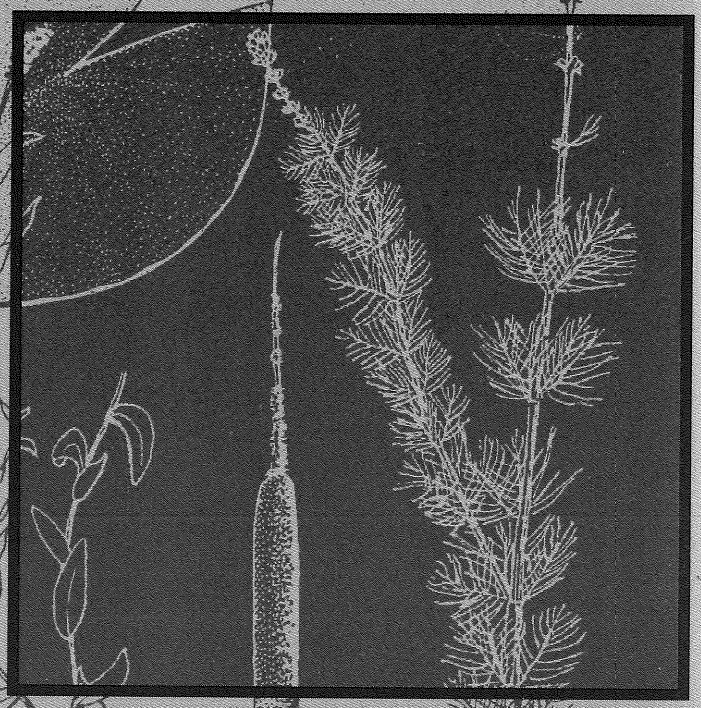
A Guide to AQUATIC PLANTS



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Minnesota Department of Natural Resources

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Introduction

If you've spent any length of time at your favorite Minnesota lake, chances are you're no stranger to aquatic plants. Maybe you've cast into lily pads looking for bass, watched minnows dart to safety in plant beds, pulled in an anchor covered with green vegetation, or waded through a few plants while swimming.

Unfortunately, most people see aquatic plants as problems. They perceive lakes or lakeshores with lots of so-called "weeds" as messy and in need of cleaning. But what a cabin owner sees as a weedy mess is an essential part of a lake's or river's ecosystem. Without aquatic plants, lakes would have fewer aquatic insects, minnows, and other wildlife. **If too many aquatic plants are removed from lakeshores, game fish populations may decrease.** Aquatic plants are an essential part of the natural community in most lakes.

Minnesota is home to about 150 species of aquatic plants. A few of those species are exotics (not native to Minnesota) and need to be strictly controlled to keep them from overrunning native plant communities. In some situations, native plants interfere with boating or swimming, and may need to be kept under control. But what most aquatic plants need is **protection**, not elimination, so they can continue to function as part of healthy aquatic ecosystems.

The purpose of this handbook is to help you:

- understand the value of aquatic plants,
- identify 25 common varieties found in Minnesota—including harmful exotic species,
- evaluate control options (if needed), and
- understand the Minnesota DNR's Aquatic Plant Management Program.

This handbook may be particularly useful to:

- lakeshore property owners interested in knowing what's growing near their dock and beach,
- all lake users who want to know more about plants growing in lakes or who are on the lookout for problems such as nutrient additions and exotic plants, and
- anglers hoping to improve their fishing.

Factors Influencing Aquatic Plant Abundance

If you have visited lakes across Minnesota, you have probably noticed that some are loaded with plants while others have hardly any. The primary factors that influence the growth of aquatic plants are water depth, bottom type, and water clarity. These factors vary from lake to lake, and are themselves influenced by what is happening in their watershed—the surrounding land that contributes water (from rainfall, snowmelt, or groundwater) to the lake. Here are some aspects of watersheds that influence aquatic plant growth:

The "Age" of the Lake

Lakes undergo a natural aging process by which they slowly fill up with sediment. This sediment is primarily decayed plant and animal matter and eroded soil that have washed in from the surrounding land. The sediment also contains nutrients such as nitrogen and phosphorous. As the sediment builds up, the lake gets shallower, the bottom sediments become more fertile, and the conditions become more favorable to aquatic plant growth.

Nutrients

Like their land-based cousins, aquatic plants need sunlight, water, carbon dioxide, and nutrients—including phosphorous, nitrogen, potassium, and calcium—to grow. The primary source of nutrients is the watershed. Northern Minnesota lakes typically have few aquatic plants because the watershed is low in phosphorous and nitrogen. In central and southern Minnesota, where the soils are naturally more fertile, more nitrogen and phosphorous enter lakes from the watershed, so these nutrient-rich lakes tend to have more aquatic plants and algae.

Weather

During periods of heavy rainfall, increased runoff brings more nutrients into a lake. These additional nutrients may be released from flooded soils or carried into the lake on silt or clay particles. Excess nutrients often boost plant growth, particularly algae or free-floating aquatic plants. If rainfall and water levels are normal, nutrient levels and plant growth tend to

remain stable. Conversely, frequent low water levels can promote plant growth, particularly that of rooted plants, by creating additional shallow-water areas and submerged soil available for growth.

Human Activities

Intense cultivation or land development near a lake can also increase the amount of aquatic plants by increasing the amount of nutrients flowing from the watershed into the water. Nutrient-laden discharges from sewage treatment plants, livestock feedlots, and leaky septic systems promote heavy growth of aquatic plants. Development within a watershed also speeds up the aging process of a lake. The construction of roads and houses removes vegetation that would normally protect soils, leading to more soil erosion. The addition of houses, paved driveways, and other hard surfaces adds to the amount of nutrient-rich runoff that flows into lakes and streams. For all of these reasons, lakes and ponds that did not support a dense growth of aquatic plants in their natural state may show increased growth because of human activities.

Aquatic Plants:
Where Do They Grow?

Within a lake or pond, aquatic plants grow in an area known as the littoral zone—the shallow transition zone between dry land and the open water area of the lake. In Minnesota waters, the littoral zone extends from the shore to a depth of about 15 feet, depending on water clarity. The littoral zone is highly productive. The shallow water, abundant light, and nutrient-rich sediment provide ideal conditions for plant growth. Aquatic plants, in turn, provide food and habitat for many animals such as fish, frogs, birds, muskrats, turtles, insects, and snails (see Figure 1). **Protecting the littoral zone is important for the health of many of a lake's fish and other animal populations.**

Aquatic plants are grouped into four major categories.

1 **Algae** have no true roots, stems, or leaves and range in size from tiny, one-celled organisms to large, multicelled plant-like organisms, such as chara (see pages 19–22). Plankton algae, which consist of free-floating microscopic plants, grow throughout both the littoral zone and the well-lit surface waters of an entire lake. Other forms of algae, including stringy filamentous types, are common only in the littoral area.

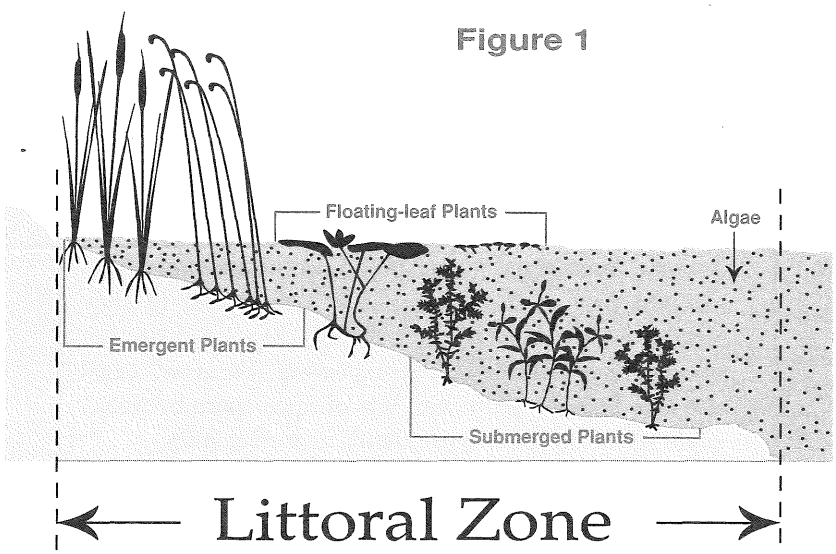
2 **Submerged plants** have stems and leaves that grow entirely underwater, although some may also have floating leaves (see pages 23–35). Flowers and seeds on short stems that extend above the water may also be present. Submerged plants grow from near shore to the deepest part of the littoral zone (see Figure 1) and display a wide range of plant shapes. Depending on the species, they may form a low-growing "meadow" near the lake bottom, grow with lots of open space between plant stems, or form dense stands or surface mats.

3 **Floating-leaf plants** are often rooted in the lake bottom, but their leaves and flowers float on the water surface (see pages 36–41). Water lilies are a well-known example. Floating leaf plants typically grow in protected areas where there is little wave action.

4 **Emergent plants** are rooted in the lake bottom, but their leaves and stems extend out of the water (see pages 42–46). Cattails, bulrushes, and other emergent plants typically grow in wetlands and along the shore, where the water is less than 4 feet deep.

As Figure 1 illustrates, each of the four types of aquatic plants favors a certain water depth. Typically, however, the growth areas are not sharply divided. Expect to see some overlap in growth—submerged plants, for example, interspersed among floating-leaf varieties.

Figure 1



The width of the littoral zone often varies within a lake and among lakes. In places where the slope of the lake bottom is steep, the littoral area may be narrow, extending several feet from the shoreline. In contrast, if the lake is shallow and the bottom slopes gradually, the littoral area may extend hundreds of feet into the lake or may even cover it entirely.

Cloudy or stained water, which limits light penetration, may restrict plant growth. In lakes where water clarity is low all summer, aquatic plants will not grow throughout the littoral zone but will be restricted to the shallow areas near shore.

Other physical factors also influence the distribution of plants within a lake or pond. For example, aquatic plants generally thrive in shallow, calm water protected from heavy wind, wave, or ice action. However, if the littoral area is exposed to the frequent pounding of waves, plants may be scarce. In a windy location, the bottom may be sand, gravel, or large boulders—none of which provides a good place for plants to take root. In areas where a stream or river enters a lake, plant growth can be variable. Nutrients carried by the stream may enrich the sediments and promote plant growth; or, suspended sediments may cloud the water and inhibit growth.

In summary: Where aquatic plants grow and how abundant they are may vary greatly from lake to lake, and even within a lake itself. Before making decisions that could affect the shoreline, examine the distribution and composition of the plant community in any lake. Qualified lake specialists can help you decide what you should or should not do to alter your shoreline. DNR staff listed in this booklet (pages 50-51) can help direct you to available resources and specialists.

Value of Aquatic Plants

Aquatic plants are a natural part of most lake communities and provide many benefits to fish, wildlife, and people. In lakes, life depends—directly or indirectly—on water plants. They are the primary producers in the aquatic food chain, converting the basic chemical nutrients in the water and soil into plant matter, which becomes food for all other life.

Aquatic plants serve many important functions:

Provide fish food

More food for fish is produced in areas of aquatic vegetation than in areas where there are no plants. Insect larvae, snails, and freshwater shrimp thrive in plant beds. Sunfish—Minnesota's most sought-after game fish—eat aquatic plants in addition to aquatic insects and crustaceans.

Offer fish shelter

Plants provide shelter for young fish. Because bass, sunfish, and yellow perch usually nest in areas where vegetation is growing, certain areas of lakes are protected and posted by the DNR as fish spawning areas during spring and early summer. Northern pike use aquatic plants, too, by spawning in marshy and flooded areas in early spring.

Improve water quality

Certain water plants, such as rushes, can actually absorb and break down polluting chemicals. Submerged plants produce oxygen while they absorb phosphorous, nitrogen, and other nutrients from the water. Algae, which thrive on dissolved nutrients, can explode in number ("bloom") if too many submerged water plants are destroyed.

Protect shorelines and lake bottoms

Aquatic plants, especially rushes and cattails, dampen the force of waves and help prevent shoreline erosion. Submerged aquatic plants also weaken wave action and help stabilize bottom sediment.

