

Manitoba Envirothon resources (Aquatics): Aquatic Plants

All information in this handout comes from:

- Manitoba's Water Protection Handbook (https://www.gov.mb.ca/waterstewardship/reports/water_protection_handbook.pdf)
 - An Identification Guide to Alberta Aquatic Plants (<http://esrd.alberta.ca/lands-forests/land-industrial/programs-and-services/pesticide-management/pesticide-use/documents/AlbertaAquaticPlants-Guide-1989.pdf>)
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Aquatic Plants

Aquatic macrophytes are plants that require a water environment to complete all or most of their life cycle. There are three main types:

Emergent macrophytes extend above the water surface in shallow areas of lakes, ponds and ditches. They have relatively rigid stems and do not rely on the water for physical support. Cattails and bulrushes are among the most common types in the province.

Floating macrophytes may be rooted or freefloating. Free-floating plants obtain their nutrients directly from the water. Rooted floating plants lack stem rigidity and depend on the water for support. Pondweed and yellow pond-lily are common rooted types. Duckweed, a small plant often mistaken for algae, is the most common freefloating aquatic macrophyte in Manitoba. Some plants, such as bur-reeds, water plantains and arrow-heads share characteristics of both emergent and floating aquatic plants. These plants usually extend out of the water like emergent plants but have floating leaves similar to floating aquatic plants.

Submerged aquatic plants have flexible stems and leaves, are rooted in the sediments and are completely covered by water - although some species have flowers that extend above the surface. Common plants include water buttercups, water milfoils and bladderworts.

The Importance of Aquatic Plants

Aquatic plants are a natural and important part of the aquatic ecosystem. They provide excellent habitat for fish, aquatic insects and terrestrial wildlife, are an important constituent in the diet of muskrats and moose and are a source of food and nesting material for waterfowl. Aquatic plants help prevent turbidity - cloudy, silty water - by stabilizing lake sediments. They also protect shorelines from excessive erosion by absorbing the force of wave action. These plants use up large amounts of nutrients, reducing the amount available for algal growth and they absorb potentially toxic substances - like mercury and lead - improving water quality.



Problems Caused by Too Many Aquatic Plants

Excessive growth of aquatic plants in recreational waterbodies and drinking water reservoirs can create a number of problems, including:

- **swimming nuisances** - excessive aquatic plant growth in shallow water discourages swimming and interferes with activities along shorelines and beaches.
- **boating difficulties** - plants clog motorboat propellers and interfere with sailboat centreboards.
- **less appealing drinking water** - aquatic plant decomposition can lead to foul odour, taste and discolouration of drinking water, making more advanced water treatment necessary.
- **less dissolved oxygen in the water for fish** - a result of the decomposition of excessive amounts of aquatic plants. Artificial water aeration has been used in Silver Beach Lake, Oak Lake, Gull Lake and others, to alleviate this problem.
- **dense aquatic plant growth in small streams and drains** - can impede water flow and contribute to flooding.

High densities of aquatic plants may be an indicator of water quality problems. If your lake or river has too many plants, it may mean that there is too much nitrogen and phosphorus entering the water. Check to see which of the following nutrient sources you can control: fertilizers, sewage, greywater, pet feces, cleaning products or shoreline erosion (Manitoba's Water Protection Handbook).

What You Can Do

- Disrupt as few aquatic plants as possible - remember that they provide essential habitat for fish and waterfowl.
- Don't use herbicides in lakes and rivers - it is illegal.
- Consider the role that aquatic plants play as home to waterfowl, fish, amphibians and aquatic insects.

Did You Know?

- Aquatic plants do not attract leeches or act as breeding grounds for mosquitoes. Leeches prefer soft sediments in shallow, calm water and will be in these areas whether or not plants are present. Mosquito larvae cannot survive the intense predation by fish and aquatic insects in aquatic plant stands.
- Utricularia or bladderworts, are common in Manitoba waters. These submerged carnivorous plants trap and consume small insects and aquatic animals that they trap in their tiny bladders.

