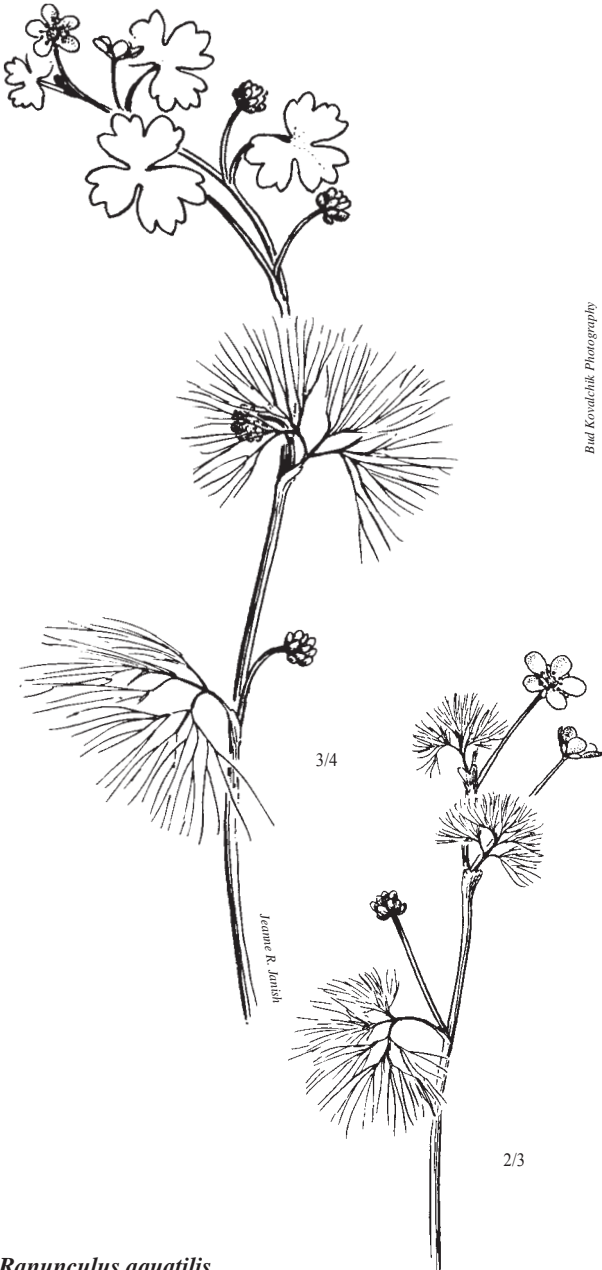
Importance of Plant: Fruits are eaten by waterfowl. Some buttercup species are poisonous, and others are used for medicinal purposes.

Distribution: Varieties are found nearly worldwide; widely distributed in all ecoregions of Alaska.

Habitat: Ponds, lake margins, rivers, slow-moving streams or ditches.

May be confused with: Each other; the flat, floating leaves which distinguish white water crowfoot from threadleaf crowfoot often only form late in the season and may not form if growing in deep water. There are many other *Ranunculus* spp., commonly found in wet, marshy habitats, but these have yellow flowers rather than white. Fanwort (*Cabomba caroliniana*) is not currently known in Alaska, but its opposite leaves can distinguish this invasive plant from these native *Ranunculus* species.





Ben Leiger

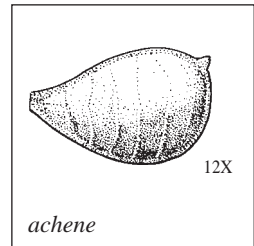


Ranunculus aquatilis

Brad Kovalevich Photography



Ranunculus trichophyllus



achene

Ranunculus aquatilis
(white water crowfoot, water buttercup)

Species: *Ruppia cirrhosa* (Petag.) Grande (Synonym: *Ruppia spiralis* L. ex Dumort.),
spiral ditch-grass
Ruppia maritima L., *widgeongrass*
Family: *Ruppiaceae*

Widgeonweeds (*Ruppia* spp.) are bushy, fan-like underwater plants (occasionally the flowers may extend above the water) with slender grass-like leaves attached to sheathing bases. They are freshwater species with a high salinity and alkalinity tolerance. They can be perennials or annuals and are variable in form depending on environmental conditions. Some botanists believe that widgeongrass and spiral ditch-grass are a single variable species with most differences in appearance related to habitat.

Leaf: Long, narrow, alternate leaves are less than 1 mm wide. Stipular sheaths, less than 7 cm long, are completely fused to the leaf and often broadly clasp the stem. *Spiral ditch-grass*: leaves to 45 cm long. *Widgeongrass*: leaves to 10.5 cm long.

Stem: Many branched stems, to 0.5 m long, less than 1 mm wide, root at the nodes and often have a zigzag appearance. Produces slender horizontal rhizomes.

Flower: Tiny flowers (3-5 mm across) lack petals and sepals, and occur in pairs on stalks. Pollination often occurs underwater or at the water surface. Once pollinated, the flower stalk coils.

Fruit: Dark colored, egg to pear-shaped, symmetrical to highly asymmetrical achene is 1.5-2 mm long and occurs in a cluster. Each fruit is on individual stalks, but all are connected to a long flowering stalk (peduncle). *Spiral ditch-grass*: peduncle 30 mm or longer; 5-30 coils. *Widgeongrass*: peduncle less than 25 mm; fewer than 5 coils (sometimes none).

Root: Fibrous. From lower nodes of erect stems and shallowly buried rhizomes.

Propagation: Seeds, fragments, rhizomes; occasionally produces overwintering buds.

Importance of Plant: Provides cover and food for many aquatic species. All plant parts are eaten by waterfowl (over 5,000 seeds were found in one duck). Often used for habitat rehabilitation.

Distribution: Both species known worldwide and documented largely in Alaska's south coastal ecoregion.

Habitat: *Spiral ditch-grass*: mostly an inland plant found in alkaline lakes. *Widgeongrass*: mostly a coastal species found in brackish water and will tolerate tidal exposure.

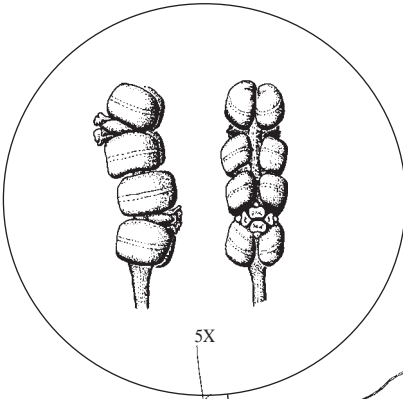
May be confused with: Each other. Peduncle length is the most consistently different physical characteristic; habitat also helps. *Widgeongrass* is usually in coastal salty water, and *spiral ditch-grass* is usually in inland alkaline water. When not in flower or fruit, they closely resemble sago pondweed (*Stuckenia pectinata*), but sago pondweed has stipules that are not completely fused to the leaf.



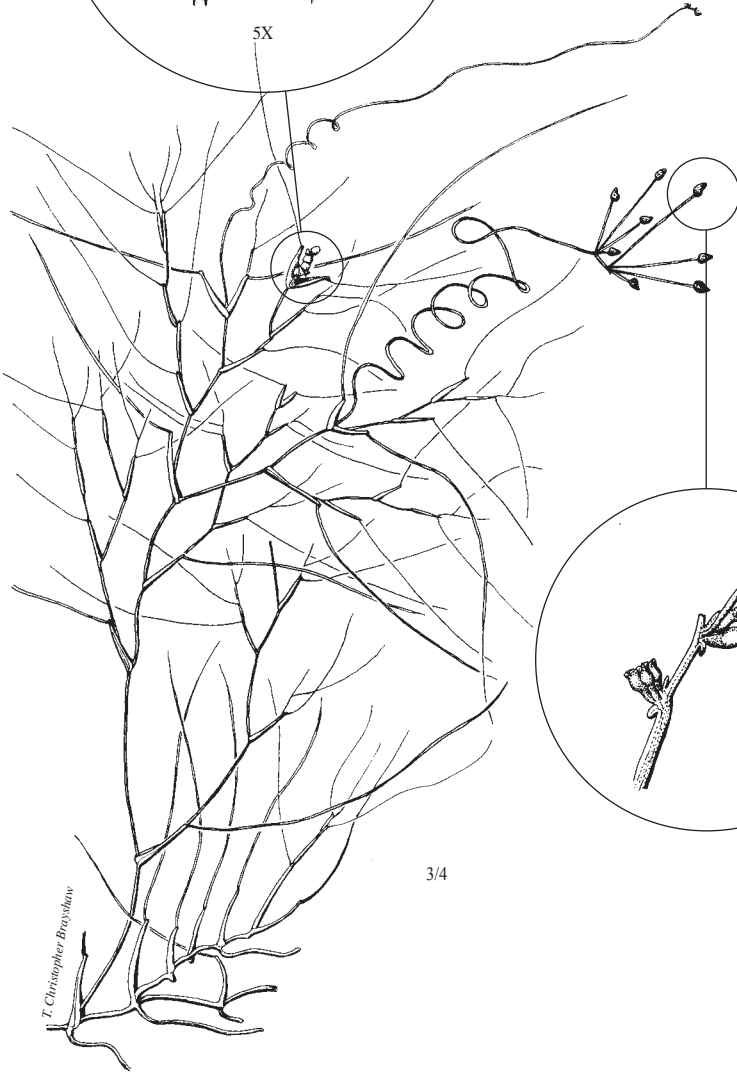
WES



Ruppia maritima



5X



3/4

T. Christopher Braysshaw

Ruppia cirrhosa
(spiral ditch-grass)

Species: *Schoenoplectus subterminalis* (Torr.) Soják (Synonym: *Scirpus subterminalis*)
swaying bulrush, water bulrush

Family: *Cyperaceae*

Unlike other bulrush species (*Schoenoplectus* spp.) with stout emergent stems, swaying bulrush grows mostly underwater and has limp, weak, underwater stems and leaves. The green, hair-like leaves and long, round stems grow completely underwater except for the flower spike, which rises above the water surface. The solitary flower spikes are short, light brown in color, and appear to grow out of the side of the stem.

Leaf: The long, very narrow, green leaves (approximately 0.5 mm wide and up to 1 m long) are limp, grasslike, and originate in a bundle at the base of the plant. Leaf tips often float on the water surface.

Stem: The slender, limp, round stem is 20-140 cm long and less than 1 mm wide.

Flower: Flowers are arranged in dry, solitary, light brown spikes 6-13 mm long and 4-7 mm wide and are at or near the stem tips. Individual flowers are hidden behind pointed scales that are 4-6 mm long. What appears to be a continuation of the stem above the flower spike is really a modified bract. The flowering spikes emerge above the water surface. Swaying bulrush blooms July to August.

Fruit: Small achenes (2.5-3.5 mm) are hard, three-sided with a prominent tip, and contain one seed.

Root: Delicate, slender rhizomes grow partly or completely below the sediment surface.

Propagation: Rhizomes and seeds.

Importance of Plant: Seeds of many bulrush species are among the most important foods for North American ducks. Stems and roots are eaten by muskrats and geese.

Distribution: Northern and eastern North America. Considered critically imperiled in Alaska, where the few documented occurrences are from south coastal habitats near Sitka and Ketchikan.

Habitat: Quiet shallow water of ponds, lakes, and marshes, and typically grows in water 0.5-1 m deep.

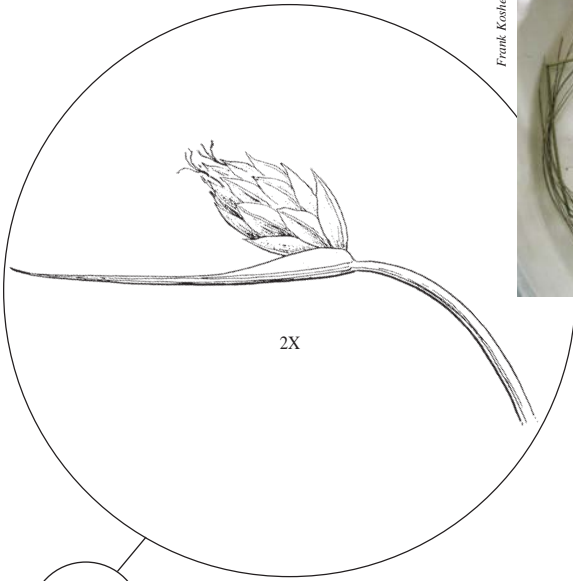
May be confused with: Bur-reeds (*Sparganium* spp.) have much broader leaves (usually 0.5-1 cm wide). Spreading rush (*Juncus supiniiformis*) has flowers that occur in clusters at the stem tips. Sedges and other members of the bulrush family, none of which have the long, submersed, hair-like leaves and the solitary flower spike of swaying bulrushes.