Provide food and shelter for waterfowl

Many submerged plants produce seeds and tubers (roots), which are eaten by waterfowl. Bulrushes, sago pondweed, and wild rice are especially important duck foods. Submerged plants also provide habitat to many insect species and other invertebrates that are, in turn, important foods for brooding hens and migrating waterfowl.

Improve aesthetics

The visual appeal of a lakeshore often includes aquatic plants, which are a natural, critical part of a lake community. Plants such as water lilies, arrowhead, and pickerelweed have flowers or leaves that many people enjoy.

Provide economic value

As a natural component of lakes, aquatic plants support the economic value of all lake activities. Minnesota has a huge tourism industry centered on lakes and the recreation they support. Residents and tourists spend more than $1.5 billion each year to hunt, fish, camp, and watch wildlife on and around the state's lakes. The wild rice harvesting industry alone is worth at least $2 million to Minnesota's economy.

When Aquatic Plants Present a Problem

The DNR recognizes that aquatic plants may interfere with a homeowner's right to reasonable access to open water. The plants also can attract leeches, provide homes for snails that carry swimmer's itch, or grow so thick that they interfere with boating, swimming, or other water recreation. To balance the needs of conservation and those of recreation, the DNR has developed an Aquatic Plant Management Program. This program, operated under Minnesota Rules, requires permits for controlling, planting, or destroying aquatic plants and other organisms in protected waters and wetlands. Because plants provide many benefits to the water environment, requests to destroy vegetation must be limited to areas where plants are seriously interfering with recreational use.

Two common ways to control aquatic plants:

1 **Mechanical control** means to cut or pull by hand or with equipment such as rakes, cutting blades, or hand-operated, motorized trimmers. Large-scale mechanical control often uses floating, motorized harvesting machines that cut the plants and remove them from the water onto land, where they can be disposed. All plants that are mechanically controlled *must* be removed from the lake. For more information on mechanical control options, call the appropriate DNR telephone number listed on pages 50-51.

2 **Herbicide control** means to use plant-killing chemicals that are applied in liquid, granular, or pellet form. The aquatic plants (sometimes only the stems and leaves) die and decompose in the lake. To reduce human exposure to the chemicals, temporary water-use restrictions are imposed in treatment areas whenever herbicides are used. Only herbicides labeled for aquatic use are allowed, and any use of an herbicide requires a DNR

permit. **Using an herbicide without a DNR permit is a misdemeanor, punishable by a fine of up to $700.** For information on specific herbicides, refer to the chart included in the Aquatic Plant Management information packet, found in the pocket in the back of this guide, or from the DNR Section of Ecological Services (see page 50).

In addition to mechanical control and herbicides, biological controls may someday be available for controlling certain harmful exotic plants. Biological control uses plants, insects, or other organisms that eat or destroy exotic plants without harming Minnesota's native species. With exotic species, such as purple loosestrife or Eurasian watermilfoil, biological control typically involves introducing predator insects or diseases that limit the problem-plant's growth in its native habitat. These control methods for Minnesota's harmful exotic plants are currently being studied and are not yet available for common use.

Whichever method of control you choose, the cost of control depends on the size and type of project. Aquatic plant control is temporary—in shallow littoral areas, the removal of aquatic plants opens up an area for other plants to grow in—so you will likely need to repeat it. For more information on permits, costs, treatment methods, and herbicide distributors, call the DNR or refer to the DNR's Aquatic Plant Management information packet. You can also discuss with an independent contractor which control method would be appropriate.

It's the Law:
State Regulations on Controlling Aquatic Plants

Under Minnesota law, aquatic plants growing in public waters are the property of the state. Because of their value to the lake ecosystem, they may not be destroyed or transplanted unless authorized by the Commissioner of the Department of Natural Resources.

Activities NOT allowed

- Destroying or preventing the growth of aquatic plants by laying a plastic mat on the lake bottom.
- Removing aquatic vegetation within posted fish-spawning areas.
- Removing aquatic plants from an undeveloped shoreline.
- Removing aquatic plants where they do not interfere with swimming, boating, or other recreation.

Control methods which MUST HAVE a permit

- Destruction of any emergent plants (for example, cattails and bulrushes. See pages 42–46).
- Cutting or pulling by hand, or by mechanical means, aquatic vegetation in an area larger than 2,500 square feet.
- Applying herbicides or algicides.
- Moving or removing a bog of any size that is free-floating or lodged in any area other than its place of origin in protected waters. (A "protected water" is generally any body of water 2.5 acres or larger within an incorporated city limit, or 10 acres or larger in rural areas. If you are unsure whether a particular lake is protected, ask at your local DNR office.)
- Transplanting aquatic plants into protected waters.
- Using any type of beach-cleaning or sand-sifting machine in the lake below the ordinary high-water level.

When a permit is NOT needed

If you are a lakeshore-property owner who wants to create or maintain a swimming or boat-docking area, you may cut or pull submerged or floating-leaf vegetation such as Elodea and pondweeds (see pages 23–41) without a DNR permit under certain conditions: First, the area to be cleared must be no larger than 2,500 square feet. Second, the cleared area must not extend more than 50 feet along the shoreline or one-half the length of your shoreline, whichever is less. A boat channel up to 15 feet wide, and as long as necessary to reach open water, may also be cleared. (The boat channel is in addition to the 2,500 square feet allowed). The cutting or pulling may be done by hand or with hand-operated or powered equipment that **does not significantly alter the course, current, or cross-section of the lake bottom.** Such control cannot be done with draglines, bulldozers, hydraulic jets, suction dredges, or other powered earth-moving equipment. After you have cut or pulled aquatic plants, you must dispose of them on land far enough from the shore to prevent them from washing onto your neighbor's property or back into the lake. Plants left in the water can contribute excess nutrients to the lake, and when they decompose, they use oxygen needed by fish. If you have any questions on control methods that do not require a permit, call your local DNR office listed on pages 50–51.

A DNR permit is not needed to gather aquatic plants for personal use (except for wild rice and yellow lotus) or for constructing a shooting or observation blind.

Applying for a permit

To apply for a permit, contact the DNR's Ecological Services Section or regional DNR office. The DNR does not grant permits automatically. Applications may be denied or modified for several reasons: because the plant beds in question are too valuable for fish or wildlife, because other lakeshore property owners or lake users object to the plants being damaged, or because the plants are part of protected, natural areas. If you get a permit, you need to take three steps to ensure that plant control is done correctly and with proper care for the environment:

1 Notify the DNR before control operations begin, as specified on the permit.
2 Post with signs any area that has been treated with an herbicide. (These signs are included with the permit or are furnished by the DNR to the commercial applicator.) Such posting is necessary to restrict swimming or fishing until the herbicide is broken down or has been diluted to safe levels.
3 Report the actual size of the controlled area and the amount of chemical used to help the DNR monitor statewide use of aquatic herbicides. If you are inexperienced in or uncomfortable with applying herbicides, you may want to hire a licensed pesticide applicator. These applicators will frequently help you obtain a permit as part of their services.

Costs, liability, and other information

In addition to administering permits, the DNR evaluates plant-control methods and provides guidance to lake associations. The agency does not endorse specific herbicides, products, or companies. Nor does the DNR arbitrate the results of control work. Liability for damage resulting from control work rests with the permittee (person receiving the permit) or his or her agent. Costs of aquatic plant-control projects must be paid by the property owners who benefit from the control. An exception is the control of exotic plants such as Eurasian watermilfoil, where state funding may be available. In addition, Minnesota Statutes, Section 111.81 authorizes cities and towns to levy taxes for the control of aquatic plants.

Stewardship: Moving from Short-term Control to Long-term Prevention

Measures such as cutting, pulling, or using herbicides can control aquatic plants from season to season. But in the long run, the best way to combat excessive growth of aquatic plants is prevention—reducing the flow of nutrients, sediments, and exotic species moving into a lake or stream. Listed below are a few practical steps you can take to maintain good water quality—and prevent excessive plant growth—in your favorite lake or pond. It will take time before these steps improve water quality and reduce plant growth, but they are essential for sustaining and enhancing desirable plant communities in Minnesota lakes.

- **Use discretion when fertilizing your property** (whether it is directly on the lakeshore or elsewhere within the lake's watershed). Have your soil tested to determine if you really need to fertilize. If fertilizing is necessary, be aware of local regulations before application. Water your lawn after fertilizing, but do not allow water to run off into streets or lakes. Also, clean up any fertilizer spilled onto roads or sidewalks.

- **Keep septic systems working properly.**

- **Remove garden and grass clippings** from street gutters, sidewalks and driveways. Compost the clippings or use them as garden mulch.

- **Maintain a vegetative "buffer zone"**—a strip of unmanaged grasses or natural vegetation allowed to grow along the shoreline. This vegetation will help prevent soil erosion from the shoreland and will absorb some of the nutrients that would otherwise enter the lake.

- **Construct a berm**—a slight hump in the ground running parallel to the shoreline—above the highest known water line. This ridge will help prevent nutrient-rich runoff from entering the lake directly. An existing ice ridge may serve the same purpose. Be sure to check with your local county or city zoning office before constructing a berm.

- **Use low- or no-phosphorous soaps and detergents.**

- **Avoid adding too many hard surfaces** (roads, roofs, pavement) close to a lake. They can cause more nutrient-rich water to run into the lake.

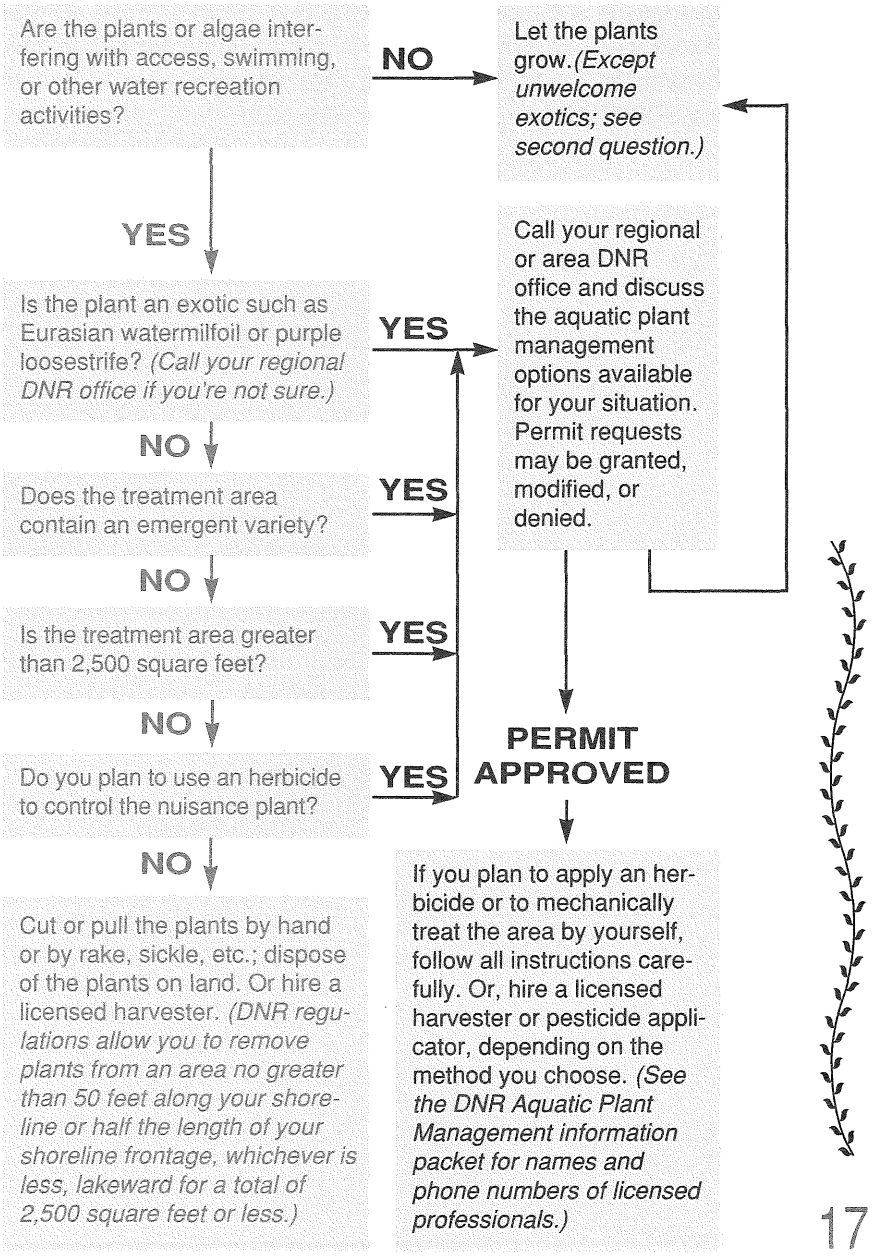
- **Clean up after your pet.** Flush the waste down a toilet or dispose of it away from the water or shoreline.