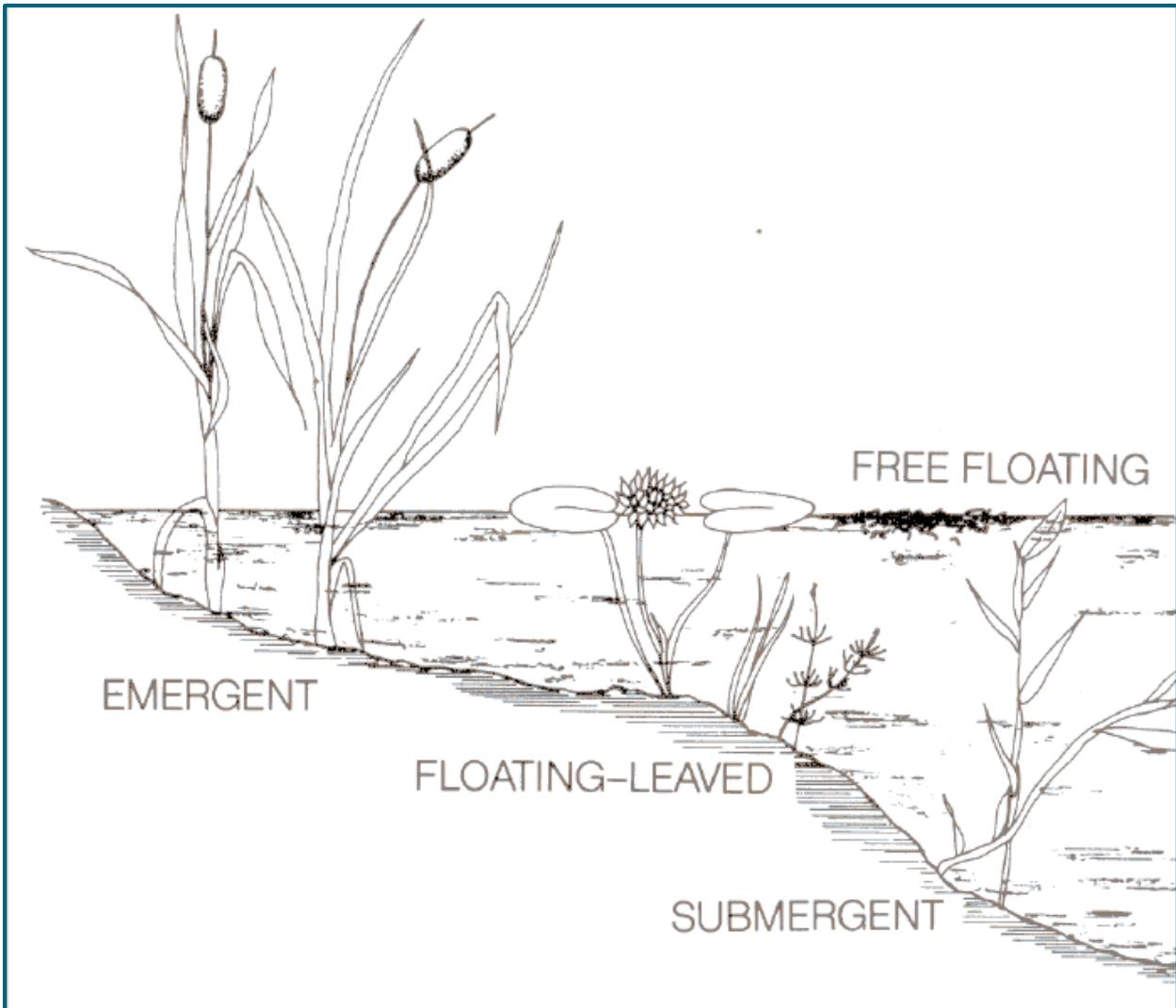


Figure 1: Distribution of Aquatic Plants in a Water Environment

Algae

Algae are primitive plants which bear no true leaves, stems or root systems. Most algae are microscopic, though some types are gregarious, clumping together to become visible to the naked eye. Other forms may be individually large enough to be seen easily. Reproduction in algae is by means of spores, by cell division or by fragmentation (An Identification Guide to Alberta Aquatic Plants).