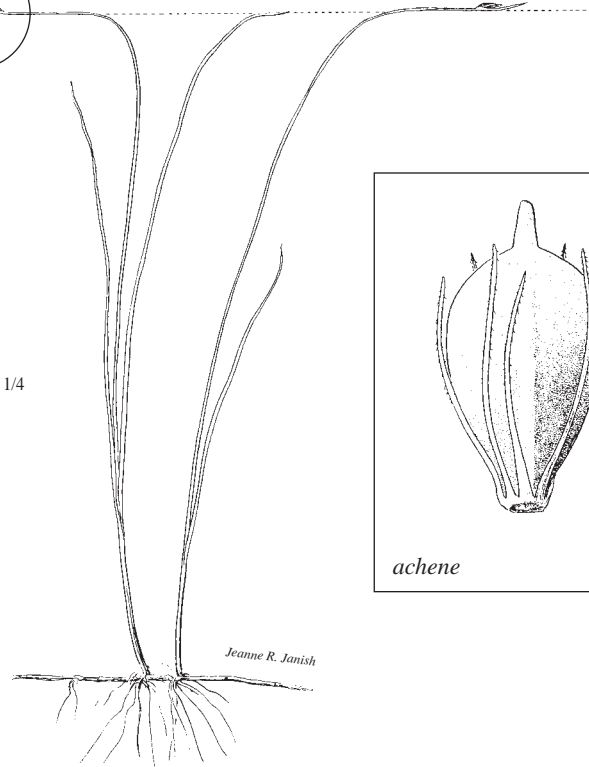
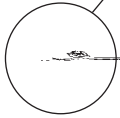
Frank Koster



Schoenoplectus subterminalis

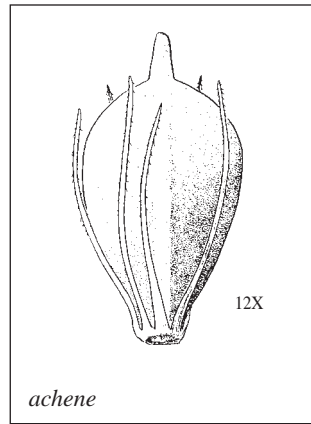


2X



1/4

Jeanne R. Janish



12X

achene

Schoenoplectus subterminalis
(swaying bulrush, water bulrush)

Species: *Stuckenia filiformis* (Pers) Böerner, *fineleaf pondweed*
Stuckenia pectinata (L.) Börner, *sago pondweed*
Stuckenia vaginata (Turcz.) Holub, *sheathed pondweed*
Family: *Potamogetonaceae*

These pondweeds have long, narrow underwater leaves and no floating leaves. Each was formerly recognized in the genus *Potamogeton*, but can be distinguished from thin-leaved *Potamogeton* spp. by their membranous sheaths (stipules) fused to leaf bases for at least 2/3 the length of the stipule and their opaque, channeled, and turgid leaves. Often the leaves spread out to produce a bush-like appearance. In Alaska, two subspecies of fineleaf pondweed are common: *S. filiformis* subsp. *occidentalis* tends to be larger overall and found in cold, slow to fast-flowing streams while *S. filiformis* subsp. *alpina* is smaller and typically found in standing waters.

Leaf: Alternate, thin, submersed with stipules fused to leaf base for most of their length
Sago: 2-12 cm long, 1 mm wide leaves have pointed tips and 1 (sometimes 3) veins. Sheath (stipules) 1-3 cm long. Fineleaf: brownish leaves, to 12 cm long, 0.5-2 mm wide, have pointed tips and 1-3 veins. Sheath (stipules) to 3 cm are tubular when young, later splitting.
Sheathed: often dark-brown leaves, to 10 cm long, 1-2 mm wide, have rounded tips and 1-3 veins. Sheaths (stipules) on main stem leaves are twice as wide as the stem, margins free.

Stem: Sago and fineleaf: thread-like, branched. Sheathed: stout below, slender above, can have 2-3 branches emerging at each node.

Flower: Sago: 2-6 whorls in spikes 1-2 cm long, usually float horizontally just beneath the water. Terminal or axillary stalk 4-12 cm. Fineleaf: 2-8 whorls on open 2.5 cm spikes; the lowest whorl sometimes remote from the others. Terminal stalks to 15 cm. Sheathed: 5-9 evenly spaced whorls on slender, flexible stalks to 12 cm.

Fruit: Achenes. Sago: 3-5 mm long, plump, back rounded, reddish-brown when ripe, beak to 0.7 mm long. Fineleaf: 2-3 mm long, broad oval, back rounded, tiny beak (0.3 mm). Sheathed: 3-4 mm long, broad oval, rounded or slightly ridged, no beak.

Root: Fibrous, from plant base and rhizomes. Sago and fineleaf produce tubers from rhizome tips.

Propagation: Seeds and rhizomes. Sago and fineleaf: also from tubers.

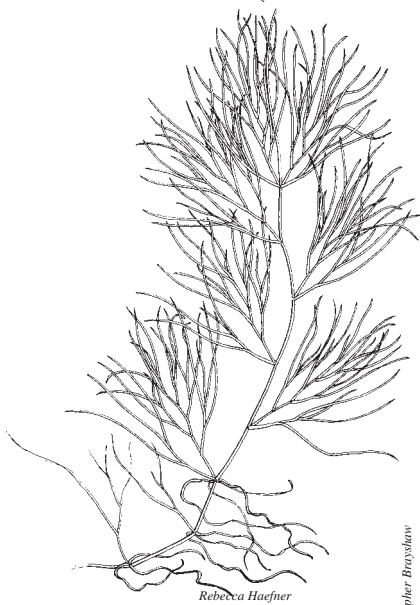
Importance of Plant: All provide food and cover for many aquatic animals. Seeds, tubers, and vegetation of sago pondweed are especially important waterfowl food.

Distribution: Many locations throughout the world. In Alaska, found in all ecoregions.

Habitat: Sago: tolerates a wide range of conditions, including brackish, alkaline, or nutrient-rich water; still to slow moving waters; 0.5 - 2.5 m deep. Fineleaf: often in shallows (15-100 cm deep) of hard water lakes. Sheathed: cold lakes and slow rivers; 1.5-3 m deep.

May be confused with: These species are so similar that some taxonomists consider them to be one species. Careful examination of the sheaths, flowers, and fruits is required to reliably distinguish them. Also widgeonweeds (*Ruppia* spp.) have similar leaves, but the sheath is completely fused to the leaf, and the fruits are differently shaped.





1/5

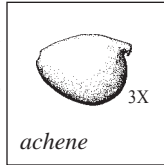
Frank Kohler



Stuckenia pectinata

Stuckenia pectinata
(sago pondweed)

T. Christopher Bryshaw

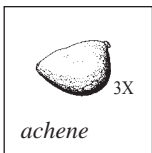
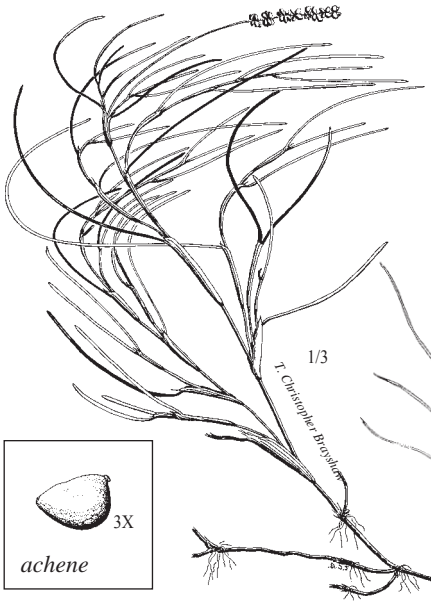


achene

Gary Larson

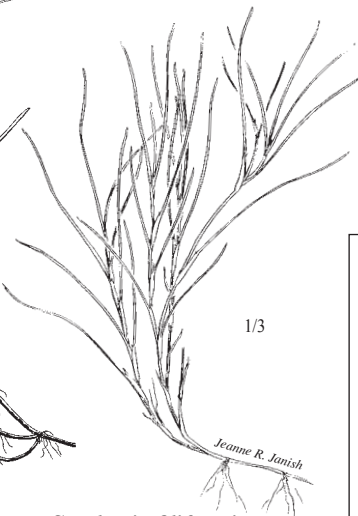


Stuckenia filiformis



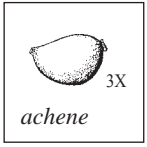
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Stuckenia vaginata
(sheathed pondweed)

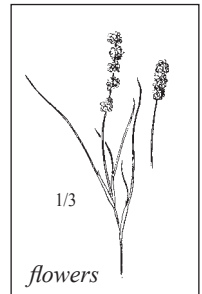


Stuckenia filiformis
(fineleaf pondweed)

T. Christopher Bryshaw



achene



flowers

Species: *Subularia aquatica* L., waterawlwort, American awlwort

Family: Brassicaceae

This small, rather uncommon, underwater herb appears as a tuft of quill-like leaves with a leafless flower stalk growing 2-10 cm tall. The small, white, 4-petaled flowers appear in a loose cluster along the ends of the stalks. The plant is found in shallow water in clear, cold lakes and slow streams, often on sandy or gravelly sediments. Waterawlwort produces the oblong seedpods characteristic of the mustard family to which it belongs. It is usually an annual plant, although it may overwinter if completely submersed.

Leaf: Narrow leaves (1-5 cm long) are wider at the base and taper to a pointed tip. Leaves are round in cross-section with all the leaves emerging from the plant base.

Stem: Short, thick, underground corm between the leaves and roots.

Flower: 2 to 8 small (1 mm long) flowers are arranged in a loose cluster at the end of flower stalks. Each flower has 4 sepals and 4 white petals. Flower stalks are smooth and erect to 12 cm tall and may have a few green leaf-like bracts. If submersed, flowers self-pollinate while remaining closed. Flowers open if above the water surface. Blooms June through August.

Fruit: Inflated, oblong, ribbed pods are 2-3 mm long with each pod containing several seeds.

Root: White, fibrous roots. Lacks rhizomes.

Propagation: By seeds.

Importance of Plant: Provides habitat for small animals, stabilizes shorelines, and is occasionally cultivated for aquaria.

Distribution: Across northern North America and also Eurasia, although Eurasian plants are often considered a different variety. Found in Alaska's interior boreal and south coastal ecoregions.

Habitat: Submerged in streams, lake shorelines, and shallow ponds. Usually in gravelly substrates; sometimes exposed as water levels drop.

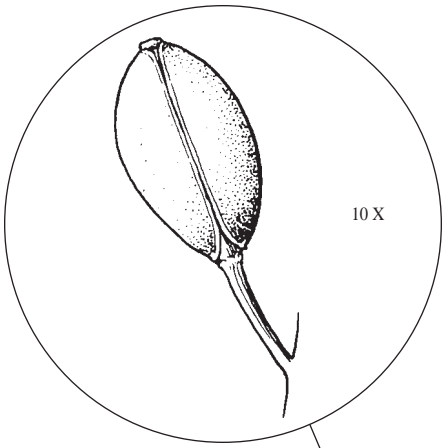
May be confused with: Many other small tufted plants such as: spikerushes (*Eleocharis* spp), which have solitary cone-like flower clusters that usually rise above the water surface and do not produce inflated pods; water lobelia (*Lobelia dortmanna*), which has similar rosettes of leaves, but the leaves are hollow and less pointed; quillworts (*Isoetes* spp.), which have distinctive, widened leaf bases.