- **Keep livestock away from streams and lakes.** Their waste adds unwanted nutrients and their hoofs erode banks.

- **Help stop the spread of undesirable exotic plants** such as purple loosestrife, curlyleaf pondweed, and Eurasian watermilfoil. Clean your boat, motor, trailer, and other equipment of all aquatic vegetation immediately after leaving the water. Dispose of the plants on higher ground to prevent reintroduction into the water.

The Permit Process:
An Overview

If you believe that the growth of aquatic plants near your shoreline creates a nuisance, use this flowchart to help pinpoint the steps necessary to identify appropriate control options.



Identifying 25 Common Aquatic Plants in Minnesota

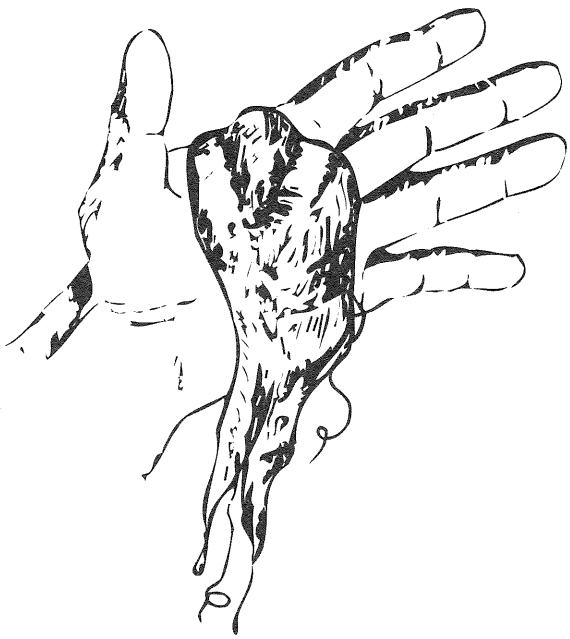
This section will help you identify common aquatic plants, understand their importance, and learn about your options for controlling the plants (if necessary). The best way to identify a plant is to obtain a live sample, shake off the excess water, and hold it next to the line illustrations in this handbook. If you have difficulty identifying a plant, call your regional DNR headquarters (see page 51).

ALGAE

Algae are primitive plants that form the base of aquatic food chains. Many algae are microscopic, consisting of a single cell. Others form chains, filaments, or colonies. Some even grow to resemble higher plants, though they have no true leaves, stems, or root systems. Many algae are free-floating and, when abundant, their presence makes the water appear green or brown. In lakes where algae growth is extreme, their decay may deplete the oxygen in the water and cause "summerkill" of fish. For information on algicides (herbicides that control algae), refer to the chart included in the DNR's Aquatic Plant Management information packet.

Filamentous Algae

(Spirogyra, Cladophora, and many other varieties)



Common names: Pond scum, water net, frog spittle, moss.

Location: Ponds, shorelines, and backwaters.

Description: Mass of long, stringy, hairlike strands; usually green in color but may become grayish or brown; individual filaments are a series of cells joined end to end, which give them a thread-like appearance.

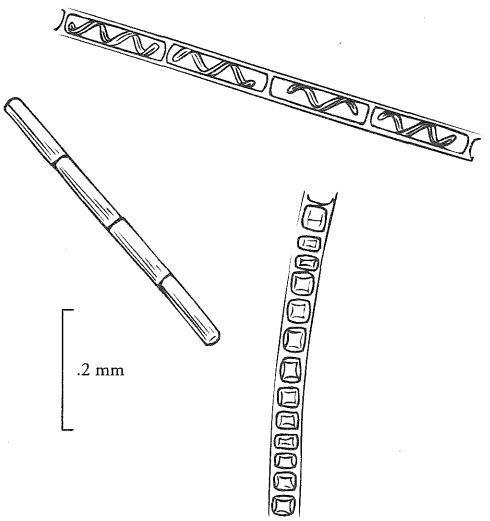
Hints to identify: Forms greenish mats on the water surface; begins growth along the water's edges or bottom and rises to the surface as a bubble-filled mass when mature; slimy or cotton-like in appearance; may form hair-like growth on logs, rocks, and other vegetation at lake bottom and on the shoreline. Spirogyra gives water a "grassy" taste and odor.

Importance of plant: Provides cover for small animals such as aquatic insects, snails, and scuds, which are valuable fish food.

Management strategy: See page 12 for DNR permit requirements. Nuisance growth, such as an algae bloom, indicates that a lake has excessive nutrients (usually phosphorus). Use preventative measures such as limiting the flow of nutrients into the lake. For existing infestations, you may achieve better control if you break up large surface mats before applying an algicide.

Plankton Algae

(Anabaena, Aphanizomenon, and many other varieties)



Common names: Blue-green algae, scum, waterbloom.

Location: Lakewide, generally free-floating, but concentrations occur along windward shores and backwater areas.

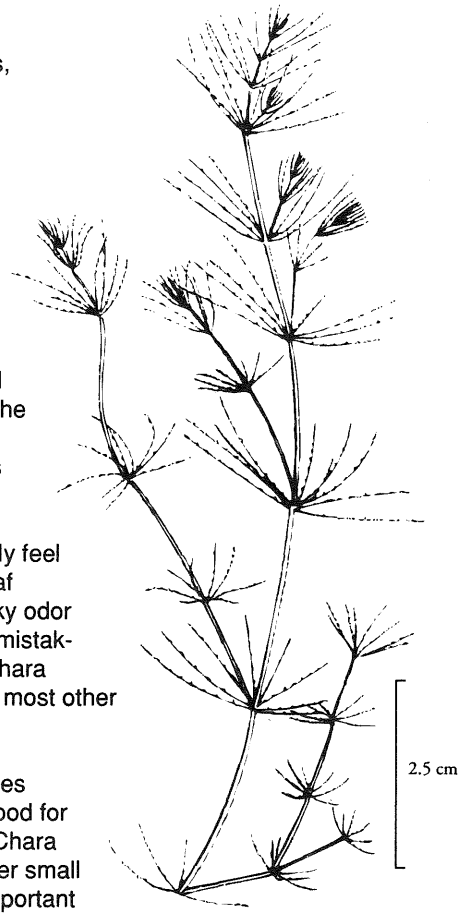
Description: Microscopic plants generally growing near the surface; may form multicellular colonies or filaments; abundant growth results in "blooms" that color the water green or turquoise blue.

Hints to identify: Look for a change in water color; severe blooms often resemble pea soup; blue-green algae form unsightly, jellylike masses or a blue, paint-like scum on beaches and shorelines.

Importance of plant: Provides food for certain small aquatic animals and young fish.

Management strategy: See page 12 for DNR permit requirements. Abundant growth indicates that a lake has excessive nutrients, usually phosphorous. Caution: When some species of blue-green algae are decaying, their cells release toxic materials, which can poison animals that drink the water. These toxic blooms are uncommon, but it is wise to keep your pets and livestock away from the water when any algal bloom is breaking up. Use preventive measures such as limiting the flow of nutrients into the lake. For existing infestations, you can get temporary control using an algicide.

Chara
(pronounced CARE-ah)



Common names: Muskgrass, stonewort, sand grass.

Location: Usually in clear, hard water.

Description: An advanced form of algae. It may grow several feet long and resemble larger plants; light-green or gray-green in color; stemlike branches with forked leaves; grows entirely below the water surface, and dense growth may cover large areas on the lake bottom.

Hints to identify: Gritty, bristly feel due to mineral deposits on leaf surfaces; emits a strong musky odor when crushed; is sometimes mistaken for coontail or milfoil, but chara has a lighter green color than most other aquatic plants.

Importance of plant: Stabilizes bottom sediments; provides food for waterfowl and cover for fish. Chara also supports insects and other small aquatic animals, which are important foods for trout, bluegills, smallmouth bass, and largemouth bass.

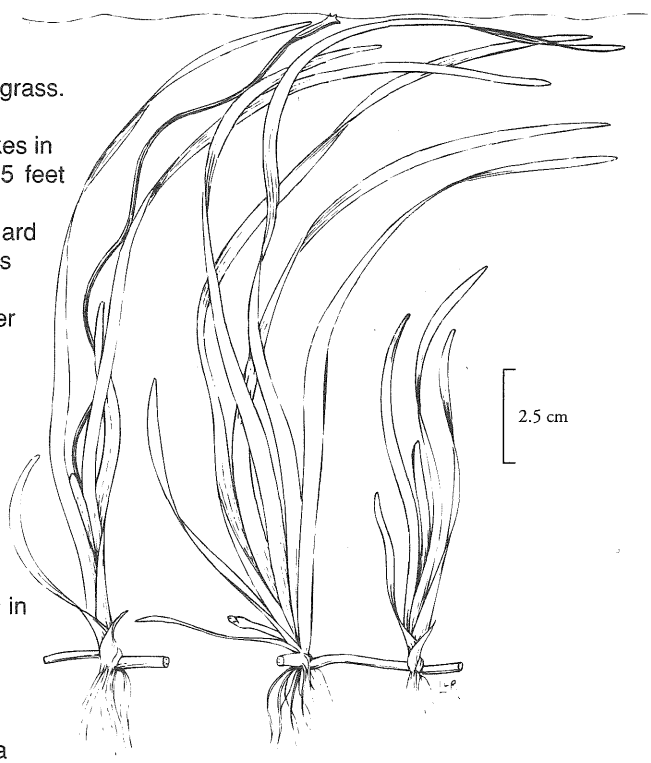
Management strategy: See page 12 for DNR permit requirements. It's best to leave these plants alone. If they interfere with boating or swimming and removal is absolutely necessary, try hand-pulling or cutting. Algicides, which require a DNR permit, can provide reasonable control.

SUBMERGED PLANTS

Submerged plants grow beneath the water surface, except for their flowers, fruits, and floating leaves. These plants grow throughout the littoral zone and can grow deeper than most other types of aquatic plants. Submerged plants have leaves that vary greatly in size and shape among the different species. Some leaves may be large and ribbon-like, while others may be feathery in appearance. The flowers are pollinated above the surface, but the seeds germinate and the young plants develop only under water.

Mechanical control of submerged plants is allowed without an Aquatic Plant Management Permit from the DNR **if the size of the treatment area meets certain restrictions** (see page 13). For information on DNR-approved herbicides used in controlling submerged plants, refer to the chart included with the DNR's Aquatic Plant Management information packet.

Wild Celery
(Vallisneria americana)



Common names: Water celery, eelgrass, tapegrass.

Location: Lakes in depths up to 15 feet and streams; prefers semi-hard bottom such as sand covered with a thin layer of muck.

Description: Leaves are ribbon-like, dark-green, and grow below the water surface; rooted in mud; in late summer, produces a small, whitish-yellow flower, supported by a coiled stalk; often grows in beds amid pondweeds and other submerged plants.