Three groups of algae will be dealt with in this section:

1. Filamentous Algae
2. Planktonic Algae
3. Macrophytic Algae

Filamentous Algae

These freshwater algae are characterized by long threads or filaments of narrow cells attached to one another, end to end. These filaments are sometimes branched, forming a tuft attached to stones (they have no structure comparable to a root). In early spring they grow on the pond bottom rising to the surface during hot, sunny weather to form a bubble-filled scum. Determination of various forms of filamentous algae should be verified by microscopic examination. Common genera of filamentous algae include *Cladophra* and *Spirogyra*.



Planktonic Algae

These microscopic organisms may be single or many-celled, and commonly form simple chains or clumps due to their gregarious nature. They appear green, blue-green or brown in colour and float freely within the water column. The growth of certain forms of this type of algae may become so great that the water may take on a thick pea soup appearance. "Algae blooms" collect at the surface of the water during periods of calm and are concentrated in-shore by wind. As these "algae blooms" die off and decay, the resulting oxygen depletion of the water may cause summerkill of fish populations. Some species of planktonic algae release toxins as they decay, occasionally rendering the water poisonous to livestock and wildlife. Other species may impart tastes and odors to water, making it undesirable for consumption. Types of planktonic algae which may form "algae blooms" in ponds and lakes include *Aphanizomenon*, *Microcystis*, and *Anabaena*.



Macrophytic Algae

Macrophytic algae can grow sufficiently large enough that individual plants may be seen readily without the aid of a microscope. A Chara will be found in hard water or alkaline lakes and in slow moving streams in which calcium is abundant. Thick mats of Chara may be encountered covering the bottom in shallow or very deep water. Chara provides a habitat for a wide variety of aquatic animals which act as food for fish and is oftentimes mistaken for a plant because it has stem and leaf-like structures.



Free Floating Aquatic Plants

Lesser Duckweed (Lemna minor L.)

Other names: Common Duckweed

Flowers: rarely present; unisexual; male flower of single stamen; female lower of single pistil; borne on the side or upper surface of thallus

Plant Body: no true leaves or stems present, plant body is in the form of a flat thallus; 2 – 5 mm in length

Roots: single rootlet borne on the underside of the thallus

Reproduction: rarely by seeds; predominantly by budding; overwinter as bulblets formed by the thalli which sinks into the bottom in fall and surface in spring

Habitat: floating on the surface of shallow ponds, marshes and pools

Ecology: eaten by waterfowl; provides shade and cover for fish and aquatic invertebrates; in overabundance may alter existing habitat by shading out other forms of vegetation

Star Duckweed (Lemna trisulca L.)

Other names: Ivy Leaved Duckweed

Flowers: rarely present; unisexual; male flower of single stamen; female lower of single pistil

Plant Body: a flat thallus; individual thalli often joined together forming T-shaped cross arrangements; thalli 6 – 10 mm long

Roots: single rootlet borne on the underside of the thallus

Reproduction: primarily by budding; seeds are rare; overwinter as bulblets formed by the thalli which sinks into the bottom in fall

Habitat: forming at or just below the water surface

Ecology: eaten by waterfowl; provides cover for fish and aquatic invertebrates; often found in association with Lesser duckweed



Common Bladderwort (Utricularia vulgaris L.)

Flowers: yellow; irregular; extending above the water surface on long stalks

Leaves: having numerous bladders 3 – 5 mm long; finely cut into numerous threadlike divisions

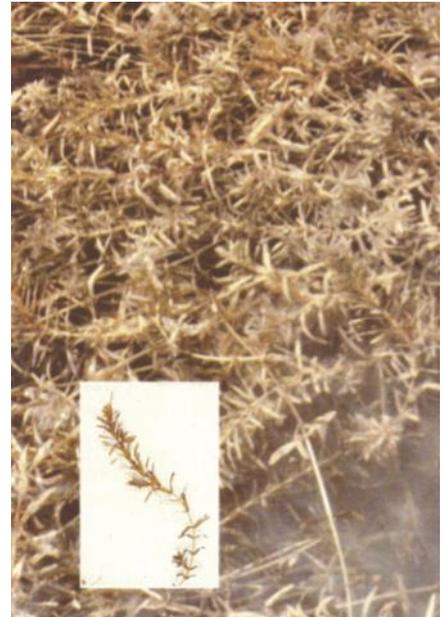
Stems: having dense foliage, 5 – 7 mm thick