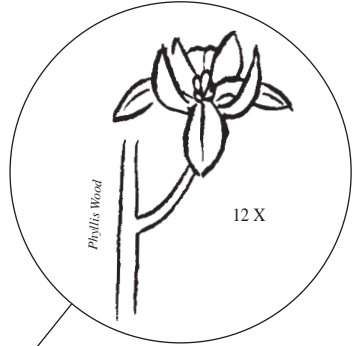
Dana Veselli



Subularia aquatica

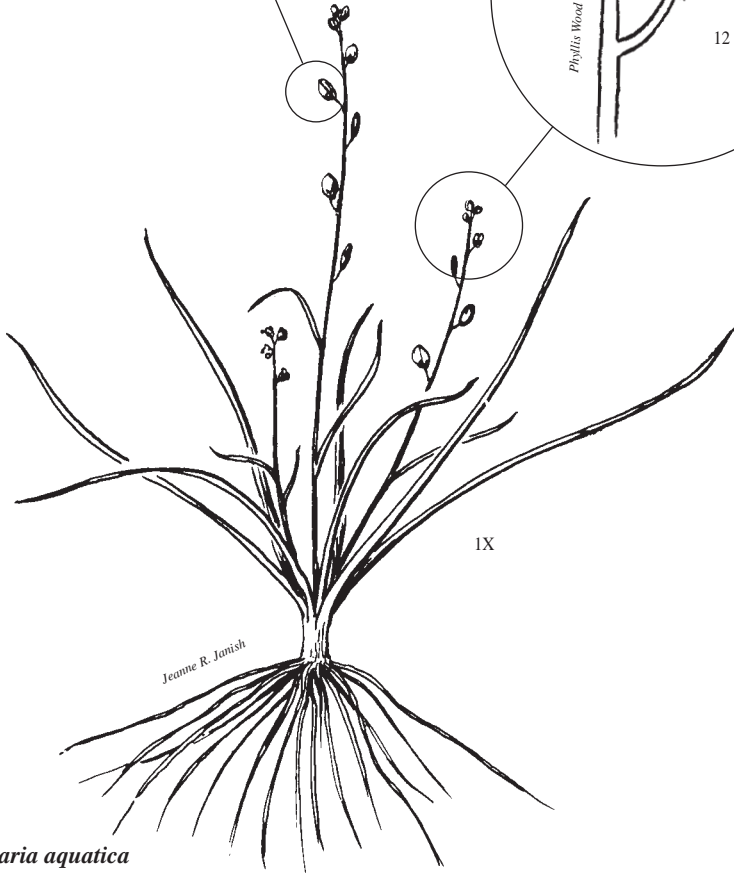


10 X



Phyllis Wood

12 X



IX

Jeanne R. Jamish

Subularia aquatica
(waterawlwort, American awlwort)

Species: *Utricularia inflata* Walt., swollen bladderwort
Utricularia macrorhiza Le Conte (Synonyms: *U. vulgaris*, *U. vulgaris* subsp. *macrorhiza*), common bladderwort or greater bladderwort
Family: *Lentibulariaceae*

Bladderworts are free-floating, submersed carnivorous plants with delicate, finely divided underwater leaves and emergent snapdragon-like yellow flowers. Bladderworts often appear dense and bushy underwater. Their most distinctive underwater features are the small bladder-like traps. These traps capture small invertebrates or even tiny fish that trigger the trap door. Enzymes are secreted to digest the prey, which then provides the plant with nutrients. Several bladderwort species are native to Alaska, but the non-native swollen bladderwort could become a nuisance if spread from Washington.

Leaf: No true leaves, but with many alternately arranged, green, finely-divided leaf-like stems with small seed-like bladders. Swollen bladderwort: distinctive spoke-like whorl of 4 to 10 wedge-shaped floating leaves (4 to 9 cm long) supports the flower stalk. Common bladderwort: 1-5 cm long, divided into 2 parts at the base, up to 20 segments total, pointed tips, bristly margins and round in cross-section; bladders 1-3 mm.

Stem: Branched stem is up to 2 m long; may be floating, submersed, or creeping on the sediment, sometimes anchored at the base by root-like structures.

Flower: Yellow, snapdragon-like flowers occur above the water. Swollen bladderwort: 3 to 14 flowers (up to 20 mm long) on upright stalks supported by a spoke-like float. Common bladderwort: 6-20 flowers (10-20 mm long) on stout stalks, with a prominent spur projecting below the lower lip of the flower. Flowers often have faint purple-brown stripes. Flowers in late summer.

Fruit: Capsule contains many seeds. Swollen bladderwort: fruit stalk (pedicel) to 35 mm long. Common bladderwort: pedicel to 20 mm long.

Root: None.

Propagation: Fragments, seeds. Swollen bladderwort: may form tiny tubers, small coiled winterbuds. Common bladderwort: may form very large (4-5 cm across) bright green winterbuds.

Importance of Plant: Food and cover for fish. Food for muskrats and waterfowl. Habitat for aquatic invertebrates. Swollen bladderwort: can become invasive, forming thick mats.

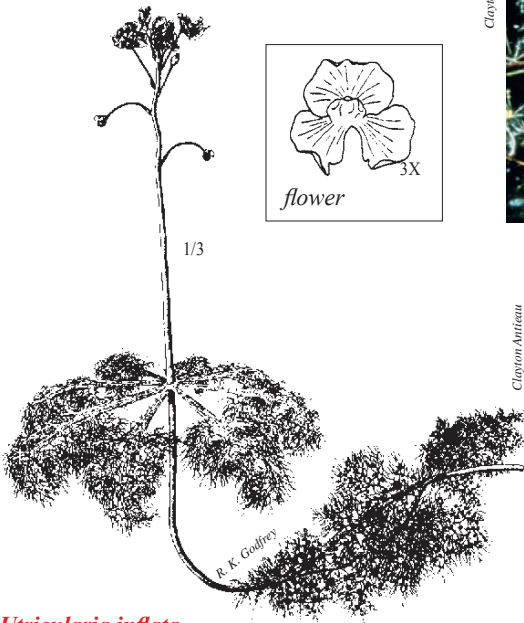
Distribution: Swollen bladderwort: native in eastern and southern North America, but introduced to in western Washington. **Not currently known in Alaska.** Common bladderwort: throughout the Northern Hemisphere; widespread throughout Alaska.

Habitat: Floating freely in shallow water or loosely attached to sediment.

May be confused with: Aquatic buttercups (*Ranunculus* spp.) and watermilfoils (*Myriophyllum* spp.) when without bladders or flowers. Other less common bladderworts. *Utricularia minor* has much smaller with flowers less than 9 mm long. *U. intermedia* has white bladders on separate stems from the “leaves.”

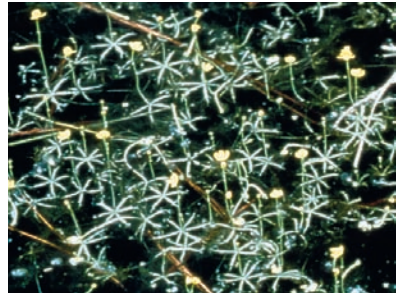


- INVASIVE -
Report this plant!
(*U. inflata* only)



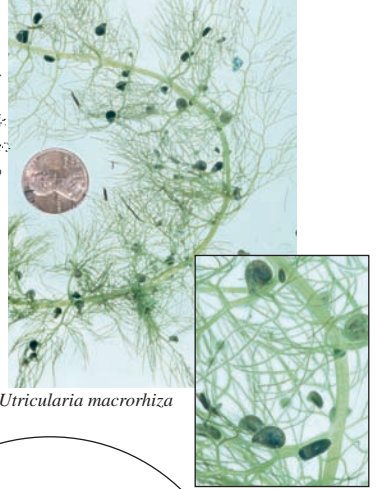
Utricularia inflata
(swollen bladderwort)

Clayton Aniteau

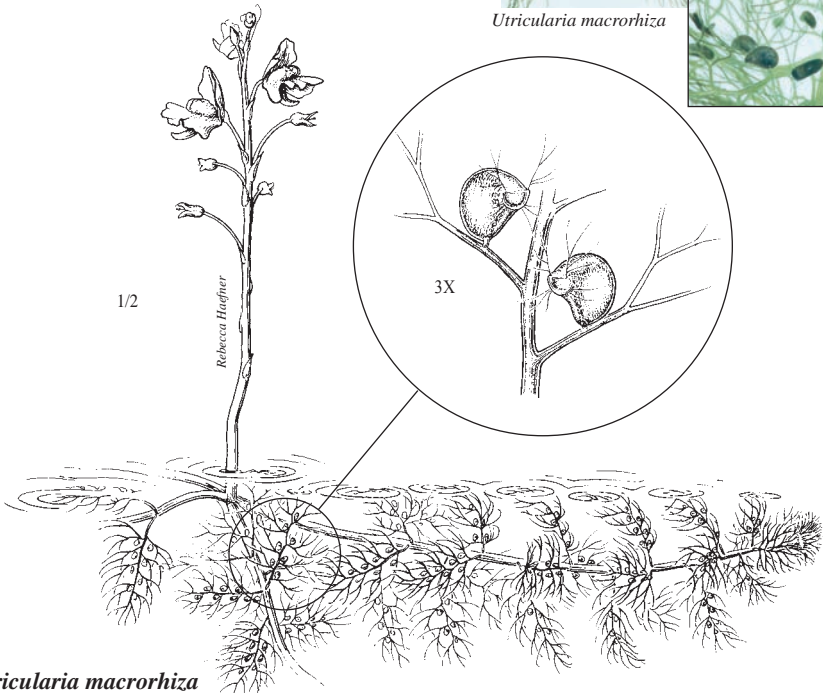


Utricularia inflata

Clayton Aniteau



Utricularia macrorhiza



Utricularia macrorhiza
(common bladderwort or greater bladderwort)

Species: *Utricularia intermedia* Hayne, flatleaf bladderwort

Utricularia minor L., lesser bladderwort

Family: *Lentibulariaceae*

Bladderworts are free-floating, submersed carnivorous plants with delicate, finely divided underwater leaves and emergent snapdragon-like yellow flowers. They often appear dense and bushy underwater. Their most distinctive underwater features are the small bladder-like traps. These traps capture small invertebrates or even tiny fish that trigger the trap door. Enzymes are secreted to digest the prey, which then provides the plant with nutrients. Several bladderwort species are native to Alaska.

Leaf: No true leaves, but with many alternately arranged, green, finely-divided flattened leaf-like stems. Divided into 3 parts at the base and then again 1-3 times. Flatleaf bladderwort: 0.5-2 cm long, blunt-ended and with minute bristled margins; 20 or more segments. Typically without bladders; if present white and found on separate, leafless branches. Lesser bladderwort: 0.3-1 cm long, narrowed tips and smooth margins; 5 segments; bladders few, borne on the leaves and 1-2 mm wide.

Stem: Slender stems (up to 0.4 mm thick) may be floating, submersed, or creeping on the sediment. Flatleaf bladderwort: up to 0.5 m long. Lesser bladderwort: up to 0.75 m long.

Flower: Snapdragon-like flowers occur above the water. Flatleaf bladderwort: 2 to 4 yellow flowers (10-15 mm long) on upright stalks; lower lip 8-12 mm long with well defined spur running parallel. Lesser bladderwort: 3 to 9 pale yellow flowers (5-8 mm long) per stalk; lower lip narrow, 4-8 mm long with poorly developed sac-like spurs.

Fruit: Capsule contains many seeds. Flatleaf bladderwort: fruit stalk (pedicle) nearly erect. Lesser bladderwort: pedicles curved downward.

Root: None.

Propagation: Fragments, seeds. Flatleaf bladderwort: may form bristly winterbuds (7-16 mm long). Lesser bladderwort: may form smooth winterbuds (2-9 mm long).