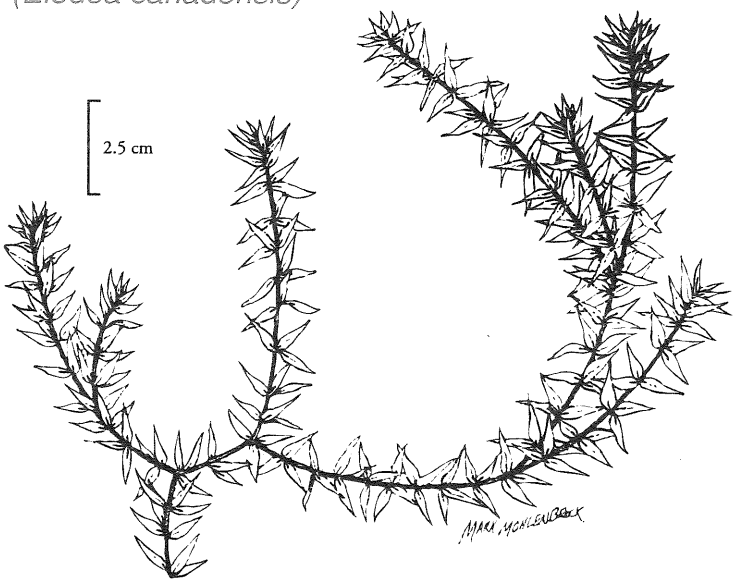
Hints to identify: Unbranched leaves extending from the lake bottom to the water surface; flowers (and occasionally some leaves) float on the surface; leaves are attached to a horizontal central stem right above lake bottom.

Importance of plant: Provides shade and shelter for bluegills, young perch, and largemouth bass; choice food of waterfowl, particularly diving ducks; attracts muskrats, marsh birds, and shore birds.

Management strategy: See page 12 for DNR permit requirements. Because wild celery is an excellent wildlife food, it is usually best left alone. Excessive growth during July and August in shallow water may present problems. Herbicides don't work well in controlling this plant. Hand-pulling or raking sometimes works, though floating, uprooted plants often re-establish themselves in shallow water.

Canada Waterweed

(Elodea canadensis)



Common names: Elodea (pronounced el-oh-DEE-a), American elodea, common elodea, anachris, waterweed.

Location: Found in lakes in depths up to 10 feet, often in hard water, and near stream inlets.

Description: Grows entirely underwater, except for a small white flower that blooms during the summer; has branched stems; plants and leaves are usually a dark, grass-green color; leaves are oval-shaped and arranged in clusters of three or four around the stem.

Hints to identify: Look for leaf clusters compacted near the tip and spaced farther apart down the stem; stems are brittle, branched, and form a large mass near the lake bottom; white flowers have three to four petals and bloom during the summer; flowers are attached to the stem by a threadlike stalk.

Importance of plant: Provides habitat for many small aquatic animals, which fish and wildlife eat; excellent oxygen producer; attractive leaves make it a popular aquarium plant. However, dense growth of this plant can create a nuisance, and its closed, compact structure is not ideal fish habitat.

Management strategy: See page 12 for DNR permit requirements. When it is absolutely necessary to cut or pull Canada waterweed, pick up all fragments—they can re-sprout into new plants. A DNR-approved aquatic herbicide can be an effective control method.

Broad-leaf Pondweeds
(Potamogeton spp.)

Common names: Large-leaf pondweed, claspingleaf (Richardson) pondweed, floating-leaf pondweed, whitestem pondweed, broad-leaf cabbage, musky cabbage, bass weed.

Location: Found in lakes and streams, growing in depths up to 20 feet; often grow near drop-offs.

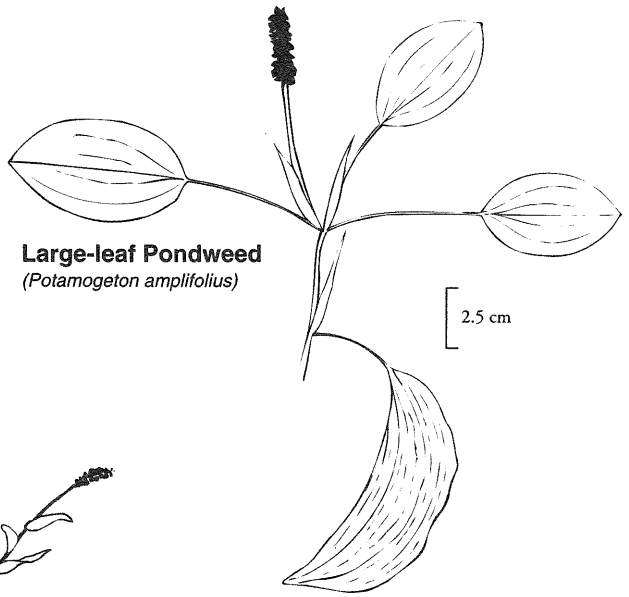
Description: Leaves 2 to 8 inches long; large-leaf and claspingleaf pondweeds grow below the water surface, except for the flowering stalk; floating-leaf pondweed grows below the water surface, except for their flowering stalk and large, floating leaves; all species have thin and delicate submerged leaves, tough stems that are firmly rooted, and a stiff appearance when out of the water.

Hints to identify: Often grow in patches or beds; have small seed heads crowded into spikes, often sticking up above water from June through August. **Floating-leaf pondweed**—Floating leaves are slightly heart-shaped. **Large-leaf pondweed**—Floating leaves are oval-shaped; submerged leaves are large and wavy; plants are seldom branched. **Claspingleaf pondweed**—Leaves are wide and wavy with a broad base that clasps the stem; plant often branches toward tip; often confused with curlyleaf pondweed, which has small "teeth" along leaf edges (see page 35), but claspingleaf pondweed has no "teeth" on leaf edges.

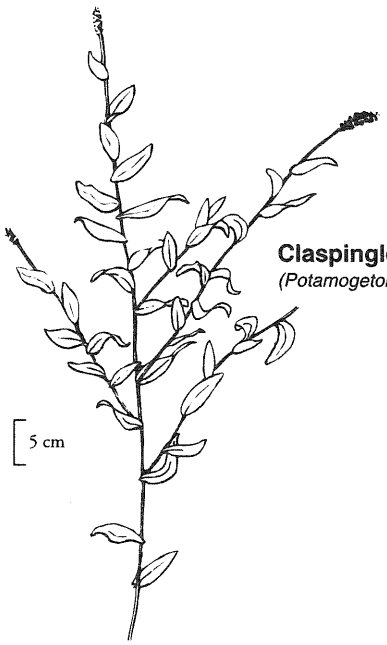
Importance of plants: Broad-leaf pondweeds provide excellent habitat for panfish, largemouth bass, muskellunge, and northern pike; bluegills nest near these plants and eat insects and other small animals found on the leaves; walleyes use these pondweeds for cover.

Management strategy: See page 12 for DNR permit requirements. These plants are important fish habitat, so it is best to let them be. Removing them may allow less-desirable aquatic plants to move in. These plants are also highly resistant to chemical control. For small problem areas, try raking or cutting the plants.

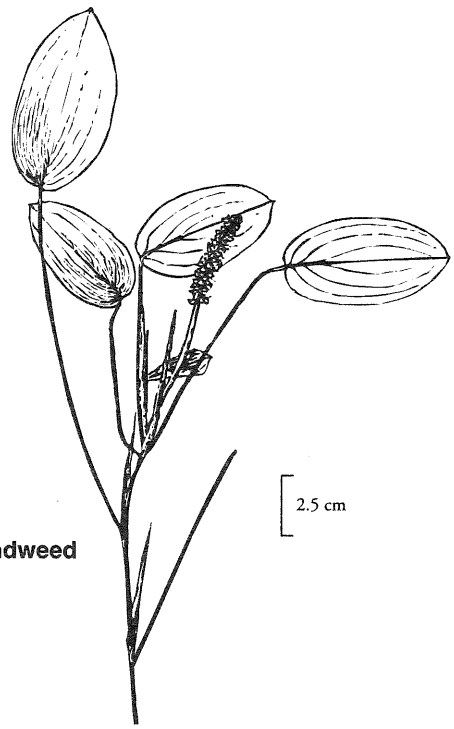
SUBMERGED PLANTS



Large-leaf Pondweed
(Potamogeton amplifolius)



Claspingleaf Pondweed
(Potamogeton richardsonii)



Floating-leaf Pondweed
(Potamageton natans)

Narrow-leaf Pondweeds

(Potamogeton zosteriformes, Potamogeton foliosus, Potamogeton pectinatus)

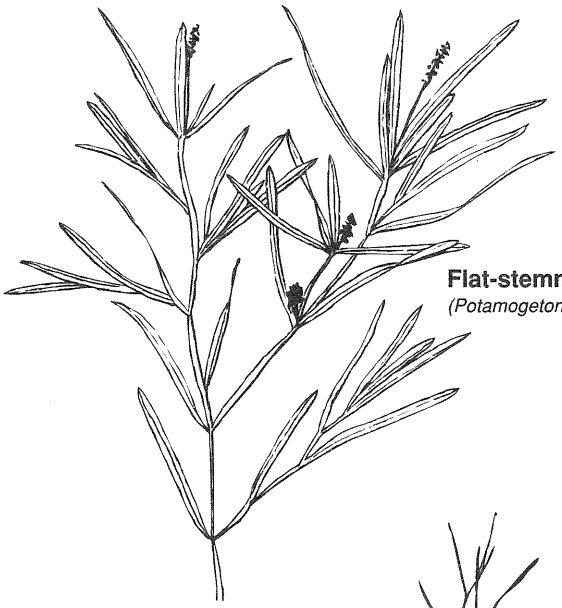
Common names: Flat-stemmed, leafy, and sago pondweeds.

Location: Grow below water surface; are firmly rooted; have branched, slender stems; have grasslike, narrow leaves; may have flowers or seeds extending above water surface; are limp when out of the water.

Hints to identify: Narrow-leaf pondweeds have no floating leaves—it is only the seeds of some types that reach or extend above the surface. **Sago pondweed** has stiff, threadlike leaves that appear bushy and are alternately arranged on one stem; spreading leaves in the water resemble a fan; small, pebble-sized fruits are spaced on the stem and emerge from the water.

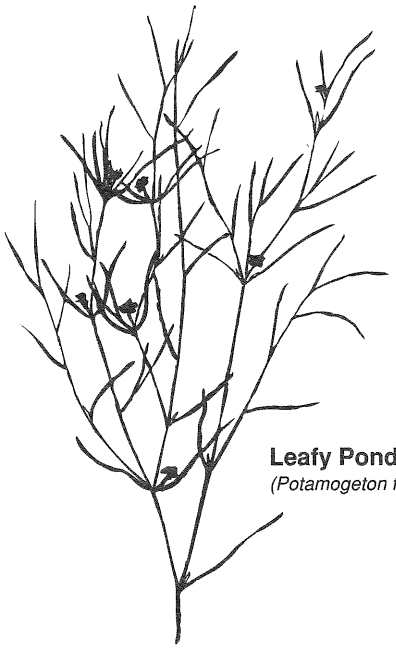
Importance of plants: Provide some cover for bluegills, perch, northern pike, and muskellunge, though these fish prefer broad-leaf pondweeds; good cover for walleye; provide food for waterfowl; support aquatic insects and many other small animals that fish and ducklings eat. Swans, geese, and diving ducks such as canvasbacks favor the tubers and seeds of sago pondweed.

Management strategy: See page 12 for DNR permit requirements. Removing narrow-leaf pondweeds may allow less-desirable plants such as curlyleaf pondweed or Eurasian watermilfoil to move in. If control is absolutely necessary, try hand-pulling, raking, or underwater cutting. A DNR-approved herbicides can be an effective control method.