Roots: lacking

Reproduction: seeds; winter buds formed at shoot apices

Habitat: lakes, sloughs, ditches; floating near the surface in quite water

Ecology: eaten by waterfowl; provides good cover for fish; the bladders of this plant open to trap small aquatic animals which are used for nutrition



Submergent Aquatic Plants

Submergent aquatic plants have flexible stems and leaves, are rooted in the sediments and are completely covered by water - although some species have flowers that extend above the surface. Common plants include water buttercups, water milfoils and bladderworts (Manitoba Water Protection Handbook).

Canada Waterweed (Elodea Canadensis Michx.)

Other names: Water Thyme, Ditch Moss

Flowers: unisexual, male and female on separate plants, the female plant is seen more commonly the female flower reaches the surface on long slender stalk; the male flower is borne on a shorter stock which separates from the plant allowing the flower to rise to the surface and meet the female.

Leaves: dark green, translucent; small and narrow, 1 – 3 mm wide, 10 – 15 mm long; commonly arranged in whorls of three

Stems: branching; ranging in length from 1 – 3 mm

Roots: may rise from the stem nodes the plant is usually rooted in the hydrosol; but may survive if floating



Reproduction: primarily by winter buds, rarely by seeds

Habitat: they produce dense stands in shallow areas of lakes, sloughs and slow moving streams

Ecology: provides shelter for a wide variety of aquatic organisms eaten by waterfowl and muskrat; an efficient oxygenator of water

White Waterbuttercup

Other names: Water Crowfoot

Flowers: produced on or above the water surface; white in colour; petals 5 – 9 mm long

Leaves: sessile; finely cut into many threadlike divisions; fairly stiff, retaining shape when taken from the water

Stems: branched

Reproduction: seeds

Habitat: commonly found in sloughs, lakes and streams; does not readily tolerate poor water quality

Ecology: may grow in over abundance, forming thick mats on the water surface

(http://home.cc.umanitoba.ca/~burchil/flowers/small/ran_aquat.jpg)



Mare's Tail (Hippurus vulgaris L.)

Flowers: green; sessile; borne in the leaf axils on emergent part of the plant

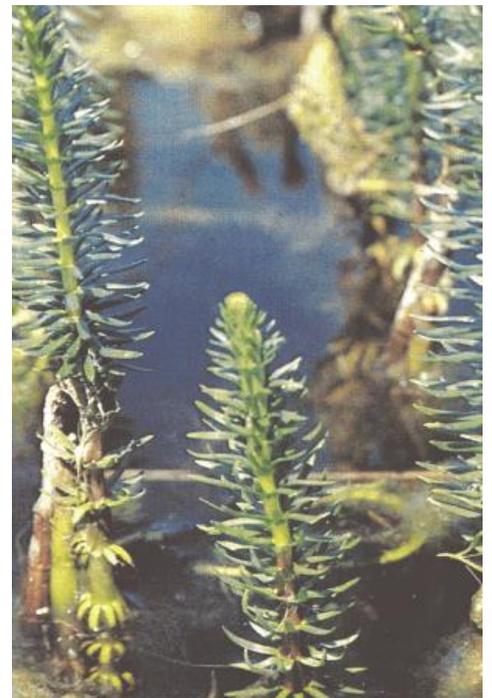
Leaves: sessile; 1 – 3 mm long; linear and pointed, in whorls of 6 to 12 leaves; submerged leaves flaccid, emergent leaves firm

Stems: unbranched; extending from a creeping rhizome; emerging above the surface

Reproduction: seeds, proliferation of the rhizome

Habitat: largely submergent in sheltered waters; may also be found growing in muddy, exposed soils

Ecology: seeds and leaves eaten by waterfowl; underwater foliage is inhabited by aquatic invertebrates



Coontail (Ceratophyllum demersum L.)