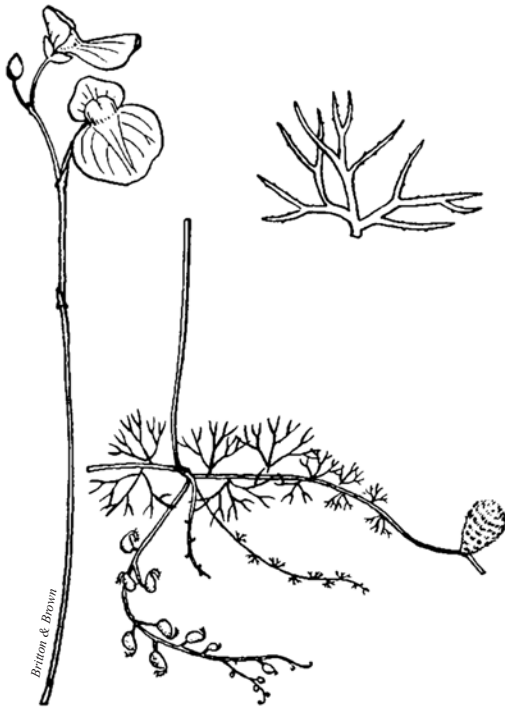
Importance of Plant: Food and cover for fish. Food for muskrats and waterfowl. Habitat for aquatic invertebrates.

Distribution: Both species are circumpolar with widespread distributions across Alaska

Habitat: Floating freely in shallow water or creeping across sediment.

May be confused with: Aquatic buttercups (*Ranunculus* spp.) and watermilfoils (*Myriophyllum* spp.) when without bladders or flowers. Other less common bladderworts. *Utricularia macrorhiza* has much larger flowers, up to 20 mm wide. *U. inflata* has distinctive spoke-like whorl of floating leaves that supports the flower stalk. Yellowishwhite bladderwort (*U. ochroleuca*) is likely a hybrid between *U. minor* and *U. intermedia*, with intermediate characteristics.



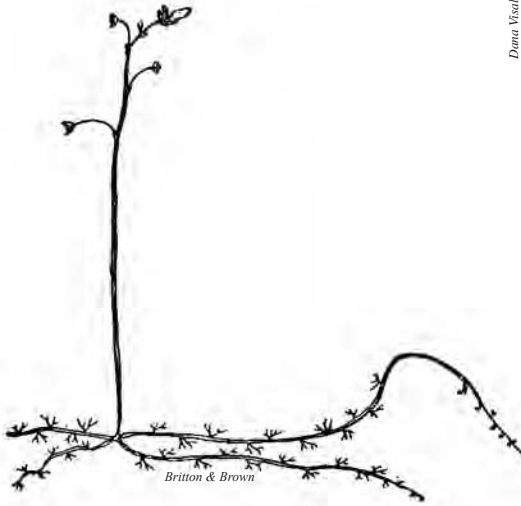


Utricularia intermedia
(flatleaf bladderwort)

Ben Legler



Utricularia intermedia



Utricularia minor
(lesser bladderwort)

Dana Visalli



Utricularia minor

Species: *Zannichellia palustris* L., horned pondweed

Family: *Zannichelliaceae*

Horned pondweed is a delicate underwater branching perennial that can grow to a length of 1 m. It has opposite, thread-like leaves that emerge in such a way as to give the plants a uniform shape. Unlike many look-alike aquatic plants that have flowers that emerge from the water on spikes, horned pondweed has inconspicuous underwater flowers and fruits at the leaf bases. Look for this plant in brackish or alkaline streams, ponds, ditches, and lakes.

Leaf: The submersed thread-like, smooth edged leaves are oppositely arranged (occasionally appearing whorled), and each leaf has a central vein. Leaves are 2-10 cm long and less than 1 mm wide. A flared, transparent, membranous sheath surrounds the stem at the leaf base.

Stem: The completely submersed weak stems are branched, thin, and threadlike.

Flower: Flowers are small, lack sepals and petals, and are solitary or clustered at the leaf bases. Male and female flowers are separate, but grow on different parts of the same plant, although often both occur together in the leaf bases. Female flowers are surrounded by a sheathing bract. Because the flowers remain entirely underwater, pollination occurs in the water. Flowers from June through August.

Fruit: Tiny banana-shaped achenes occur in clusters. Each achene is 2 to 4 mm long and has a conspicuous hooked beak measuring 1-1.5 mm long. A distinctive toothed ridge develops along the outer edge of the achene.

Root: Roots from slender creeping rhizomes.

Propagation: By seeds and rhizomes.

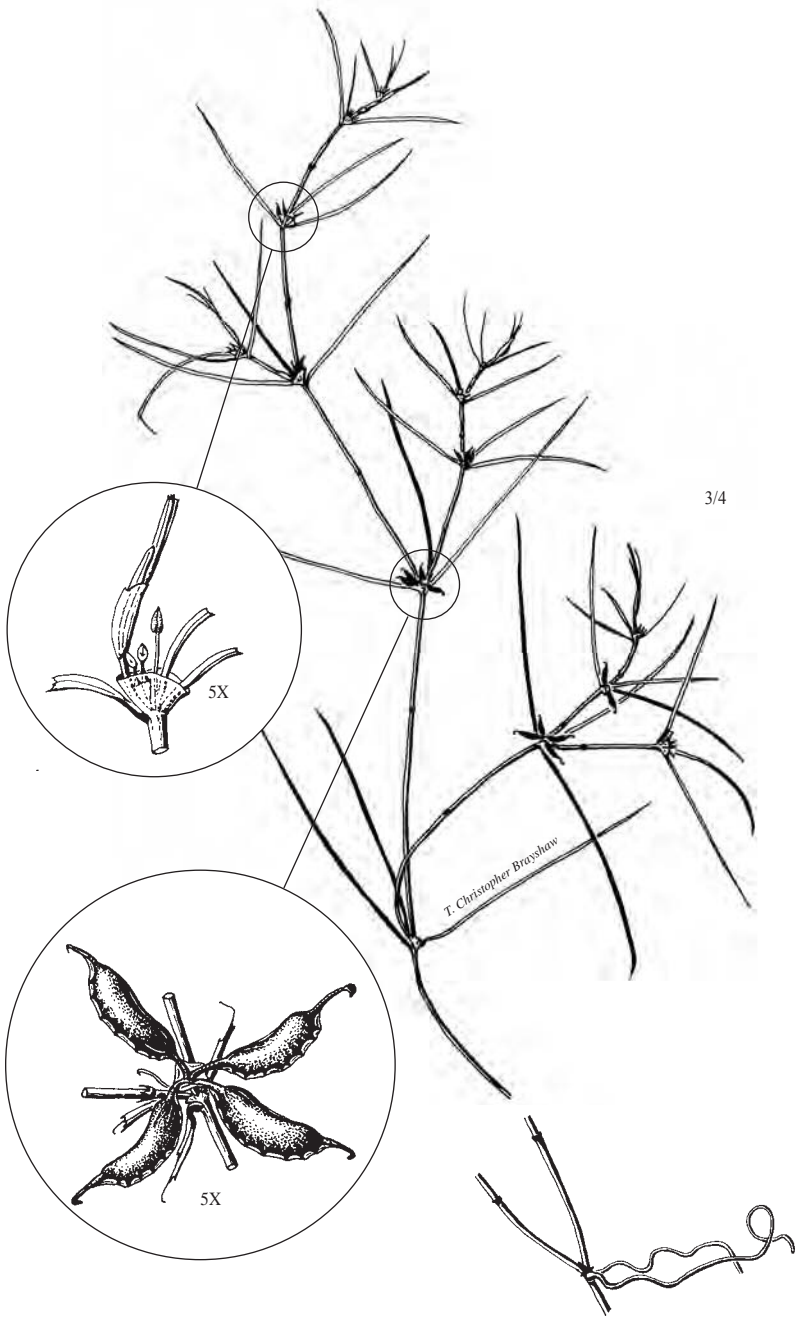
Importance of Plant: Fruits and entire plants are eaten by waterfowl and other birds. Provides good habitat for small aquatic animals.

Distribution: More or less worldwide and common throughout North America. In Alaska, known from fresh and brackish waters along in coastal regions of the Pacific Ocean and the Bering Sea.

Habitat: Shallow freshwater, alkali, or brackish lakes, ponds, ditches, and streams.

May be confused with: Widgeonweeds (*Ruppia* spp.), which have alternately arranged, more densely spaced leaves. Flowers of widgeonweeds are located at the end of stalks rather than clustered at the base of the leaves. Water-nymphs (*Najas* spp.), which have tooth-edged opposite leaves with a widened base, and oval fruits. Narrow leaf pondweeds (*Potamogeton* spp.), which are more robust and have flowers and fruits on long stalks.





Zannichellia palustris
(horned pondweed)

CHAPTER 5

MACROSCOPIC
ALGAE

Species: *Chara* spp., muskgrass, stonewort, muskwort

Family: Characeae

Although these common lake inhabitants look similar to many underwater plants, they are actually algae. Muskgrasses are green or gray-green colored algae that grow completely submersed in shallow (4 cm) to deep (20 m) water. Individuals can vary greatly in size, ranging from 5 cm to 1 m in length. The main “stem” of muskgrasses bear whorls of branchlets, clustered at regularly spaced joints. When growing in hard water, muskgrasses sometimes become coated with lime, giving them a rough gritty feel. These algae are identifiable by their strong skunk-like or garlic odor, especially evident when crushed.

Leaf: Algae lack true leaves. Six to 16 leaf-like branchlets of equal length grow in whorls around the stem, and are never divided. These branchlets often bear tiny thorn-like projections, which give the plant a rough or prickly appearance when magnified.

Stem: Algae lack true stems. The round, stem-like structure varies from 5 cm to over 1 m in length.

Flower: Algae do not produce flowers. Instead, microscopic one-celled sex organs called oogonia are formed. These tiny organs and patterns in the cases that surround them are used to distinguish between species.

Fruit: Algae do not produce fruits. Tiny spores are produced in fruiting bodies. In some muskgrass species the fruiting bodies are orange and very conspicuous.

Root: Muskgrasses may be attached to the bottom by root-like structures called holdfasts.

Propagation: Spores carried by water and waterfowl; plant fragments.

Importance of Plant: An important food source for waterfowl, particularly ducks. Provides valuable protection for young fish and invertebrates. Muskgrasses grow quickly and occasionally cover the entire bottom of ponds, however because of its low growth it is rarely considered a nuisance.

Distribution: Worldwide. More than 30 species in the U.S. Distribution in Alaska is not well understood, but documented in multiple lakes in the interior boreal and south coastal regions.

Habitat: Fresh to brackish water, inland and coastal, in both shallow and deep water. Some species found in alkaline lakes and slow-moving streams. Muskgrasses will often grow in deeper water than vascular aquatic plants.

May be confused with: Other macroscopic algae: *Nitella* (*Nitella* spp.), which have symmetrically forked smooth branchlets, do not have lime coatings, and lack the odor of muskgrasses; and *Tolypella* spp., which have unsymmetrically forked branches. Slender water-nymph (*Najas flexilis*) and coontail (*Ceratophyllum demersum*) are vascular plants which have a different leaf structure and do not produce an odor when crushed.