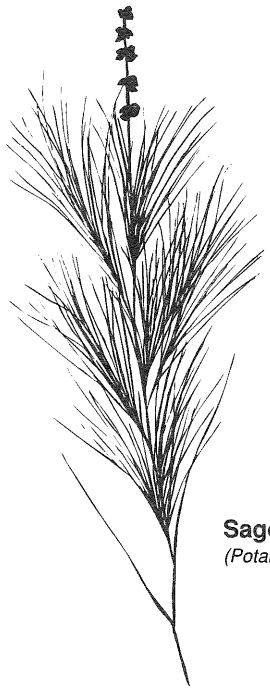


Flat-stemmed Pondweed
(Potamogeton zosteriformis)

2.5 cm



Leafy Pondweed
(Potamogeton foliosus)

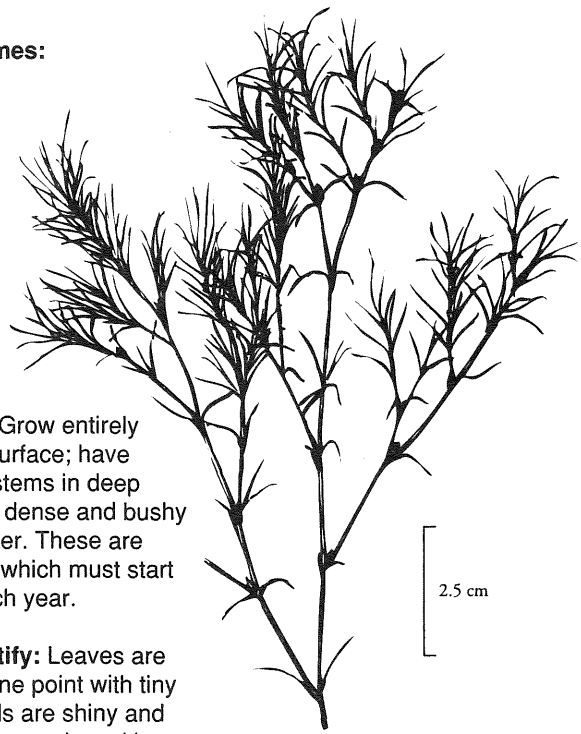


Sago Pondweed
(Potamogeton pectinatus)

Bushy Pondweed and Naiads

(pronounced NAY-ads)

(Najas marina, Najas guadillim, Najas minor, Najas guadalupensis, Najas flexilis)



Common names: Bushy naiad, water naiad, brittle naiad, slender naiad, spiny leaf naiad.

Location: Clear water at depths of up to 20 feet.

Description: Grow entirely below water surface; have long, waving stems in deep water and are dense and bushy in shallow water. These are annual plants which must start from seed each year.

Hints to identify: Leaves are tapered to a fine point with tiny "spines"; seeds are shiny and smooth. Bushy pondweed is sometimes confused with chara, but chara has a musky odor when crushed and bushy pondweed does not.

Importance of plants: Entire plants are eaten by waterfowl, especially mallards; provide cover for young largemouth bass and northern pike and small bluegills and perch.

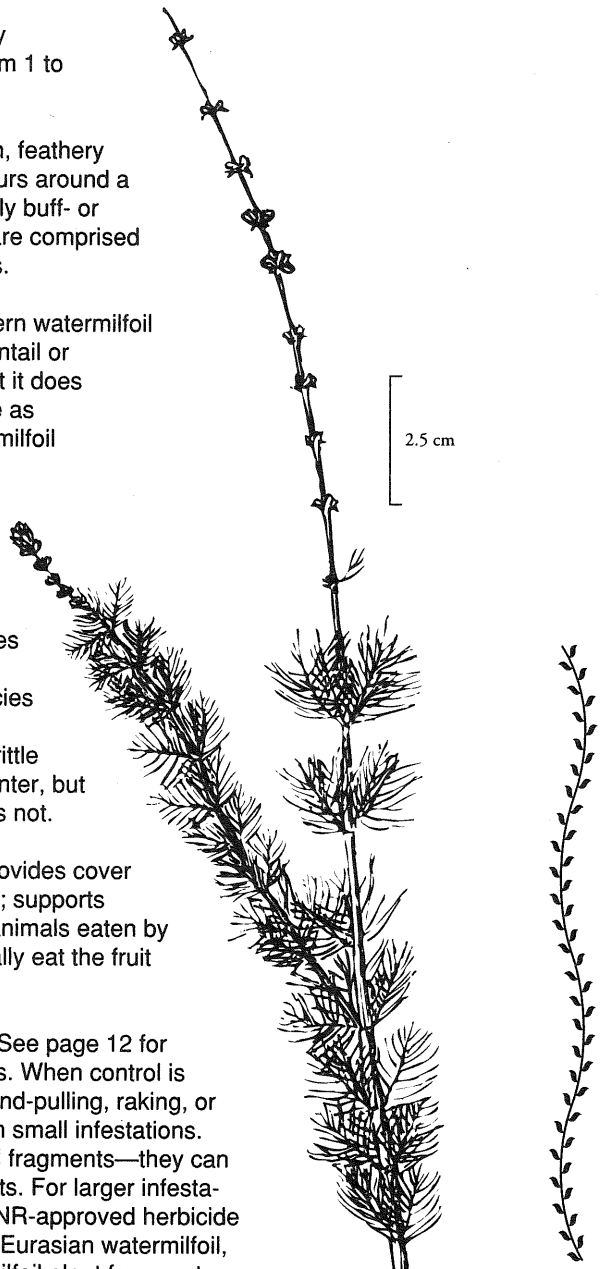
Management strategy: See page 12 for DNR permit requirements. Bushy pondweed has become more common in recent years; it can grow excessively in some areas and cause problems. In most areas, it will not be a nuisance and is best left alone—removal may allow less-desirable plants to move in. When control is absolutely necessary, a DNR-approved herbicide can be effective.

Northern Watermilfoil
(Myriophyllum exalbescens)

Location: Grows entirely underwater in depths from 1 to 20 feet.

Description: Dark-green, feathery leaves are grouped in fours around a hollow stem that is usually buff- or pinkish-colored; leaves are comprised of 5 to 10 pairs of leaflets.

Hints to identify: Northern watermilfoil is often mistaken for coontail or Eurasian watermilfoil, but it does not branch at the surface as much as Eurasian watermilfoil does; northern typically has half as many leaflet pairs as Eurasian has; northern leaves are rigid when removed from the water, but Eurasian leaves are limp when out of water. The northern species also forms winter buds (groups of small, dark, brittle leaves) in late fall and winter, but the Eurasian variety does not.



Importance of plant: Provides cover for fish and invertebrates; supports insects and other small animals eaten by fish; waterfowl occasionally eat the fruit and foliage.

Management strategy: See page 12 for DNR permit requirements. When control is absolutely necessary, hand-pulling, raking, or cutting can be effective in small infestations. Collect and dispose of all fragments—they can regenerate into new plants. For larger infestations, treatment with a DNR-approved herbicide can be effective. As with Eurasian watermilfoil, carrying northern watermilfoil plant fragments on Minnesota's roads is illegal.

UNDESIRABLE EXOTIC

Eurasian Watermilfoil

(Myriophyllum spicatum)

Location: Grows in depths of up to 15 feet in sandy, mucky, or rocky bottoms.

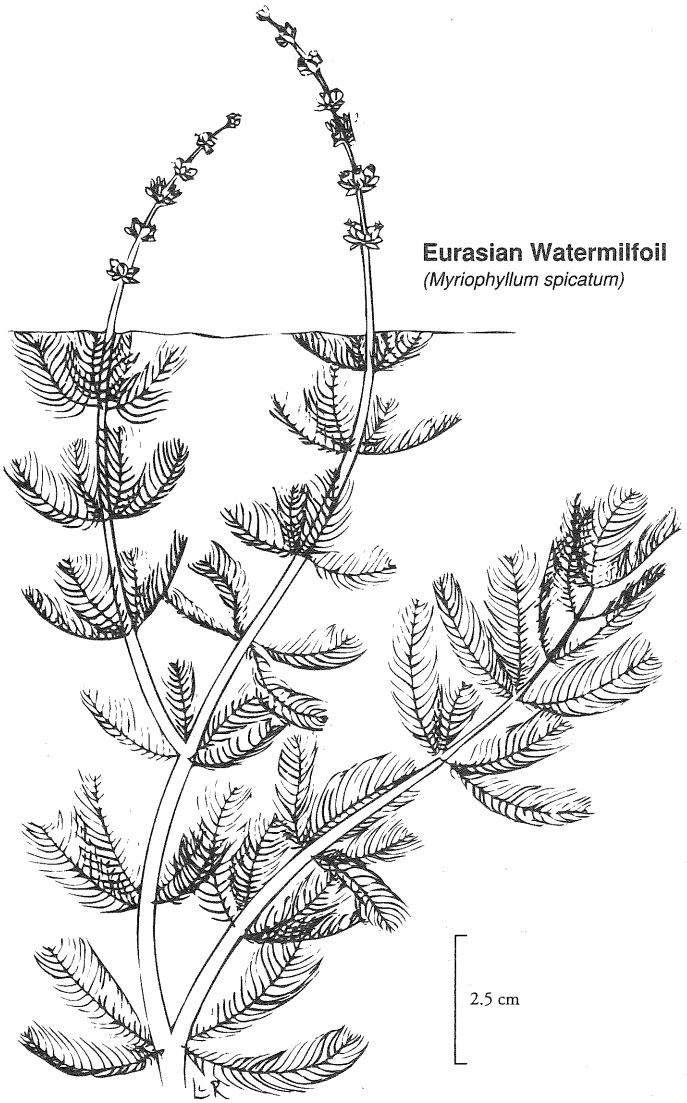
Description: A rooted plant consisting of a reddish-brown stem with many branches; dark-green, feathery leaves are grouped in clusters of four around the stem. In late summer, a 1-inch-long flower spike of tiny yellow flowers sticks up above the water surface.

Hints to identify: Each leaf typically has 10 to 21 pairs of leaflets, which are closely spaced. Frequently confused with coontail and the native northern watermilfoil (but unlike northern, the Eurasian variety is fragile in appearance—its leaves collapse against the stem when removed from the water); often branches profusely at the surface to form brownish mats; produces no winter buds.

Importance of plant: Because it often forms dense surface mats, which shade native plants and interfere with water recreation, Eurasian watermilfoil has been designated as an undesirable exotic aquatic plant in Minnesota.

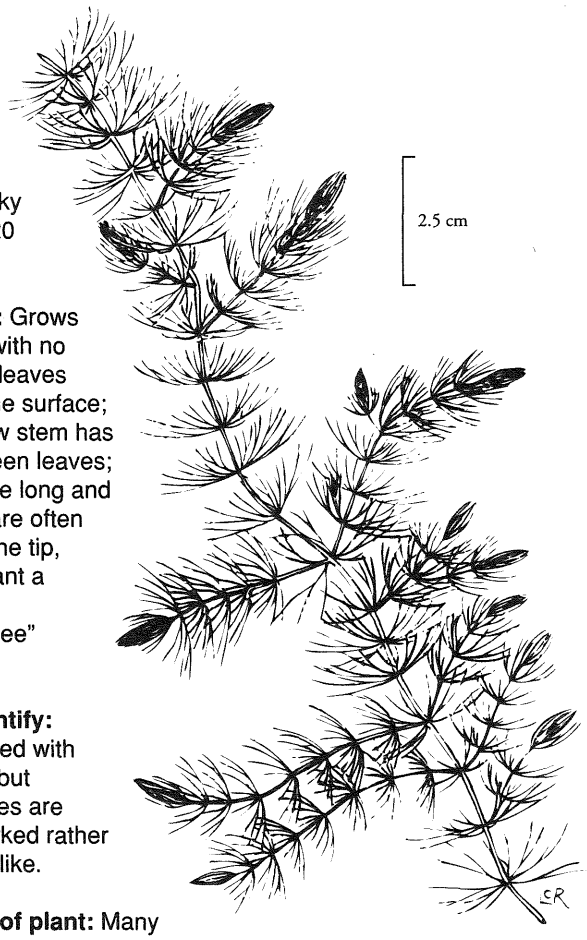
Management strategy: See page 12 for DNR permit requirements. The DNR has a special program to manage Eurasian watermilfoil in Minnesota. The aim of this program is to minimize the damage milfoil causes to the state's ecosystems, recreation, economy, and tourism. Prevention is the best way to slow the spread of this exotic plant. Boaters at lake accesses need to remove all plant fragments from boats, trailers, and other equipment immediately after leaving the water.

Transporting Eurasian watermilfoil on Minnesota roads is against the law. Monitor your lake regularly to see if Eurasian watermilfoil has entered. If you find an infestation, immediately call the DNR (either your local DNR office or the Eurasian watermilfoil coordinator—see page 50). The DNR will use hand-pulling or a DNR-approved herbicide to attempt to eradicate the infestation. An herbicide may provide good control of large, established infestations, but it will not likely eradicate the plant from a lake.