Other names: Hornwort

Flowers: minute; sessile in the leaf axis

Leaves: in whorls of 5 – 12 leaves; whorls variably spaced on the stem, crowding towards the tip, giving a “coontail” appearance; each leaf forked into 2 or 4 toothed divisions; often stiff and coarse in texture because of lime deposits

Stems: branching; 30 cm – 1.5 m in length

Roots: usually lacking

Reproduction: rarely by seeds; winter buds forming on shoot apices

Habitat: embedded in the hydrosol early in the season, later existing unattached

Ecology: eaten by muskrat and waterfowl; shelters young fish and supports aquatic insect life; moderately efficient as an aerator

Resource (<http://nativeplants.evergreen.ca/search/view-plant.php?ID=00942>)

Richardson Pondweed (Potamogeton richardsonii (benn.) Rydb.)

Other names: Clasping Leaf Pondweed

Flowers: produced in thick spikes which may emerge

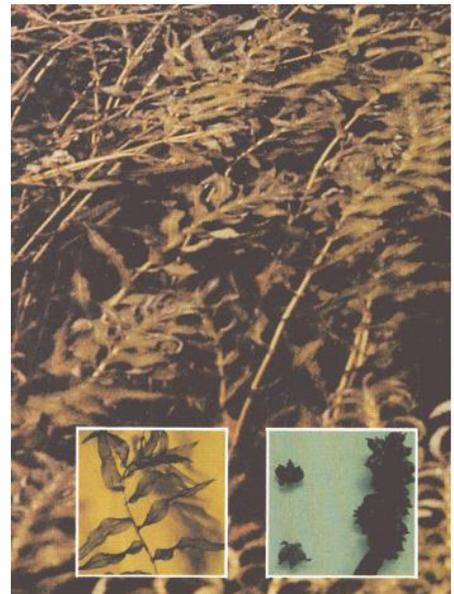
Leaves: all submerged, 3 – 12 cm long, lessening in length towards tip of stem; oval to linear; clasping stem at points of attachment; sessile; margins wavy

Stems: branched; extending from unspotted rhizomes

Reproduction: seeds; proliferation of the rhizome

Habitat: lakes, ponds and slow moving streams

Ecology: provides good habitat for aquatic organisms; all or part of the plant is eaten by ducks, shorebirds, muskrats, beaver and moose



Flat-Stemmed Pondweed

Flowers: forming a terminal spike; emerging

Leaves: linear, 10 – 20 cm long; with prominent midvein; nonsheathing base; stipules well developed, fibrous, 1 – 3 cm long

Stems: flattened; several times as wide as thick; branching

Reproduction: predominantly by tubers and winter buds; seeds

Habitat: common to lakes, sloughs and slow moving streams

Ecology: tubers and seeds are important as duck food



Small-Leaf Pondweed

Flowers: forming an emergent spike

Leaves: linear, 1 – 8 cm long, .3 – 1.5 mm wide; with three veins, midvein prominent

Stems: threadlike; branched

Reproduction: seeds; winter buds

Habitat: growing in clumps; usually in deeper water (depths of 2 – 3 meters)

Ecology: provides a good source of food for waterfowl; cover for fish



Large-Sheath Pondweed

Flowers: forming a 3 – 8 cm long spike

Leaves: long (10 – 40 cm) and slender; coarse in texture; lower leaves have a broadened stipular sheath (2 – 5 cm long) which is much wider than the stem

Stems: branching; extending from a rhizome; relatively thick compared to the leaves

Reproduction: seeds, proliferation of the rhizome

Habitat: lakes, larger sloughs and slow moving streams

Ecology: may form dense stands under suitable conditions; can become problematical because of its large size



Sago Pondweed

Other names: busy pondweed

Flowers: forming a long slender terminal spike; distance between flower whorls varies; floating at or near the surface