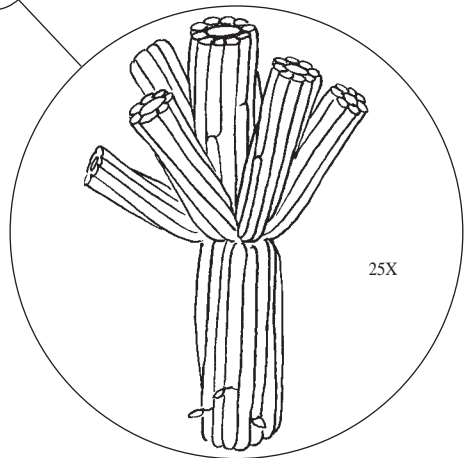
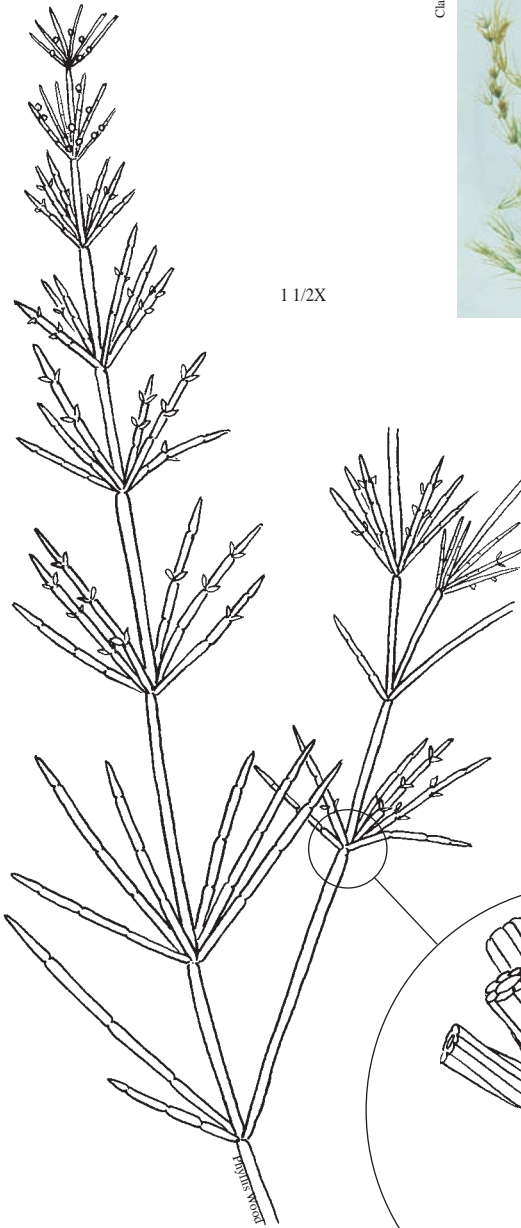


Clayton Antleau



Chara sp.

1 1/2X



Chara sp.
(muskgrass, stonewort, muskwort)

Species: *Nitella* spp., nitella, brittlewort

Family: Characeae

Nitellas are bright green algae often mistaken for higher plants because they appear to have leaves and stems. These long, slender, delicate, smooth-textured algae lie on the bottom of a lake or pond and are seldom found in the water column. Whorls of forked branches are attached at regularly spaced intervals along the “stems.” Nitellas sometime grow together with muskgrasses (*Chara* spp.), another macroscopic algae, to form underwater meadows.

Leaf: No true leaves. 6 to 8 evenly forked branchlets grow in whorls at regularly spaced intervals along the “stem.” Unlike the rough branchlets of most muskgrasses (*Chara* spp.), nitella branchlets have a smooth texture.

Stem: No true stems. Hollow, stem-like structures have whorls of forked branches along their entire length. The largest nitella species have “stems” up to 2 m long.

Flower: Does not bear flowers. Instead nitellas have microscopic spore-producing organs. Male organs grow at the base of the branchlets. Female organs are in a cluster on the sides of the branchlets below the male organs.

Fruit: Produces spores rather than fruits.

Root: Lacks roots. May be attached to the bottom by root-like structures called holdfasts or floating free above the sediment.

Propagation: Spreads by spores transported by wildlife and will also form new plants from vegetative fragments.

Importance of Plant: Provides cover for fish, food for fish and waterfowl, and stabilizes sediment. Because nitellas have no roots, they remove nutrients directly from the water.

Distribution: Worldwide. More than 30 species are reported to occur in the U.S. Distribution in Alaska is not well understood, but documented in the south coastal ecoregion.

Habitat: Nitellas grow in shallow to deep waters of soft water or acid lakes and bogs. They often grow in deeper water than flowering plants and frequently form a thick carpet or grow in clumps along the bottom.

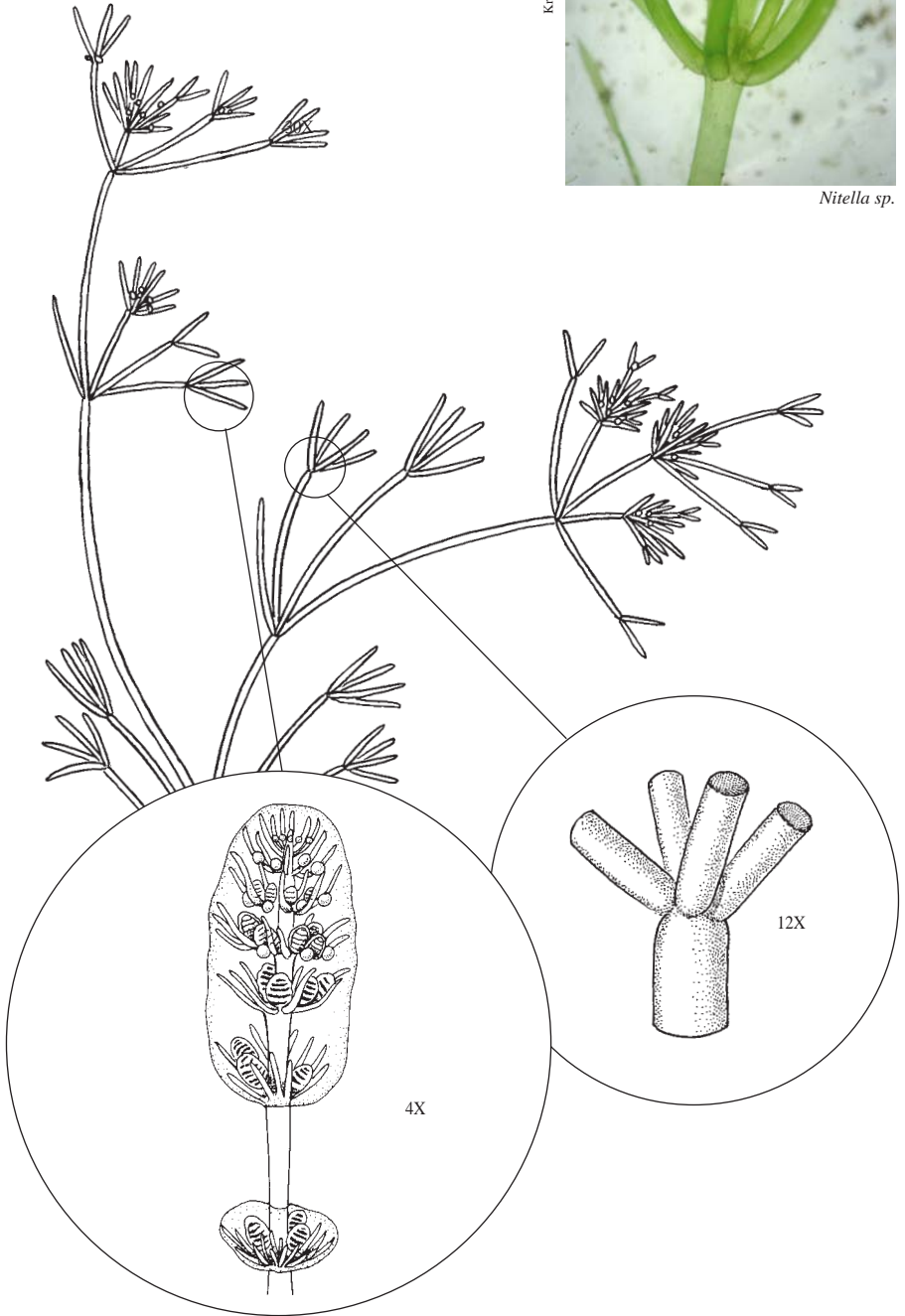
May be confused with: Muskgrasses (*Chara* spp.), which have unforked branches and a distinctive, unpleasant garlic odor, especially when crushed. Another algae, *Tolypella*, has unevenly forked branches in contrast to the evenly forked branches of the nitellas. Nitellas may also be confused with two vascular plants: water-nymphs (*Najas* spp.), which have opposite leaves, and coontail (*Ceratophyllum demersum*), which has leaves that fork into several segments.



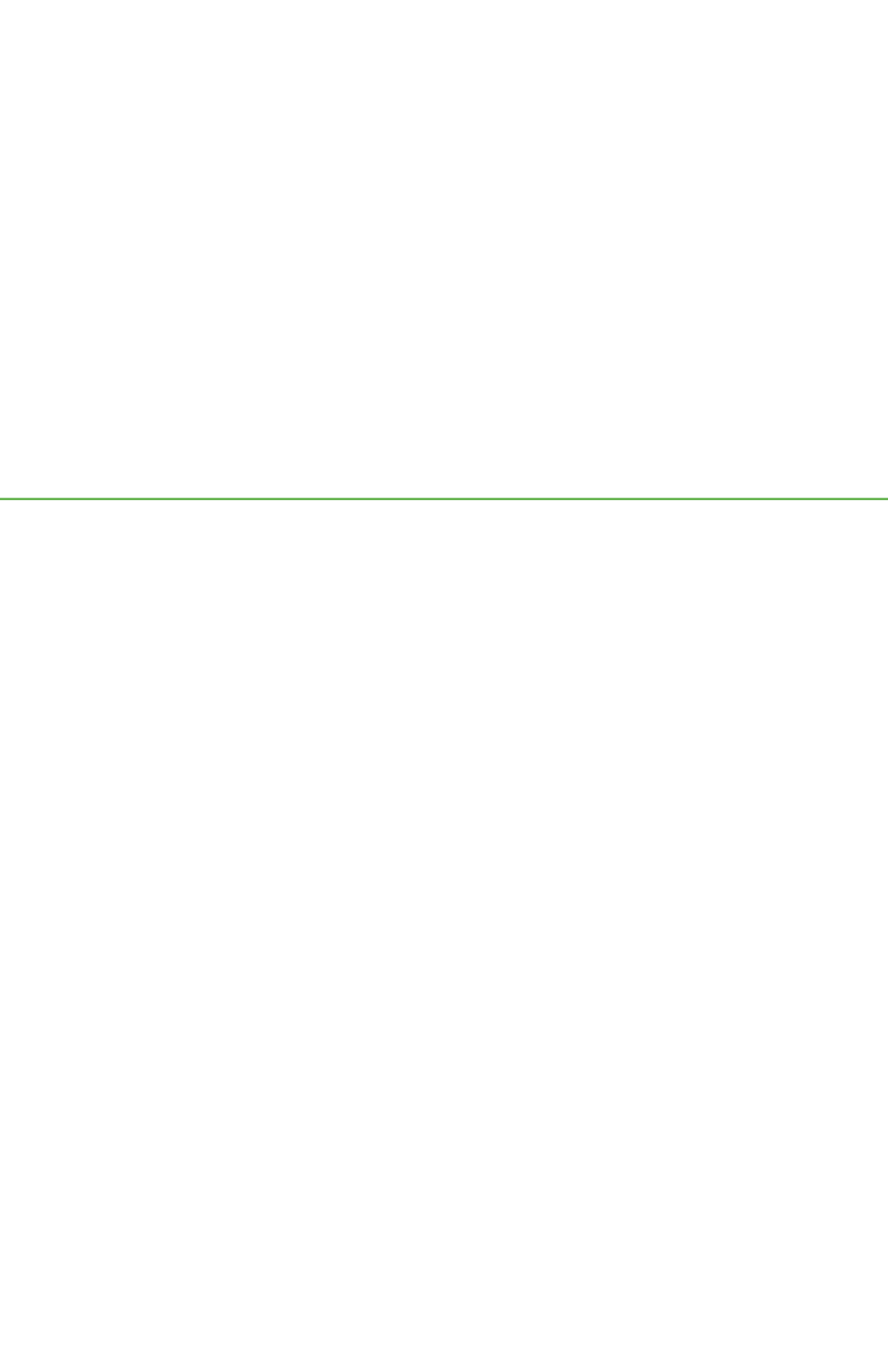
Kristian Peters



Nitella sp.



Nitella sp.
(nitella, brittlewort)



CHAPTER 6

AQUATIC MOSS

Species: *Fontinalis antipyretica* Hedw., antifever fontinalis moss, common water moss

Family: Fontinalaceae

Fontinalis moss is a dark green underwater plant that attaches to rocks or logs in flowing water, or floats loose or attached in still water. The leaves are sharply pointed, ridged, overlapping, and arranged in 3 rows along the entire length of the stems. The stems grow up to 60 cm long and appear triangular if the leaves are removed. Common water moss does not produce flowers, reproducing by stolons, plant fragments, or spores instead. It is one of only a few truly aquatic mosses in the Pacific Northwest. It is often found dried and dormant above water in the summer.