Eurasian Watermilfoil
(Myriophyllum spicatum)

Coontail
(Ceratophyllum demersum)



Common name: Hornwort.

Location: Clear-to-murky water up to 20 feet deep.

Description: Grows underwater with no roots; upper leaves may reach the surface; central hollow stem has stiff, dark-green leaves; plants may be long and sparse, but are often bushy near the tip, giving the plant a "coontail" or "Christmas tree" appearance.

Hints to identify: Often confused with watermilfoil, but coontail leaves are spiny and forked rather than feather-like.

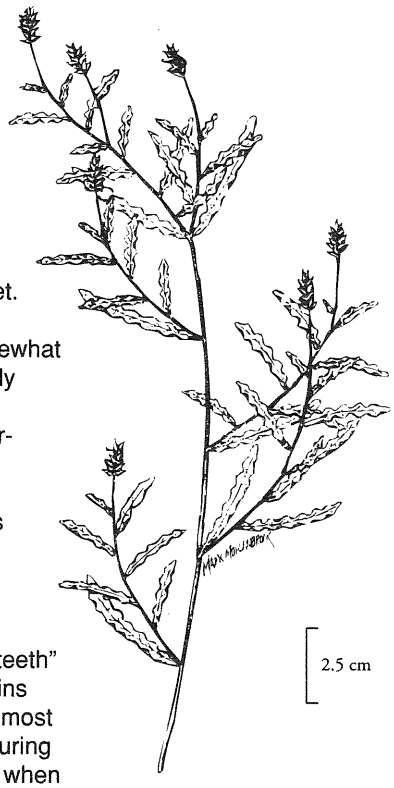
Importance of plant: Many waterfowl species eat the shoots; it provides cover for young bluegills, perch, largemouth bass, and northern pike; supports insects that fish and ducklings eat. However, when growing densely, provides poor fish habitat and commonly grows to nuisance proportions along shorelines.

Management strategy: See page 12 for DNR permit requirements. Coontail is important to young fish, so try not to remove all of it in a problem area. If control is necessary, try cutting or raking to reduce the amount of plants. Remove all plant fragments from the water because they can regenerate into new plants. Herbicide control can be effective.

UNDESIRABLE EXOTIC

Curlyleaf Pondweed

(Potamogeton crispus)



Common names: Curly cabbage, crisp pondweed.

Location: Grows from the shore to depths of up to 15 feet.

Description: Leaves are somewhat stiff and crinkled, approximately 1/2-inch wide and 2 to 3 inches long; leaves are arranged alternately around the stem, and become more dense toward the end of branches; produces winter buds. Frequently confused with claspingleaf pondweed (see page 26).

Hints to identify: Has small "teeth" visible along edge of leaf; begins growing in early spring before most other pondweeds; dies back during midsummer; the flower stalks, when present, stick up above the water surface in June; appears reddish-brown in the water, but is actually green when pulled out of the water and examined closely. Easily confused with claspingleaf pondweed, which has leaves with no "teeth" around their edges.

Importance of plant: Provides some cover for fish; several waterfowl species feed on the seeds; diving ducks often eat the winter buds.

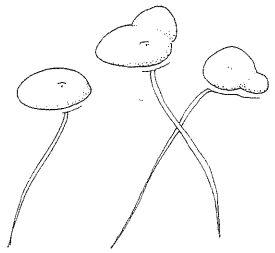
Management strategy: See page 12 for DNR permit requirements. Like Eurasian watermilfoil, curlyleaf pondweed is not native to the United States and often causes problems due to excessive growth. If control is necessary, herbicides and harvesting can be effective.

FLOATING-LEAF PLANTS

Floating-leaf plants include species rooted on the lake bottom and others that are free-floating. In areas where floating-leaf plants grow, submerged plants may be scarce because the masses of floating leaves prevent sunlight from penetrating the water. Certain snails, bugs, and mayflies lay their eggs on the underside of the floating leaves. Sunfish and other fish species breed and nest among floating-leaf plants.

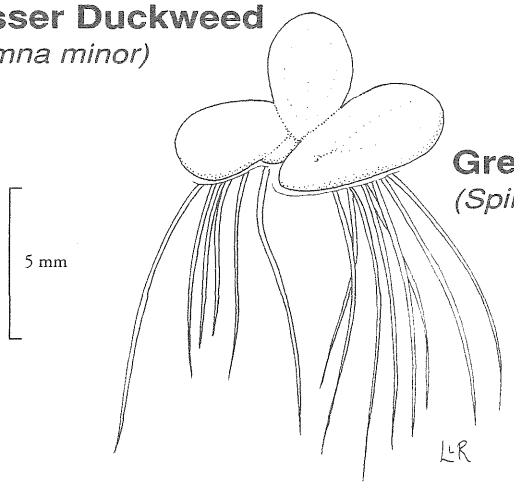
Mechanical control of floating-leaf plants is allowed without obtaining an Aquatic Plant Management Permit from the DNR **if the treatment area meets certain size requirements** (see page 13). Yellow lotus, a floating-leaf plant found in southern Minnesota (see page 41), is a protected wildflower and may not be harmed. For more information on DNR-approved herbicides for controlling floating-leaf plants, refer to the chart included with the DNR's Aquatic Plant Management information packet.

FLOATING-LEAF PLANTS



Watermeal
(Wolffia columbiana)

Lesser Duckweed
(Lemna minor)



Greater Duckweed
(Spirodela polyriza)

Common names: Lesser duckweed, duck's meat, water lentil.

Location: Ponds and quiet backwaters of lakes and streams; some duckweeds are often found near creek inlets or in ditches. Rarely will duckweed become overly abundant on lakes and ponds exposed to wind and heavy wave action. Watermeal is often found growing near duckweed.

Description: Tiny, free-floating green plants. **Watermeal** resembles small grains floating on the water surface; no roots are present. **Duckweed** typically consists of a leaf or cluster of leaves with small roots that hang down into the water; leaves and stem are not distinguishable from each other.

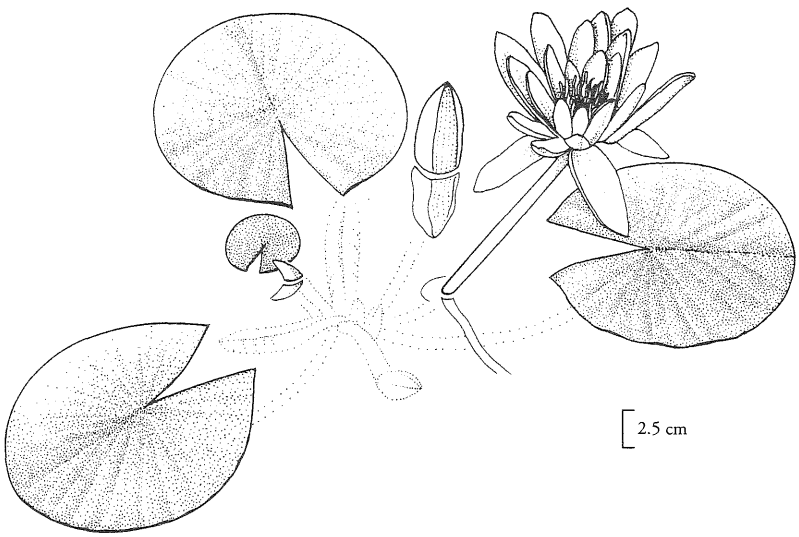
Hints to identify: From a distance, duckweed is often mistaken for algae; it may form a green blanket several inches thick on the water surface. Duckweed is not interconnected, as is filamentous algae. Watermeal resembles green cornmeal floating in the water.

Importance of plants: Provide food for waterfowl and marsh birds; support insects that fish eat. However, may shade out larger, submerged plants.

Management strategy: See page 12 for DNR permit requirements. Duckweed and watermeal reproduce rapidly and are too small for effective mechanical control. If control is absolutely necessary, herbicides can be effective.

White Water Lily

(Nymphaea spp.)



Common names: Lily pad; fragrant water lily.

Location: Grows rooted in mucky or silty bottoms up to 5 feet deep.

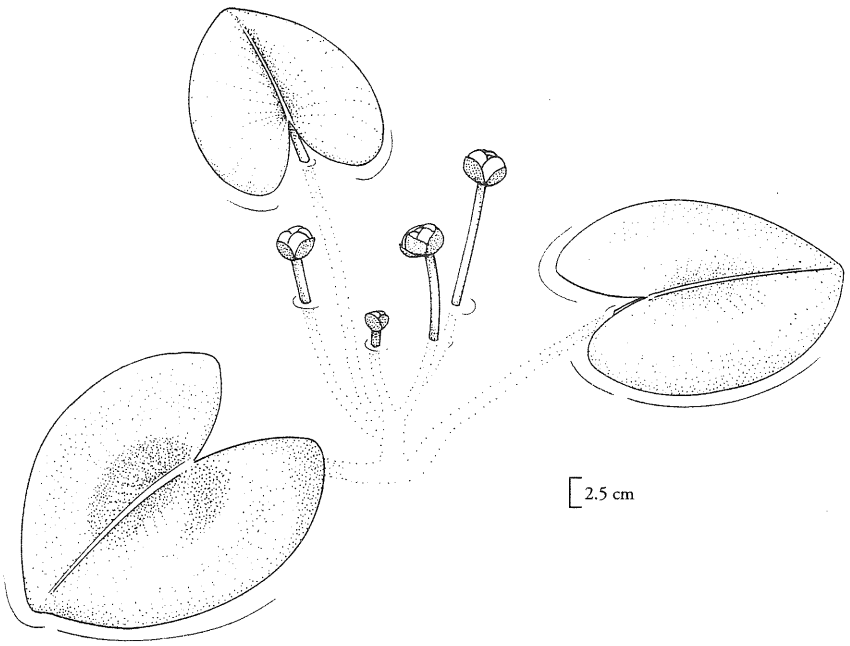
Description: White flower with rows of petals surrounding a yellow center; rooted on the bottom and floating on the water surface or extending slightly above it; surrounded by round, floating leaves that are green-colored and 6 to 12 inches in diameter; plant stem is mostly below water surface.

Hints to identify: Familiar "lily pad" shape—floating, round leaves, green on top and green or purplish underneath; leaves have a slit from the edge to the center; flower opens in morning and usually closes by afternoon.

Importance of plant: Provides excellent habitat for largemouth bass and sunfish; seeds are eaten by waterfowl; highly decorative —often planted in water gardens.

Management strategy: See page 12 for DNR permit requirements. Because of its value as fish habitat and as a decorative plant, the white water lily is usually best left alone. Removing it may allow less-desirable plants to move in. If removal is necessary to clear space for recreation, an herbicide is the most effective control method. The lily's thick tubers make hand-pulling or cutting difficult.

Spatterdock
(Nuphar spp.)



Common names: Yellow water lily, yellow cow lily, pond lily.

Location: Sheltered areas; shallow waters with muck or silt bottoms.

Description: Rooted plant with bright yellow flower that extends slightly above the surface; flower is surrounded by a heart-shaped leaf; leaf is grass-green colored, 8 to 16 inches long, and may float or extend above the water surface; petiole (leaf stalk) is mostly below the surface.