Leaves: submerged, narrowly linear; triangular in cross section; 3 – 10 cm long

Stems: slender, with many branches; extending from a slender rhizome

Reproduction: predominantly by tubers; seeds

Habitat: may inhabit a wide range of aquatic environments from shallow, swift water to fairly deep, still water

Ecology: may grow in overabundance, producing large quantities of organic matter in the aquatic ecosystem; important as an oxygenator; eaten by birds and aquatic orientated mammals; tubers may be heavily fed upon by ducks



Narrow-Leaved Water-Plantain

Flowers: small; in clusters, at end of short spikes, attached in whorls to a long stalk from the base of the plant; flowers whitish or brownish

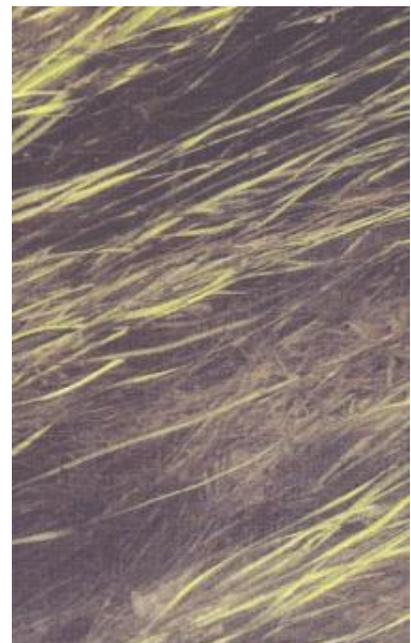
Leaves: long, grass-like; arising from the base of the plant; in younger plants, leaves narrow and floating; in mature plants, leaves broader, with widened tips, floating or erect

Stems: bulb-like, with fibrous roots

Reproduction: by seed or vegetatively from the perennial stem

Habitat: shallow water of ponds, sloughs, lakes, streams, ditches and canals; grows entirely submerged or emerged

Ecology: seed used by waterfowl; prominent plant in irrigation canals



Floating Leaved Aquatic Plants

Floating aquatic plants may be rooted or free floating. Free-floating plants obtain their nutrients directly from the water. Rooted floating plants lack stem rigidity and depend on the water for support.

Yellow Water Lily

Other names: spatterdock, cowlily

Flowers: yellow; emerging; on long stalks; tulip-like; 4 – 7 cm wide

Leaves: broadly oval; 10 – 30 cm long; bi-lobbed; long petioles (up to 4m); floating; young submersed leaves often red tinged

Stems: thick rhizomes

Reproduction: seeds; tubers; proliferation of the rhizome

Habitat: in sheltered waters of ponds, lakes and slow moving streams

Ecology: eaten by deer, moose and insects; rhizome is a chief source of food for muskrat; seeds eaten by birds; floating leaves provide shade and protective cover for fish and aquatic invertebrates.



Water Smartweed

Flowers: pink to red in colour; emergent; in form of a raceme 1 -3 cm long

Leaves: floating; oblong; up to 10 cm long; petiolate

Stems: a rhizome trailing in the water or lying on the bottom

Roots: arise from the stem nodes

Reproduction: seeds; proliferation of the rhizome

Habitat: lakes, sloughs and marshy areas; may be seen as an erect terrestrial plant which differs in having a larger raceme, hairy stem and hairy lanceolate leaves

Ecology: used as a food source by waterfowl, shorebirds and muskrat



Floating-Leaf Pondweed

Other names: Broad-leaved Pondweed

DESCRIPTION:

Flowers: small, green, numerous; on a thick, terminal, emergent spike

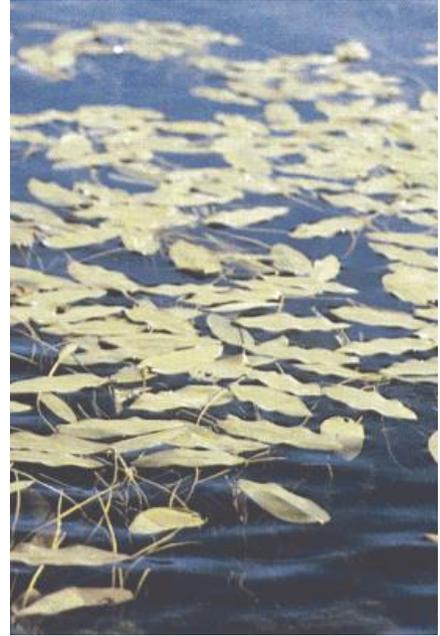
Leaves: numerous, broad, leathery floating leaves on petioles; occasionally long, narrow, submerged leaves up to 46 cm in length