Leaf: The rather rigid, sharply pointed leaves are 4 to 9 mm long, broadly lance-shaped to egg-shaped, and have a lengthwise ridge down the back. They are arranged in 3 rows and partly overlap along the entire length of the stem. When removed from the stem, the leaves appear to be folded lengthwise down the middle.

Stem: The branching stem is 20 to 60 mm long, conspicuously three-angled (appears triangular in cross section), and entirely covered by leaves.

Flower: None, produces spores instead.

Fruit: Microscopic spores are produced in smooth capsules that measure 2 to 2.6 mm long. Spores are only produced on plants that are subjected to periods of drying. Fertilization and spore release will only take place above water.

Root: No true roots. Rootlets (rhizoids) attach common water moss to rocks and logs.

Propagation: Mostly by stolons and leafy plant fragments. Infrequently by spores.

Importance of plant: Provides habitat for aquatic insects, larvae, and other microorganisms. Small fish species will nest in it. It is a popular plant for cold water aquariums.

Distribution: In northern North America it extends southward to Pennsylvania in the east and Arizona in the west. Also in Europe, Asia, and Africa. In Alaska, known the south coastal ecoregion.

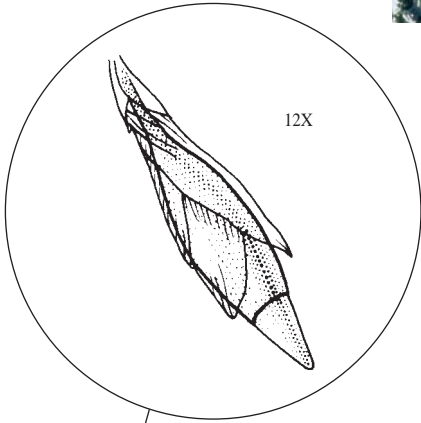
Habitat: Water moss is found attached to rocks or logs in swift-flowing water, or floating loose or attached to substrate in still water. It is common in shaded sites and prefers slightly acidic water. It requires water below pH 8.4 where dissolved carbon dioxide is available.

May be confused with: Refer to technical keys to be sure of species since numerous different varieties of Fontinalis moss exist. Additional Fontinalis spp. noted in Alaska include *Fontinalis neomexicana* and *Fontinalis hypnoides* var. *duriaei*. Other moss species, which have leaves that are not ridged or as distinctly 3-rowed as common water moss.

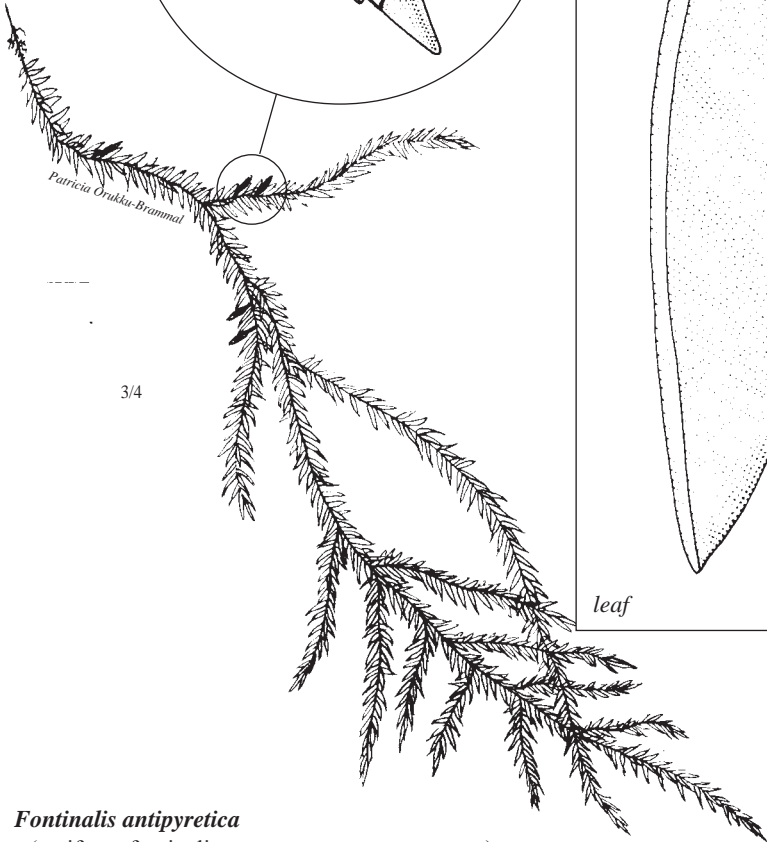




Fontinalis sp.

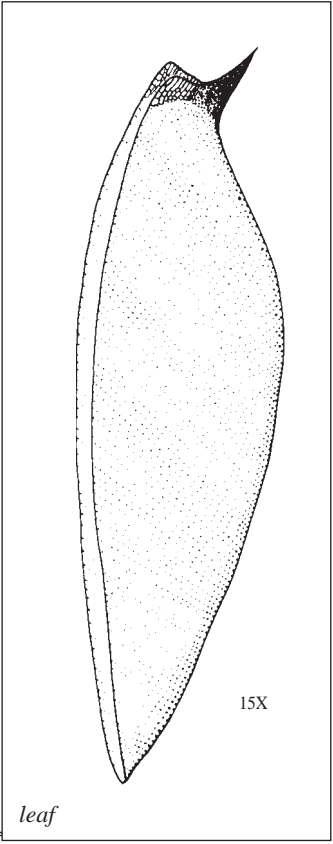


12X



Patricia Oruklu-Bramul

3/4



15X

leaf

Fontinalis antipyretica
(antifever fontinalis moss, common water moss)

Species: *Sphagnum* spp., peat moss, sphagnum

Family: Sphagnaceae

Mosses, as well as liverworts, belong to a plant group called Bryophytes. The Bryophytes are characterized by having no specialized food and water transport tissues. They lack flowers, true leaves, stems, or roots, but they do have analogous structures. Peat moss is unique in that it can hold large quantities of water inside its cells. Some species can hold up to 20 times their dry weight in water, which is why peat moss is commonly sold as a soil amendment. Peat moss can acidify its surroundings, and is commonly found in bogs and fens.

Individual peat moss plants consist of a wiry main axis with small clusters of soft, floppy side branches. The top of the plant has compact clusters of young branches. The side branches consist of a series of more-or-less overlapping, cup-shaped, or spear-shaped “leaves.” Some species have thick, water-swollen “leaves” and a correspondingly plump appearance, while other species hold smaller amounts of water and thus have a thinner, stringier appearance.

Leaf: Lacks true leaves. Peat mosses have leaf-like structures with two kinds of cells: small green living cells and large clear structural dead cells. They are spoon-shaped or spear-shaped and are clear, green, yellowish, or reddish.

Stem: Lacks a true stem. The brown, black, or yellowish main axis is thin, wiry, and upright.

Flower: Flowers are not produced. Spores are released from specialized black, shiny capsules at the tips of thin stalks.

Fruit: Mosses lack fruits. Spores are produced in capsules.

Root: No true roots. Branched filaments, called rhizoids, develop on some species and anchor plants to the substrate.

Propagation: Spores and fragmentation.

Importance of plant: Critical to the formation of muskegs or peat bogs, which are home to unique assemblages of plants and wildlife. Used as a soil amendment, packing material, absorbent, and fuel. Historically used as bandage material because of its acidic, antibacterial quality.

Distribution: Peat moss species occur primarily in the Northern Hemisphere. Wide distribution in Alaska.

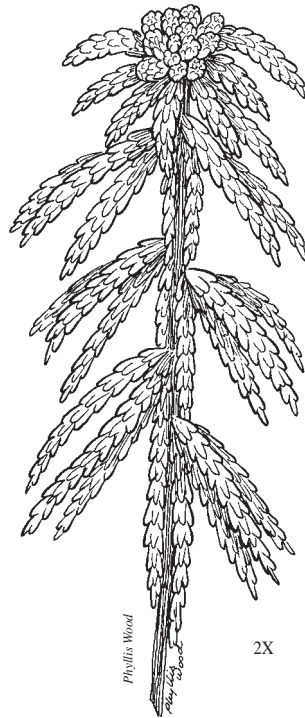
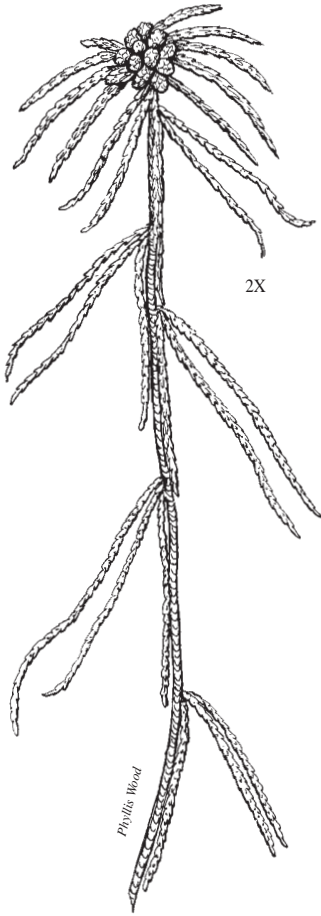
Habitat: Bogs and fens; often forms mats on bog surfaces.

May be confused with: Other moss species. Peat moss can be distinguished by its unique branch clusters. The plant color, the shape of the “leaves” growing around the “stems,” and the shape of the green cells are characteristics used to identify peat moss to species. Refer to technical keys to be sure of species since many species exist in Alaska.

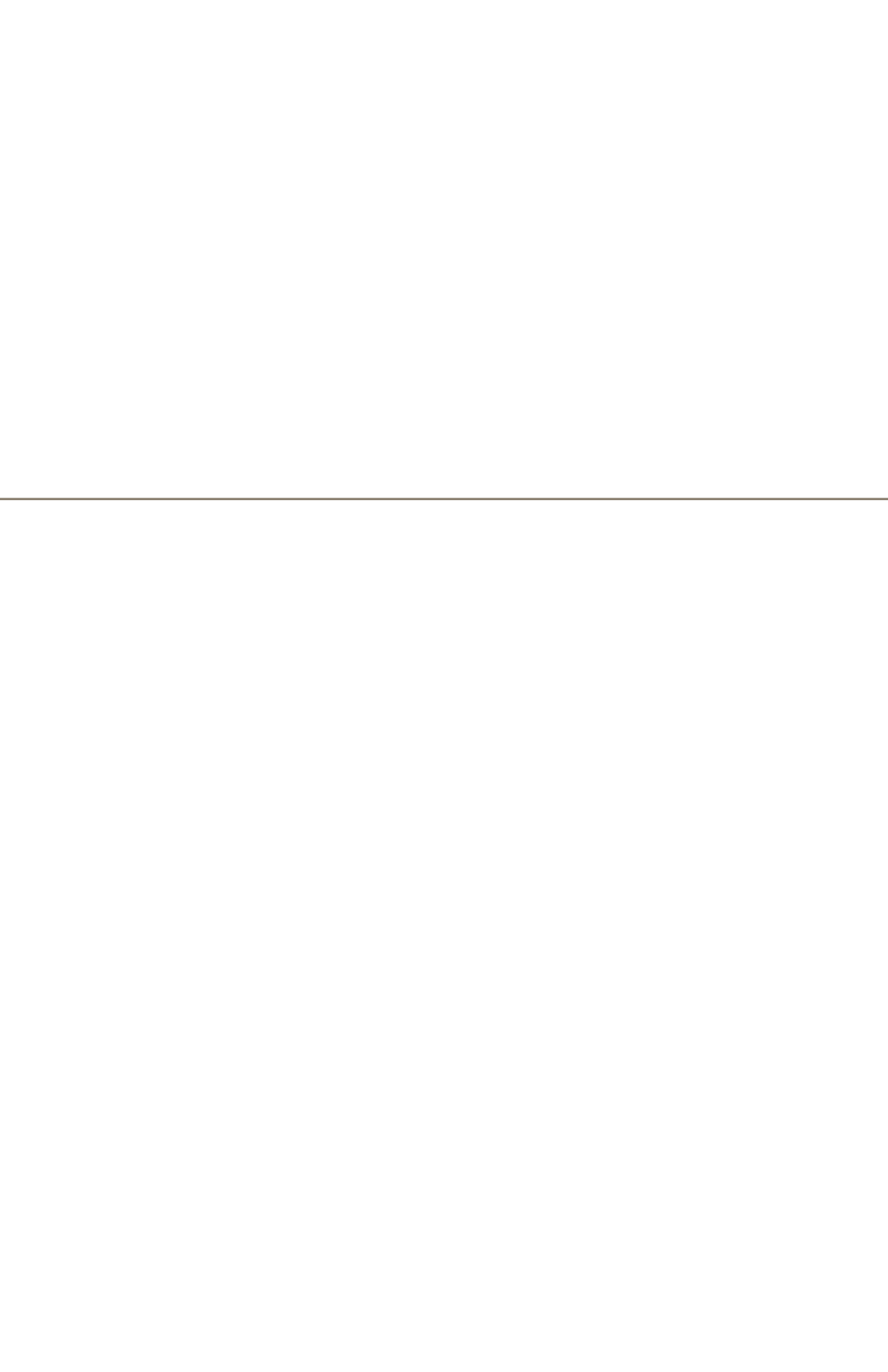




Sphagnum sp.