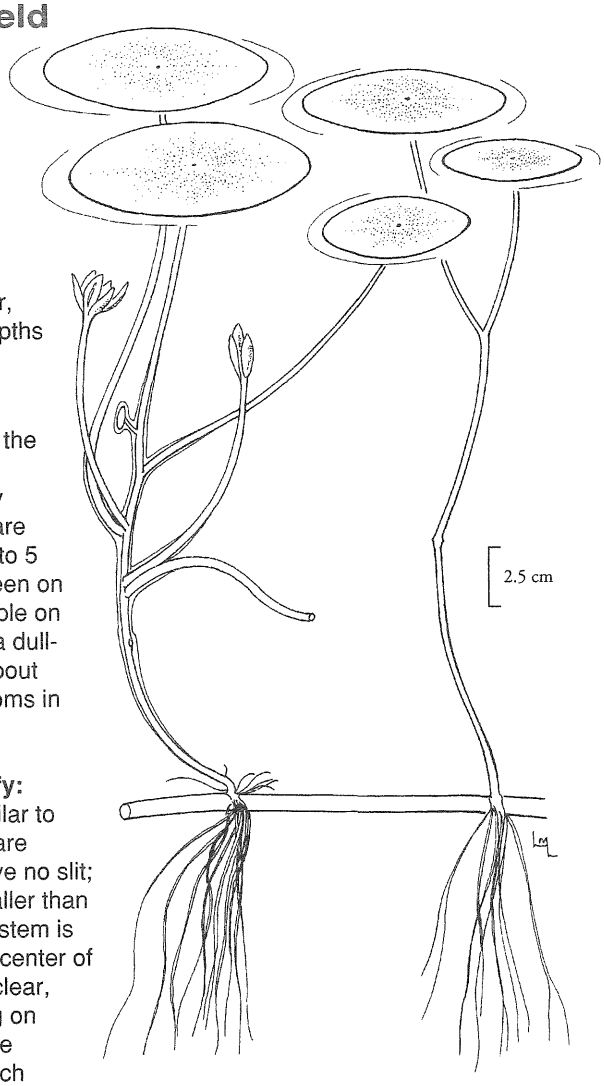
Hints to identify: Flower forms a yellow "ball" with petals that curve inward; flower rises several inches above water.

Importance of plant: Fruits are eaten by waterfowl and muskrats; the underwater roots contain starch and are edible.

Management strategy: See page 12 for DNR permit requirements. Because spatterdock is a valuable and decorative plant, removing it may allow less-desirable plants to move in. If removal is necessary, herbicide treatments provide the best results.

Watershield

(Brasenia schreberi)



Common names:
Dollar bonnet.

Location: Clear, soft water to depths of 10 feet.

Description:
Leaves float on the water surface; stems are firmly rooted; leaves are oval-shaped, 2 to 5 inches long, green on the top and purple on the underside; a dull-purple flower about 1-inch long blooms in June.

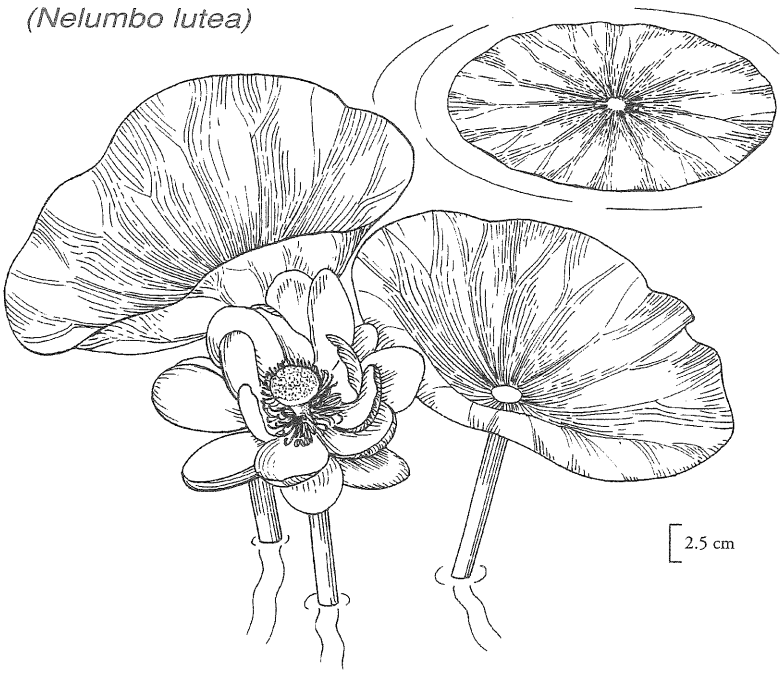
Hints to identify:
Leaves are similar to a lily pad's but are smaller and have no slit; flowers are smaller than the water lily's; stem is attached to the center of the leaf; has a clear, jelly-like coating on the stem and the underside of each leaf.

Importance of plant: Provides shade and cover for panfish, largemouth bass, and northern pike; is eaten by waterfowl.

Management strategy: See page 12 for DNR permit requirements. Because watershield provides good habitat for fish, try not to remove all of it in a problem area. If you must treat the plant with an herbicide, begin in early summer before the jelly-like coating develops on the leaves.

PROTECTED SPECIES

Yellow Lotus
(Nelumbo lutea)



Common names: American lotus, duck acorn, water nut.

Location: Lakes, quiet streams, rivers.

Description: Grayish-green leaves, up to 2 feet wide, float or stand above water surface; flowers are fragrant, pale-yellow, and grow as large as 10 inches in diameter; has an extensive underground root system.

Hints to identify: The leaves that protrude above the water often look like inverted umbrellas; the petiole (leaf stalk) is attached to the center of the completely circular leaf; the yellow flower contains many petals; acornlike seeds are housed in a spongy, flat-topped structure.

Importance of plant: Aesthetically appealing; waterfowl eat the seeds; starchy tubers (roots) can be eaten by humans.

Management strategy: See page 12 for DNR permit requirements. In Minnesota, the yellow lotus is a protected wildflower: no removal is allowed.

EMERGENT PLANTS

Emergent plants are rooted to the lake bottom and have stems and leaves protruding above the water surface. These plants are usually rigid and do not depend on the water for support. Many different fish, frog, bird, and mammal species find food and shelter among emergent plants. In many cases, emergent plants such as cattail and bulrush provide extremely valuable fish and wildlife habitat, and they are critical for maintaining clear water and a healthy fishery. Because of their ecological value, emergent plants may not be removed under any circumstances without a DNR permit.

Limited control of emergent plants may be allowed by the DNR, but you must first talk to the DNR area fisheries supervisor or regional aquatic plant management specialist. Their numbers are listed on page 51.

Bulrushes
(Scirpus spp.)

Common names: Reeds, pencil reeds.

Location: Marshes, shorelines, sand and gravel bars, shallow waters up to 8 feet deep. Hardstem bulrush grows on firm bottoms; softstem bulrush grows on mud bottoms.

Description: Grow above water to a height of 5 to 10 feet tall; have triangular or round-shaped stems; slender green leaves appear to be a continuation of the stem; loose cluster of brownish flowers and seeds are located near the tip of the stem.

Hints to identify: A long, tubular stem without leaves, or a triangular stem that may have long leaves similar to those of tall grasses.

Importance of plant: Excellent fish habitat—provide spawning areas for northern pike and, in early spring, provide nesting cover for largemouth bass and bluegills. Bulrushes attract marsh birds and songbirds and provide food for ducks, geese, and swans.

Management strategy: See page 12 for DNR permit requirements. To preserve natural habitat, the DNR allows the removal of bulrushes only in a small area to provide boat access to deeper lake water. Herbicides are the most effective control method on initial treatments. Once an area is cleared, periodic cutting below the surface will generally provide control.

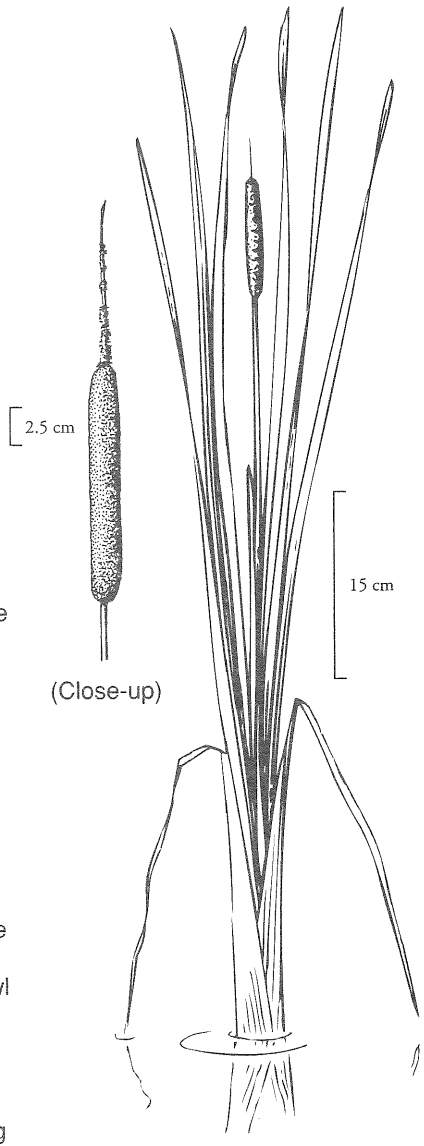
Cattail

(Typha latifolia, Typha angustifolia)

Location: Marshes, ditches, shorelines; shallow areas of lakes, ponds, and slow streams; quiet water up to 4 feet deep.

Description: Grows above water surface; is thickly rooted; has long, slender stalks growing 3 to 10 feet high; flower consists of a cigar-shaped "cattail," which is green during early summer and turns brown and fuzzy in the fall and following spring.

Hints to identify: Look for the fuzzy brown "cattail" near the top of the stalk. Leaves are long, flat, and about 1-inch wide.

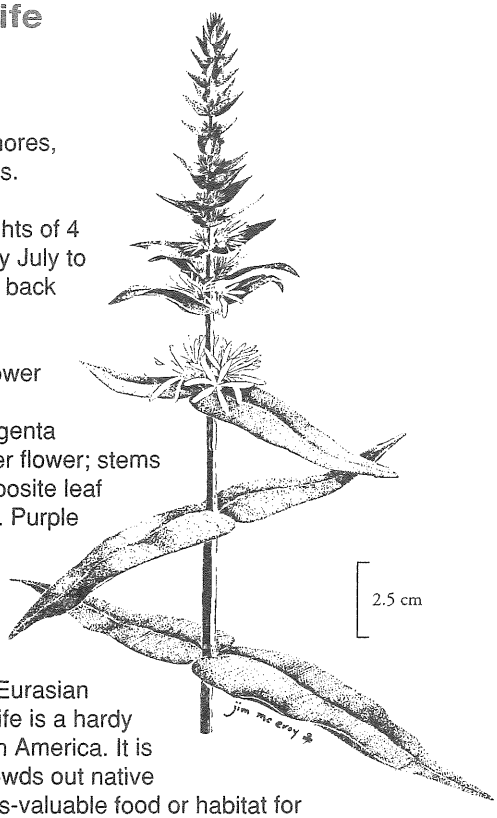


Importance of plant: Helps stabilize marshy borders of lakes and ponds; helps protect shorelines from wave erosion; northern pike may spawn along shore behind the cattail fringe; provides cover and nesting sites for waterfowl and marsh birds such as the red-winged blackbird; stalks and roots are eaten by muskrats and beavers; the starchy roots, young flowering spikes, and pollen can be eaten by humans, too.

Management strategy: See page 12 for DNR permit requirements. To preserve as much cattail habitat as possible, the DNR permits the removal of these plants only in a small area to provide boat access to deeper lake water. Cutting cattails below the water surface after first frost provides good control, as will application of a DNR-approved herbicide to the leaves. Once an area is cleared, control may not be needed again for several years.

UNDESIRABLE EXOTIC

Purple Loosestrife
(Lythrum salicaria)



Location: Wetlands, lakeshores, streams, river banks, ditches.

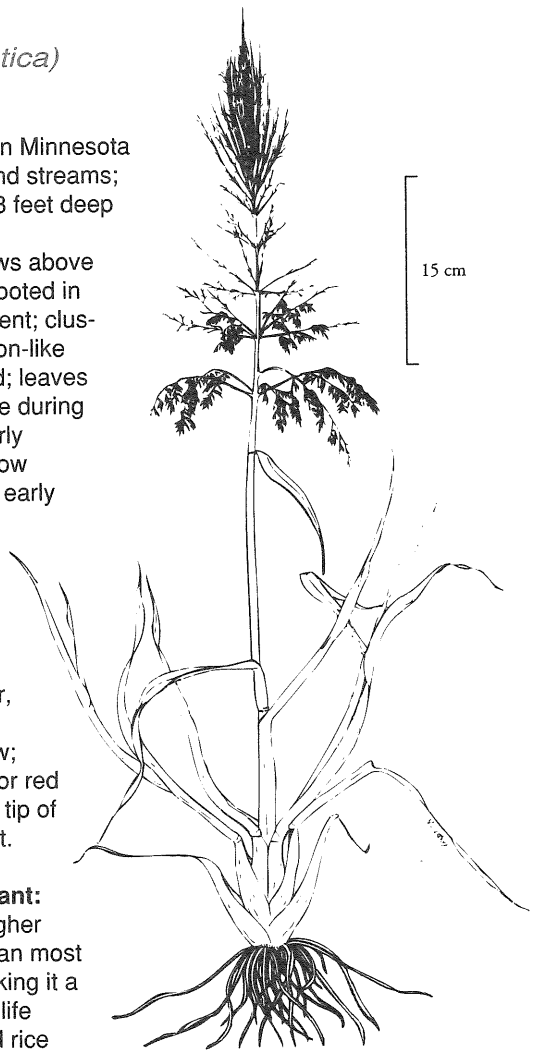
Description: Grows to heights of 4 to 10 feet; blooms from early July to early September; stems die back each fall.