Stems: rarely branched; extending from a rhizome

Reproduction: seeds; proliferation of the rhizome

Habitat: shallow or deep water of lakes, marshes

Ecology: seeds provide food for ducks; provide cover for fish food organisms



Emergent Aquatic Plants

Emergent plants extend above the water surface in shallow areas of lakes, ponds and ditches. They have relatively rigid stems and do not rely on the water for support. Cattails and bulrushes are among the most common types in the province (Manitoba Water Protection Handbook).

Reed Grass

Flowers: forming a large, feathery panicle; tawny or purple in colour

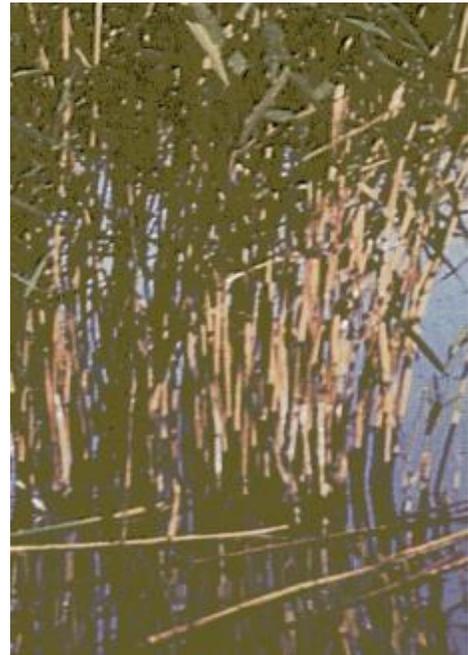
Leaves: large and flat; 1 – 3 cm wide, with overlapping sheaths; tip of leaf boat-shaped

Stems: extending from thick rhizomes; 1.5 – 3 m in height

Reproduction: seeds; proliferation of the rhizome

Habitat: quiet water of lakes and sloughs; marshy areas and ditches

Ecology: important in providing cover for birds and small mammals; rhizomes fed upon by muskrat; helps in preventing erosion by holding the soil



Common Cattail

Flowers: forming a dense terminal spike; unisexual; male portion of the spike produced above the thick, cigar-shaped female portion

Leaves: linear; upright, sheathing the stem; up to 1 meter long and 20 mm wide

Stems: growing erect; up to 2.5 m high; cylindrical; extending from a rhizome

Reproduction: seeds; proliferation of the rhizome

Habitat: any wet place on marshy area; may grow on exposed soil if water table is sufficiently high (within .5 m of the soil surface)

Ecology: provides excellent habitat for birds and small mammals; pheasants use cattails for cover; rhizomes are eaten by muskrat and beaver; aerial portions may be fed upon by terrestrial mammals



Bulrush

Flowers: forming spikelet's, arranged laterally or terminally on the stem; minute; in the axils of scales; flower clusters subtended by one or more bracts

Leaves: blades often lacking; when present, linear and sheathing the stem

Stems: often naked; triangular or circular in cross section, may reach 2.5 m in length in some species; extending from a rhizome

Reproduction: seeds; runners; rhizomes

Habitat: shallow shoreline waters, wet meadows

Ecology: bulrushes are used for food by muskrat, as nesting sites by birds and are important soil binders



Rush

Flowers: produced terminally on the stem; may appear to be lateral due to a long, cylindrical floral bract extending continuous with the stem

Leaves: may be cylindrical or flattened in cross section, or may be reduced to bladeless sheaths

Stems: in clumps or arising from a creeping rhizome; circular in cross section; 20 cm – 80 cm in height