Sphagnum sp.
(peat moss, sphagnum)



CHAPTER 7

CURIOSITIES

Species: *Didymosphenia geminata* (Lyngb.) M. Schmidt, didymo, rock snot

Family: Gomphonemataceae

Didymo is a species of diatom, a single-celled algae, native to northern latitudes of North America and Europe. In recent years, its range, growth patterns and persistence appear to be increasing both in the United States and in New Zealand. Individual didymo cells cannot be seen with the naked eye, but they form long, branched stalks which become visible colonies attached to rocks or other substrates. Nuisance blooms consisting of thick mats resemble wet tissue paper, fiberglass insulation or “rock snot” and are easily spread downstream or between waterheds when transported by waders, nets or other fishing equipment. These blooms may cover 30-100% of the river bottom.

Description: Initial colonies appear as small, circular clumps that are light tan or brown. The texture is woolly or cottony, as opposed to slimy or slippery. As colonies expand, they may entirely cover the streambed and/or may attach to plant stems, forming long ropey strands. These long strands may be tan to white in color, appearing like wet tissue paper, sheepskins, or fiberglass insulation. Single cells resemble old-fashioned soda bottles attached to long strands or stalks and are large (80-140 μm) compared to other diatom species. Examination with 400x or greater magnification required to confirm identification.

Propagation: Vegetative (cell division) and sexual reproduction.

Importance of plant: Diatoms are important primary producers, contributing to the global carbon cycle through photosynthesis and serving as a valuable food source. Nuisance blooms of didymo may negatively impact fisheries, by preventing access to sediment for feeding, refuge or spawning; significantly alter local food webs; and alter local hydrologic patterns.

Distribution: Native to northern North America, including Alaska, and Europe; recently expanding beyond historic range and introduced in New Zealand.

Habitat: Historically limited to cool, low-nutrient waters; increasingly found in nutrient rich streams and rivers where it blankets rocks and other stable substrates. Found in shallow areas with ample light. Known from lakes, but nuisance blooms only known in flowing waters.

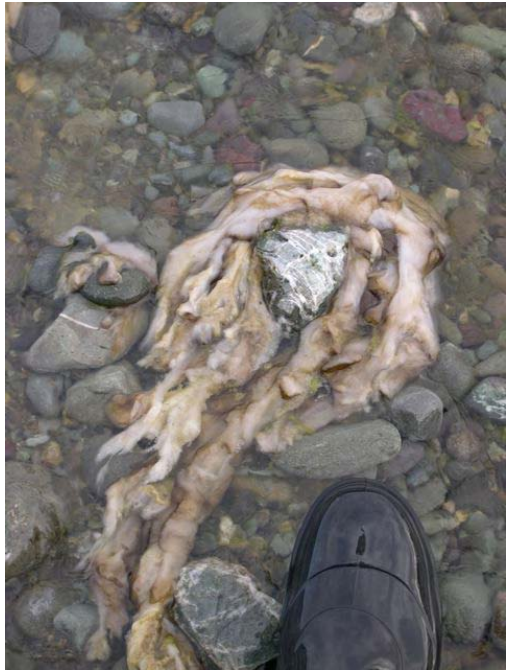
May be confused with: Attached filamentous algae species, although the texture is distinctively woolly. When didymo is broken or pulled apart it feels like wet cotton or wool and does not break apart when rubbed between fingers. Resembles other diatom species (*Gomphoneis*, *Cymbella* and *Gomphonema* spp.) when viewed with a microscope, but is much longer with thicker stalks and forms stronger attachments to substrates.



Max L. Bothwell



Max L. Bothwell



Didymosphenia geminata
(didymo, rock snot)

Freshwater Sponges

Although sponges are animals, they are included in this manual because they are sometimes mistaken for aquatic plants or algae. Sponges are multicellular animals consisting of masses of cells embedded in a gelatinous matrix. The matrix is bound together by minute, spine-like structures of calcium or silica called spicules and spongy organic fibers called spongin. Although most of the more than 5,000 known sponges occur in marine environments, 150 species live in freshwater. Freshwater sponges are pitted with pores and often are yellow, brown, or greenish. Sponges filter large volumes of water through their pores, capturing tiny particles for food. Freshwater sponges vary in size from a few millimeters to more than a meter across. All species have a free-swimming, microscopic larval stage, but are attached (sessile) as adults. They are widely distributed in well-oxygenated ponds and streams where they grow on plant stems, pieces of wood, and other submersed objects. They will overwinter in a dormant state (called gemmules), but are most commonly seen in summer or fall. They may be lobed, composed of fingerlike projections, or quite irregularly shaped and are robust enough to be picked up without falling apart, unlike many kinds of algae.

Bryozoans

Bryozoans are tiny colonial animals that are fairly common in lakes and streams with suitable habitat. Different species form colonies that range in appearance from delicate wispy moss-like growths to basketball-size gelatinous masses. Each colony is comprised of many individual creatures called “zooids.” Zooids are microscopic cylindrical creatures with a mouth, digestive tract, muscles, and nerve centers. The zooids are covered by a protective matrix that may be delicate, hard, or gelatinous depending on the species. They feed by filtering tiny algae and protozoa through a crown of tentacles (lophophore). Bryozoan colonies grow by budding from the adult zooids. New colonies will establish from a free-swimming, microscopic larval stage or by growth of dormant spore-like “statoblasts.” Most bryozoans live in saltwater, and of the 20 or so freshwater species in North America, most occur in warm-water regions attached to plants, logs, rocks, and other firm substrates. The forms most likely encountered in the Alaska are translucent, brownish-gray, jelly-like masses that look like they have little black dots embedded in them. They are often found in areas where there is a constant, slow flow of water.





Vanessa Morgan



Bryozoan

Filamentous Green Algae

Algae are a diverse group of simple organisms, once considered by scientists to belong to the plant kingdom. They form the base of most aquatic food chains and are therefore important to a healthy lake system. Some algae exist as single cells, others form masses with many cells clumped together. Some can swim, while others live attached to rocks or plants. One of the ways this varied group was historically classified was by their coloration, such as green, brown, red, golden-brown, or yellow-green algae.

The green algae are common in lakes and sometimes get attention when certain types form green, stringy, often slimy-feeling masses as the result of high levels of nutrients. These are actually long strands, or filaments, composed of thousands of individual single-celled green algae connected end-to-end. The most common mat forming alga is *Spirogyra*; often studied in high school biology classes. When large quantities of green algae begin to decay, it can become a nuisance, creating offensive odors and depleting surface waters of dissolved oxygen. The resulting loss of oxygen can stress or even kill other aquatic organisms such as fish.

Cyanobacteria (Blue-Green Algae)

Blue-green algae were once included with the other algae. It is generally agreed by scientists, however, that they should be classified with bacteria, an ancestral group, and be called cyanobacteria. Cyanobacteria can be important for supplying certain mineral nutrients to the aquatic environment, but generally do not serve as a primary food source like true algae.

Under nutrient rich conditions, these microscopic single-celled or colonial organisms can multiply rapidly to form extensive “blooms” that cause the water to become green colored. They may eventually float to the surface and accumulate near shore as a thin bright green surface scum which cannot be picked up like a filamentous green algae mat. When a bloom dies, the water surface may become colored with a mixture of bright blue and white material, often mistaken for a paint spill. When in bloom, some blue-green algae may also contribute to potential health and water quality problems. For reasons not well understood, a few species occasionally produce toxins known to kill wildlife and domestic animals. They may also impart distasteful flavors to drinking water in addition to producing foul smelling masses as they die and decompose.



HEC



Clayton Antieau

Filamentous algae

HEC






Vanessa Morgan



Cyanobacteria
(blue-green algae)

APPENDIX A

APPENDIX A - GLOSSARY

- Achene:** A hard, dry, one-seeded fruit that does not split open when mature. Often looks like a seed.  achene
- Alkaline:** Containing soluble mineral salts (alkaline waters are considered to be hard waters).
- Alternate:** A leaf arrangement where each leaf occurs singly at each node (see opposite, whorled).  alternate
- Annual:** A plant that completes its life cycle and dies within one year (such as petunias).
- Anther:** A male flower part. The pollen-bearing structure at the top of the stamen. (Fig 1)
- Awn:** A stiff, pointed elongation at the tip of a structure.
- Beak:** A hardened projection often seen on the edge of pondweed achenes. The illustrated achene (above right) has a prominent beak.
- Blade:** The broad, usually flat part of a leaf or petal. (Fig 3,4)
- Brackish:** Slightly salty or having a high concentration of dissolved minerals.
- Bract:** A reduced or modified leaf associated with a flower or flower cluster.
- Capsule:** A dry, usually many-seeded fruit that splits open at maturity.
- Compound:** Divided into similar smaller parts, such as leaves composed of two or more distinct leaflets.
- Corm:** A solid bulb-like stem usually found underground.  corm
- Deciduous:** Losing leaves seasonally – a maple tree is deciduous.
- Dioecious:** Having male and female flowers on separate plants.
- Eutrophic:** Lakes characterized by high levels of nutrients (nitrogen and phosphorus), often very productive systems with many aquatic plants and algae.
- Exotic:** Nonindigenous to a region or country.
- Flower:** The reproductive part of the plant. Flowers may be male only, female only, or both male and female (complete). (Fig 1,2)

Flower Parts

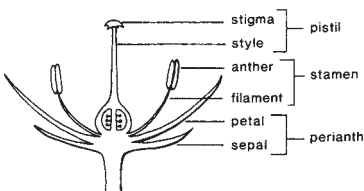


Figure 1

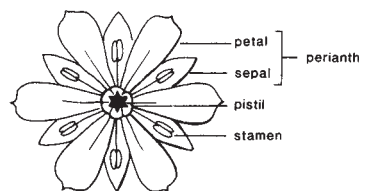
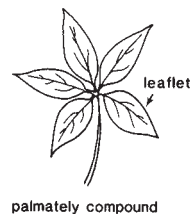
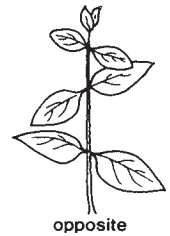
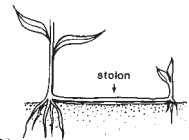
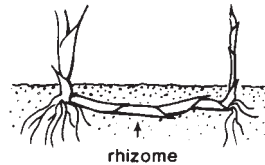