Hints to identify: A long flower spike at the top of the plant containing many purple-magenta flowers; has 5 to 6 petals per flower; stems are rigid and four-sided; opposite leaf arrangement is on the stem. Purple loosestrife is sometimes confused with blazing star, fireweed, and blue vervain.

Importance of plant: Like Eurasian watermilfoil, purple loosestrife is a hardy perennial not native to North America. It is an aggressive plant that crowds out native vegetation and provides less-valuable food or habitat for muskrats, waterfowl, and many popular marsh birds. It also can destroy northern pike spawning areas and clog drainage ditches. Because purple loosestrife is considered a noxious weed in Minnesota, it is unlawful to transport the plant.

Management strategy: See page 12 for DNR permit requirements. The DNR has a special program to manage purple loosestrife: The aim of that program is to minimize the spread of purple loosestrife until better control methods are developed. The DNR maintains a database of all purple loosestrife infestations in Minnesota and pays for the control of high-priority infestations. New infestations should be reported to the nearest DNR office or to the purple loosestrife coordinator (see page 50). Control during early stages of infestation is important; once the infestation becomes large, control is difficult. Manual control of a small cluster of plants is possible. Pull or dig out the plant before early August, when it flowers and produces seeds. Dry and then burn the plants if possible; otherwise, they can re-root. For larger infestations, contact the local DNR office for information on proper control methods.

Wild Rice
(Zizania aquatica)



Location: Northern Minnesota lakes, marshes, and streams; water 6 inches to 3 feet deep

Description: Grows above water surface; is rooted in soft, mucky sediment; clusters of green, ribbon-like leaves are tapered; leaves float on the surface during late spring and early summer; stalks grow 3 to 10 feet tall by early July.

Hints to identify: Wild rice grows only in calm, clear water, not in murky water, where cattails are more likely to grow; grains are yellow or red and appear at the tip of the stalk in August.

Importance of plant: Wild rice has a higher protein content than most cereal grains, making it a good food for wildlife and humans. Wild rice attracts many wild birds, especially waterfowl and red-winged blackbirds, and it also provides nesting cover for waterfowl.

Management strategy: See page 12 for DNR permit requirements. It is best to let wild rice grow. In addition to providing good habitat for wildlife, wild rice is a substantial food crop worth at least $2 million to the state's economy each year.

Answers to Common Questions about Controlling Aquatic Plants

Q. I saw an ad for some granules and pellets that can be put into the water to control vegetation. Are these legal to use?

A. Yes, but only with a DNR permit. When the correct type is used, the pellet and granule forms of herbicides can effectively kill many types of aquatic plants. The use of any herbicide in public waters requires a permit from the DNR. Most herbicides are "selective," which means they kill only certain species (see the chart in the Aquatic Plant Management information packet.)

Q. How safe are the herbicides registered for aquatic use? I don't want to hurt anything when I get rid of the plants around my dock or beach.

A. When used according to label instructions, the health and environmental risks are very low. The EPA requires extensive testing of herbicides registered for aquatic use to ensure that they can be used safely. In addition, the DNR examines these products and may further restrict how and if they may be used in Minnesota lakes. DNR pesticide enforcement specialists monitor the use of herbicides in Minnesota lakes to ensure that proper procedures are followed and precautions are taken. For more information on the safety of aquatic herbicides, contact your local DNR office.

Q. My pond is covered in a green scum. What is it and how can I get rid of it?

A. The "scum" is probably either filamentous algae or duckweed (see pages 20 and 37). If you look at duckweed closely, it is composed of individual, oval-shaped plants about 1/8- to 1/4-inch long. Duckweed can be removed by skimming or applying a DNR-approved herbicide. Filamentous algae is composed of long, green threads—often matted together, resembling green cotton. The "scum" could also be a severe bloom of plankton algae that has floated to the surface. Filamentous algae can be controlled with copper sulfate or other copper-based algi-

cides. A bloom of plankton algae occurring at this stage is a sign that the algae is dying; the bloom will break up by itself.

Q. I see a lot of foam on the local lake. Is this caused by pollution from detergents?

A. Probably not. Organic compounds that leach out of pollen, leaves, and other dead vegetation in the water are natural foaming agents. They often cause the formation of foam, particularly on windy days.

Q. What is swimmer's itch? How can it be controlled?

A. Swimmer's itch *(Schistosome dermatitis)* is a temporary but annoying skin infection that swimmers get in some lakes, usually in June and July. Swimmer's itch is not caused by aquatic plants, but by tiny, fork-tailed parasites that burrow into the skin. Each parasite begins as an egg released from infected waterfowl, the parasite's primary host. After hatching, the parasites develop into free-swimming animals that burrow into certain kinds of snails. In the snail, the organisms further develop, finally emerging in warm weather as microscopic animals. This stage reinfects waterfowl, but may also burrow into humans by mistake. Swimmers can reduce the chance of getting swimmer's itch by drying themselves vigorously with a towel immediately after leaving the water. Temporary control of swimmer's itch may be obtained by using a DNR-approved chemical to kill the host snails.

Q. Does harvesting aquatic plants do any good?

A. That depends on your expectations. If you want only to temporarily open up areas in the lake for recreation, then harvesting can help achieve that goal. If you want to permanently reduce the amount of vegetation in the lake, there is no method of aquatic plant control currently allowed in Minnesota that will do this.

Q. Does harvesting aquatic plants work better than using herbicides?

A. Many experts in aquatic plant management make no distinction between harvesting and using herbicides to control aquatic plants. Both methods only temporarily control aquatic vegetation. Most herbicides currently being used for aquatic vegetation control in Minnesota are

"contact" herbicides, which kill the upper portion of the plant but do no damage to the root system. After being harvested or treated with herbicides, aquatic plants will grow back.

Mechanical harvesting does have certain *advantages* as an aquatic plant control method.

- The areas cleared of vegetation are available for recreational use immediately, whereas areas treated with herbicides have temporary restrictions on fishing, swimming, and domestic uses.
- Harvesting removes the plant material, which will otherwise decompose and release nutrients into the water.
- Regulations and restrictions on the use of mechanical harvesting are not as stringent as are those for using herbicides.

However, mechanical harvesting also has certain *disadvantages.*

- Harvesting is usually more costly.
- A disposal site for harvested plants must be found. (However, it should be noted that the harvested vegetation make an excellent mulch for gardens or fields.)
- Harvesting is slower and generally limited to water deeper than 2 to 3 feet with few bottom obstructions.
- Small fish and other aquatic organisms are killed along with the plant material (see next question).

Q. Does harvesting hurt the fishing?

A. It is common for small fish and other aquatic organisms to be killed along with harvested vegetation. However, studies have shown that the numbers removed do not damage the overall fish populations in a lake.

Q. Aquatic plants are a nuisance around my dock. Will I always need to control them?

A. Probably. The major factors limiting aquatic plant growth are bottom type, water depth, and light availability. Lakes with shallow areas of nutrient-rich, organic sediment and adequate light penetration will likely always have lots of submerged aquatic vegetation. And that's good news. These native aquatic plants provide tremendous benefits to your lake, so keep control to a minimum.

Directory

For answers to questions on how to identify and manage aquatic plants, write or call the regional DNR office nearest you (see page 51); or write to DNR's Ecological Services Section at: Minnesota Department of Natural Resources, Ecological Services Section, 500 Lafayette Road, St. Paul, MN 55155-4025; or call the appropriate department listed below. Residents outside the seven-county metro area may call the St. Paul office toll-fee by dialing 1-800-766-6000.

Ecological Services Section—St. Paul

General Information. 612-296-2835

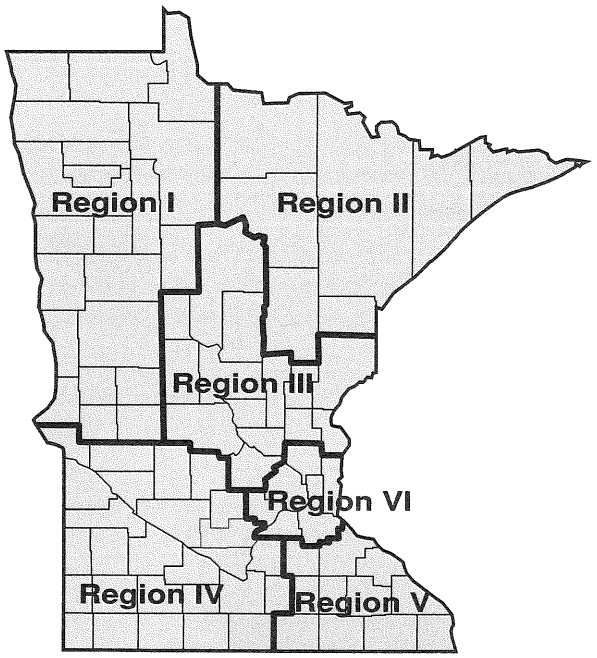
Aquatic Plant Management Supervisor. 612-297-0782

Eurasian Watermilfoil Coordinator. 612-297-8021

Purple Loosestrife Coordinator. 612-297-3763

Aquatic Invertebrate Biologist. 612-297-4888

NOTE: Aquatic pesticide enforcement specialists are stationed in Brainerd (218-828-2553) and in St. Paul (612-296-0784). They monitor aquatic pesticide use and investigate possible cases of pesticide misuse throughout Minnesota.



DNR Division of Fish and Wildlife Regional Fisheries Managers

Region I—Bemidji 2115 Birchmont Beach Road N.E. Bemidji, MN 56601	218-755-3959
Region II—Grand Rapids 1201 E. Highway 2 Grand Rapids, MN 55744	218-327-4415 (or 4414)
Region III—Brainerd 1601 Minnesota Drive Brainerd, MN 56401	218-828-2624
Region IV—New Ulm P.O. Box 756, Highway 15 South New Ulm, MN 56073	507-359-6000
Region V—Rochester 2300 Silver Creek Road N.E. Rochester, MN 55906	507-285-7427
Region VI—St. Paul 1200 Warner Road St. Paul, MN 55106	612-772-7950

Selected References

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Aquatic and Wetland Plants of Florida. David P. Tarver, John A. Rodgers, Michael J. Mahler, and Robert L. Lazor. Tallahassee, FL: Florida Department of Natural Resources. 1986. Paperback, 127 pp.

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How to Identify and Control Water Weeds and Algae. 4th Edition. Edited by James C. Schmidt. Milwaukee, WI: Applied Biochemists Inc. 1990. Paperback, 108 pp.

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Key to the Common Aquatic Plants of Minnesota. Special Publication No. 53. Richard A. Carlson and John B. Moyle. Minnesota Department of Natural Resources. 1968. Hardcover, 64 pp.

Pond Life: A Guide to Common Plants and Animals of North American Ponds and Lakes. George K. Reid, Ph.D. NY: Golden Press-Western Publishing Company Inc. 1987. Paperback, 160 pp.

Aquatic Plants:
Seeing the Bigger Picture

The 25 aquatic plants listed in this handbook are those you are most likely to encounter during a trip to your favorite lake or pond. Keep in mind that many other aquatic plant species grow in Minnesota—about 150 in all, including water buttercup, smartweed, river pondweed, and skullcap. For information on aquatic plants not featured in this guide, check your public library or the publications listed in the Selected References section, page 52.