Reproduction: seeds; rhizomes

Habitat: shallow water along shorelines or in wet meadows

Ecology: eaten by muskrat; seeds are eaten by upland birds



Arrowhead

Flowers: in whorls of three flowers on a scape; unisexual; female flowers generally found lower on the scape; white in colour

Leaves: aerial leaves sagittate; submerged leaves may be narrowly linear; petioles originate from the base of the plant; 20 – 40 cm in height

Stems: rhizomes

Reproduction: seeds; tubers; runners; proliferation of the rhizome

Habitat: marshes and shallow areas or shores of lakes

Ecology: tubers are often sought after by ducks



Giant Bur-Reed

Flowers: unisexual; forming dense spherical heads; male flowers produced uppermost on the stem

Leaves: long, slender and sessile; longitudinal and cross veins are present on the leaves and form a meshwork pattern

Stems: sturdy, 50 – 150 cm high; extending from rhizome

Reproduction: seeds; proliferation of the rhizome

Habitat: marshes and shallow areas

Ecology: may be fed upon by waterfowl and muskrat



Source : Shortt, 1908

Glossary (be familiar with the terms, but do not memorize)

APEX: tip of a stem, branch or root

AXIL: space formed by the angle between a leaf or branch and the stem

BLADE: the flattened or broad portion of a leaf

BRACT: a scale or leaf-like structure extending under a flower or flower cluster

BUDDING: a form of reproduction where the parent plant produces offspring vegetatively

BULBLET: a small bulb

CREEPING RHIZOME: a rhizome growing on or near the soil surface

EMERGENT: extending above the water surface

FILAMENTOUS: thread-like

FLOATING LEAVED: leaves floating but rooted

FREE FLOATING: plant floating but unattached

GREGARIOUS: individuals living in groups

HEAD: a dense flower cluster on a short common axis

HYDROSOIL: soil covered by water

IRREGULAR (flower): having one or more floral organs of a series, i.e. petals, unequal in shape or size

LANCEOLATE: lance-shaped; wide at the base and pointed at the tip

LATERAL: on the side of

LEAFLET: a division of a compound leaf

LINEAR: narrow and long with parallel sides

MACROPHYTE: a large or fairly large plant; easily seen with the naked eye

NODE: a level on the stem from which leaves or roots may arise

OBLONG: oval but with broadly rounded ends and nearly parallel sides

PANNICLE: a compound raceme; a branched flower cluster, lowermost branches longer

PEDUNCLE: a flower stalk having a single flower or flower cluster

PERFECT (flower): complete flower; having both male and female organs, petals and sepals

PETIOLE: the stalk of a leaf

PINNATE: a compound leaf with leaflets arranged on both sides of a common axis

PISTIL: a female portion of a flower

PLANKTONIC: suspended in the water column

RACEME: a group of stalked flowers arranged on a common axis

RHIZOME: a root producing stem, commonly underground

ROOTLET: a small root

RUNNER: a horizontal branch extending along the ground and giving rise to new roots and plants

SAGITTATE: shaped like an arrowhead, lobes directed downward

SCAPE: a flowering stalk without leaves originating at or near the ground

SESSILE: without a stalk

SHEATH: a collar-like outgrowth at a node, or the basal portion of a leaf wrapped around the stem

SPIKE: a group of flowers sessile or nearly so growing close together on a longitudinal axis

STAMEN: male portion of a flower

STIPULE: an outgrowth at the base of a leaf blade or petiole

SUBMERGENT: growing under water

TERMINAL: at the end of a stem, branch or root

THALLUS: a plant body without true roots, stems or leaves

TUBER: a thickened underground branch or part of a branch capable of producing new plants

UNISEXUAL: of one sex

WHORL: a group of three or more like organs such as leaves or flowers arising from a single node

WINTER BUD: a small hardened grouping of close leaves surviving the rest of the plant over winter and capable of producing a new plant in spring

Resources

Shortt, A. H. (1908). Watercolour - Stem of a Giant Bur-reed. In *UM Digital Collections*. Retrieved January, 2016, from

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