Figure 2

Freshwater:	Water with a low salt concentration.
Fruit:	The ripened ovary bearing the ripened seeds.
Gland:	A bump, depression, or appendage on a plant's surface that produces a sticky or greasy viscous fluid.
Habitat:	The environment in which a plant lives.
Herb:	A non-woody plant that dies back to the ground at the end of the growing season.
Holdfasts:	Root-like structures that anchor plant-like algae to the substrate.
Inflated:	Hollow and swollen, appearing filled with air.
Invasive:	Tending to spread and then dominate the new area.
Keel:	The ridge of any structure formed by a fold, alluding to its resemblance to the keel of a boat.
Leaflet:	A part or division of a compound leaf.
Margin:	Edge – as in the edge of a lake or the edge of a leaf.
Midvein:	The main central vein of a leaf. Sometimes called midrib (Fig 3)
Monoecious:	Having male flowers and female flowers together on the same plant.
Nectary:	A gland that secretes a sticky, often sweet-tasting fluid (nectar).
Non-native:	Nonindigenous to a region or county. An introduced species.
Node:	The place on the stem where a leaf, branch, or root is attached (or has been attached). (Fig 3,4)
Nut:	A hard, dry, usually one-seeded fruit that does not open at maturity. Harder and thicker sided than an achene.
Nutlet:	A small nut or a very thick-walled achene. Usually several produced by a single flower.
Oogonium:	In algae, a female reproductive cell producing one or more eggs.
Opposite:	Two leaves arranged on opposite sides of each node.
Ovate:	Shaped like a long section through a hen's egg, broadest below the middle, narrowed at the tip.
Palmate:	Divided into three or more lobes, leaflets or veins of a leaf that diverge from a common point, like the fingers from the palm of a hand.
Pedicel:	The stalk that supports one flower only when there are several on a peduncle.
Peduncle:	The stem of a solitary flower or the main stem of a flower cluster.
Perennial:	A plant that lives for more than two years.
Perigynium:	A sac enveloping a fruit in <i>Carex</i> spp. (sedges).
Petals:	The inner ring of the flower leaves. Often white or brightly colored to attract pollinators (see sepal). (Fig 1,2)



- pH:** The measure of the concentration of hydrogen ions. The acidity or alkalinity of the water. pH of 7 is neutral; below 7 is acid; above 7 is basic.
- Pinnate:** Feather-like, with a row of leaflets on either side of a central stalk.
- Pistil:** The female flower organ, consisting of the seed-bearing ovary, stigma and style. (Fig 1,2)
- Pith:** Soft spongy tissue in the center of the stems and branches of certain species.
- Pod:** A dry fruit that splits open at maturity.
- Pollen:** Powdery grains that bear the sperm and are produced in the anther.
- Rhizoid:** A simple root-like structure.
- Rhizome:** A horizontal underground stem that is distinguished from the root by the presence of nodes or scale-like leaves.
- Rosette:** A cluster of leaves arranged in a circle usually at ground level (like a dandelion).
- Saline:** Salty or brackish.
- Scale:** A small thin or flat outgrowth, often associated with underground parts, though leaves or bracts may be scale-like.
- Sepals:** The outermost ring of the flower leaves; often green and leafy in structure (see petal). (Fig 1,2)
- Sessile:** Attached directly at the base, without a stalk.
- Sheath:** A tubular part surrounding another part, often papery. In pondweeds, the portion of the leaf that surrounds the stem.
- Spadix:** A fleshy clublike spike bearing minute flowers, usually enclosed within a sheath-like spathe.
- Spathe:** A sheathing bract, or pair of bracts, which partly encloses an inflorescence, especially a spadix.
- Spike:** A flower cluster with sessile flowers arranged along an unbranched stalk, blooming from the bottom upwards.
- Spikelets:** Small, much-reduced spikes with few flowers.
- Spore:** The reproductive body of ferns and other non-seed plants.
- Stalk:** A stem or similar structure that supports a flower, flower cluster, or a leaf.
- Stamen:** The male part of a flower, usually consisting of the stalk-like filament and the pollen-bearing anther. (Fig 1,2)
- Stem:** The part of the plant bearing leaves and flowers and composed of nodes and internodes (space between the nodes). Sometimes also below ground (see rhizome, corm, stolon, tuber). (Fig 3)
- Stigma:** The upper tip of the pistil of the flower, receives the pollen. (Fig 1)



- Stipe:** A stalk which supports a pistil or other structure
- Stipules:** A pair of wing-or scale-like structures often found at the base of leaves. Sometimes joined into a sheath.
- Stolons:** A stem that trails along the sediment or soil surface that forms roots at the nodes (strawberries spread by stolons).
- Style:** The stalk-like portion of the pistil between the stigma and the ovary. (Fig 1)
- Submersed:** Growing underwater (submerged).
- Subpalmate:** Almost palmate.
- Substrate:** The sediment that plants root in.
- Succulent:** A fleshy plant that holds water in its stems or leaves.
- Tepals:** Petals and sepals that are almost indistinguishable from each other, as in rushes (*Juncus* sp.).
- Thallus:** A main plant body not differentiated into stems and leaves, as in duckweeds and liverworts.
- Toothed:** A saw-like edge.
- Tubers:** An enlarged, fleshy, reproductive and food-storage structure produced on an underground stem (a potato is a tuber).
- Turion:** An structure (often overwintering) that is scaly or often thick and fleshy that detaches and then germinates or starts growth in the spring.
- Vascular:** Refers to the circulatory system in plants, or to plants with veins.
- Vein:** A circulatory structure often prominent in leaves.
- Whorls:** A ring of three or more similar structures radiating from a common point (a whorl of leaves around a node).
- Winter buds:** Structures that form on the plant in the fall, and then germinate in the spring to form a new plant. Often look like compact bundles of small leaves.

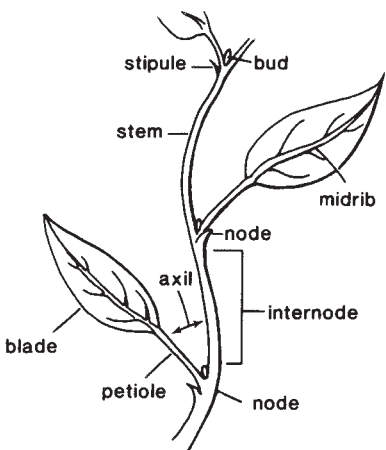
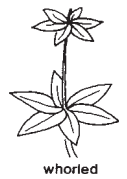


Figure 3

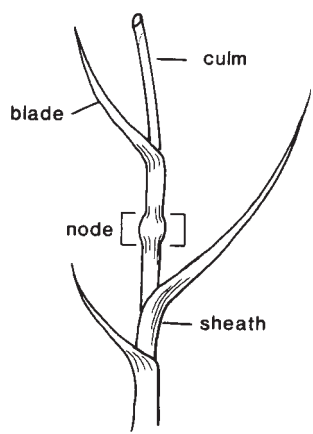


Figure 4

APPENDIX B

APPENDIX B - Collecting and preserving Aquatic Plant Specimens

Materials Needed:

Plant Press * - may be purchased or built. A plant press consists of alternate layers of corrugated cardboard, absorbent (blotting) paper or newspaper, and equal-sized pieces of plywood with straps or some other method of applying even pressure.



Pencil and Waterproof Paper - for making notes on site.

Herbarium Paper * - acid-free, 100 percent rag paper is best. If purchasing paper locally, use heavy stock, relatively acid-free paper with a high rag content. High grade, thick typing paper is suitable and can usually be purchased at stationary stores. University bookstores generally sell “biology paper” which is good quality 8 1/2 by 11 inch white paper.

Packets * - for extra plant structures (like seeds), use small envelopes or a piece of folded paper (2 x 3 inches).

Herbarium Paste * - available from biological supply companies. White glue can also be used (should have a polyvinyl acetate base).

Linen Tape - book binder’s tape is best. Cellophane tapes should be avoided.

Labels * - see the sample label for an example of a completed label. Labels should be sized to fit in the lower right corner of the herbarium paper.

* These items are available from biological supply companies.

Collecting the Plant

It is sometimes necessary to collect a specimen of an unknown plant in order to identify it, to submit it to an expert to confirm identification, or to add it to an established herbarium collection. If collecting aquatic plants simply to observe and identify, use a jar, plastic bag, or bucket of water to float the plants while you are observing them. Use the following guidelines:

1. Do not collect a plant unless there are large numbers of individuals present (at least 20 other plants of the same species).
2. Collect only what you will use.

3. Collect an average plant— resist the temptation to collect a plant that looks different from the rest.
4. Do not collect imperilled, rare or uncommon aquatic plants unless you have first discussed the collection with the Alaska Natural Heritage Program at the following address:

Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage, 707 A Street, Anchorage, AK 99501

5. Collect as much of the plant as possible: include roots, stems, leaves, flowers, and fruits. Plants may be collected by hand pulling, or using a weighted rake to gather plants in deeper water.

If collecting plants for a permanent collection or for identification by an expert, also use the following guidelines:

6. Write as much information about the plant as possible on the notepaper (the information will be used later for plant identification and labeling the plant). Include the date; collector's name and address; location (name and location of the waterbody); depth of water; flow rate of water; substrate (sediment) description; whether leaves and/or flowers are submersed (below the water surface), floating, or emergent (above the water surface); color and odor of flowers; and names of the plant species growing with or nearby the collected plant.
7. Wash the plant in clean water to remove algae, debris, and sediment. Keep the plants moist until they can be pressed.

Press the Plant

Note: It is easiest to identify aquatic plants before pressing. If this is not possible, press the plant while it is fresh, then send it to an aquatic plant expert as instructed below.

1. Prepare the plants for pressing
 - For delicate submersed plants, the best method is to float the plant onto a sheet of paper (newspaper or heavy stock paper will work, or you can float the plant directly onto herbarium paper). This is accomplished by placing the plant in a pan of water with the paper below it. Position the plant on the paper and hold it in place with a finger. Slowly lift the paper and plant from the water. The water flowing from the paper should separate the leaves while the plant adheres to the wet paper.

Cover the plant with newspaper or absorbent paper. (If the plants stick to the newspaper, they can be first covered on one side with wax paper).

- When pressing plants with whorled or finely divided leaves, it is useful to separate one node (the section where the leaves are attached to the stem) and float it onto a small portion of the paper. This gives a cross section showing the leaf pattern.
 - For plants with thick stems, roots, or leaves, the bulky portion can be split before pressing to facilitate drying and to prevent uneven pressure in the plant press.
 - If extra flowers, fruits, or vegetative parts are collected, these should be pressed, dried, and later placed in packets and glued to the herbarium paper.
2. Press the plant by placing it between two sheets of newspaper or absorbent paper then sandwiching this between two sheets of corrugated cardboard. Several prepared specimens can be stacked in this manner (label or number the plants so you know which plant matches which field note). Then put the stack between two firm pieces of wood and apply an even pressure using straps, bolts, or a heavy weight. Place in a warm, dry area. To avoid mildew, change the newspaper periodically until the plants are dry. The plants will dry faster if placed over a heat register, fan, or incandescent light bulbs.

Mount the Plant

Note: If identification of the plant needs to be verified, send a duplicate pressed, but unmounted specimen with a complete label to an authority on aquatic plants. They will keep this plant for their collection and notify you of the plant's name. Be sure the two plants are of the same species.

1. Once the plant has dried and is identified, it is mounted and kept for future reference:
 - Arrange the plant on a piece of herbarium paper (for those plants not floated onto herbarium paper). If the plant is too long, it may be cut into several sections and placed lengthwise on the paper.
 - Either glue or tape the plant to the paper (the use of glue or paste will sometimes tend to cause delicate submersed plants to curl; tape may be preferable in such cases).
 - Complete a label with the plant's Latin (scientific) name, location, site description, name of collector, and the date collected. Attach the label to the lower right corner of the paper – see sample label on the next page.
 - If additional reproductive parts (seeds, flowers, fruits) or vegetative parts have been collected, these are placed in a packet. This is glued to the top of the herbarium paper.
2. Care should be taken to ensure that plants are not damaged by insects. Mounted plants may be stored with an insecticide or repellent (mothballs) to prevent colonization by insects.

3. A permanent plant collection should be usable by others and should be organized in a standardized manner, more or less consistent with permanent collections housed in regional herbaria. If the guidelines for handling and preserving specimens are followed, your collections will be useful to anyone.

4. Give each plant an identification number, these running in consecutive order through the lifetime of the collector. The number should correspond to that used to identify the plant in a field notebook.

Example of a Sample Label

University of Alaska Museum Herbarium University of Alaska Fairbanks Fairbanks, AK	
Plant name →	<u>Myriophyllum sibiricum</u> Komarov
Location/Site →	Seward Peninsula Highland, E. end Imuruk Basin, mouth of Davidson Slough
Collector(s) →	C. Meyers 27 July 1987 ← date

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