

RIC Report 029

Discussion Document

**IDENTIFICATION REYS  
to the  
AQUATIC PLANTS  
of  
BRITISH COLUMBIA**

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## **Keys to the Aquatic Plants of British Columbia**

### **Introduction**

Not all of the plants listed are native or established outside of cultivation in British Columbia. Some are aquarium plants that are introduced from time to time but do not persist, or are in cultivation but do not survive for long when they escape. Others are major invasive weeds in other parts of the world which have not yet been found in British Columbia but which may be expected. People deliberately or inadvertently introduce many aquatic plants, some of which do eventually become established. This list also includes many species of aquatic grasses (Poaceae), sedges (Cyperaceae) and *Juncus*. Species of *Carex* are not treated in the keys. Most of these three groups are marginal or wetland species and are difficult for non-specialists to identify. Their treatment is not as complete as that of the other obligate groups of aquatic plants and some species may be found, especially during high water, which are not included in these keys. Treatment of the obligate lacustrine, as opposed to the facultative lacustrine, wetland or bog species, should be complete.

The species concept used is that of the author and is not universally accepted. It is a 'lumping' approach and designed to make it as easy as possible for non-specialists to reach the same identification when keying out aquatic plants, without getting bogged down in difficult taxonomic problems. Additional field observations increasingly confirm that much of the variation given distinct names in herbaria has no taxonomic validity. Many herbarium species do not reflect the reality of field observations. Aquatic plants are genetically plastic and respond to changing environmental conditions with a tremendous amount of morphological variability. These morphological variants reflect variable environmental conditions rather than genetic distinction at the species level.

The following pages include a list of all the species covered by these keys, a key to groups of aquatics based on their growth forms and habitats, keys to each of the growth form and habitat groups, a general key to the aquatic plants of British Columbia, a key to aquatic plants with finely dissected submerged leaves, keys to the families and genera identified in the general key, a set of brief notes on each species of aquatic plant, a listing of partial synonymy of the species which defines the authors species concept and allows access to other literature which may use different names, some references which are useful in studying the aquatic plants of British Columbia and illustrations of the types of dissected underwater leaves which may be found.

The various keys are not mutually exclusive and may be used together to help narrow down the choices or confirm the identification of a species. Using the Life-Form key may narrow down the number of species one has to choose from in the genus or species keys, or in the dissected leaf key. Similarly if the plant obviously has dissected underwater leaves then using the dissected leaf key is a lot more efficient than going through the general key. The life-form key may give only a few choices which can then be readily compared with illustrations in a manual for identification. Some of the keys are in hierarchical sets. The life-form and habitat key gets you to a group of plants and the subsequent species key gets you to the individual species. The key to families gets you to genera and species if you know the family, and the key to genera gets you to species if you know the genus. If you already know the family or genus you can go directly to the key that is appropriate to the level of your knowledge of the plant in question, and not have to start with the general key to all the aquatic plants.

Using several different keys which should include the plant in question is also a good check on your ability to use the keys and on the usefulness of the keys. You should get the same identification each time, if you do not perhaps you have made some assumptions about the plant which are not true, have taken the wrong fork in one of the keys or perhaps one of the keys can not handle some unanticipated variation in the specimen. All identifications made by keys should be checked with descriptions and illustrations, or better yet with herbarium specimens, to verify the identification. The less of an expert you are, or the less experience you have with the species, the more important this verification becomes.

## List of Aquatic Plant Species for British Columbia.

*Acorus calamus* L.  
*Agrostis aequivalvis* (Trin.) Trin.  
*Agrostis idahoensis* Nash  
*Alisma gramineum* Gmel.  
*Alisma plantago-aquatica* L.  
*Alopecurus aequalis* Sobol.  
*Alopecurus geniculatus* L.  
*Azolla filiculoides* Lam.  
*Beckmannia syzigachne* (Steud.) Fernald  
*Berula erecta* (Huds.) Cov.  
*Brasenia schreberi* Gmel.  
*Butomus umbellatus* L.  
*Cabomba caroliniana* Gray  
*Calamagrostis stricta* (Timm) Koel.  
*Callitriche anceps* Fern.  
*Callitriche hermaphroditica* L.  
*Callitriche heterophylla* Pursh  
*Callitriche stagnalis* Scop.  
*Callitriche verna* L.  
*Caltha natans* Pallas  
*Caltha palustris* L.  
*Carex* L.  
*Catabrosa aquatica* (L.) Beauv.  
*Ceratophyllum demersum* L.  
*Ceratophyllum echinatum* Gray  
*Chara braunii* Gm.  
*Chara canescens* Desv. and Lois.  
*Chara globularis* Thuill.  
*Chara vulgaris* L.  
*Cicuta bulbifera* L.  
*Cicuta douglasii* (DC) Coult. and Rose

*Decodon verticillatus* (L.) Ell.  
*Distichlis spicata* (L.) Greene  
*Dulichium arundinaceum* (L.) Britt.  
*Echinochloa crusgalli* (L.) Beauv.  
*Egeria densa* Planch.  
*Eichhornia crassipes* (Mart.) Solms  
*Elatine triandra* Schkur.  
*Eleocharis acicularis* (L.) R. and S.  
*Eleocharis palustris* (L.) R. and S.  
*Elodea canadensis* Rich.  
*Elodea longivaginata* St. John  
*Elodea nuttallii* (Pianch.) St. John  
*Equisetum fluviatile* L.  
*Equisetum palustre* L.  
*Eriophorum chamissonis* C. A. Mey.  
*Eriophorum polystachion* L.  
*Fontinalis antipyretica* L.  
*Glyceria borealis* (Nash) Batchelder  
*Glyceria grandis* Wats.  
*Glyceria leptostachya* Buckl.  
*Glyceria occidentalis* (Piper) J\* C. Nels.  
*Glyceria striata* (Lam.) A. S. Hitch.  
*Gratiola ebracteata* Bentham  
*Gratiola neglecta* Torr.  
*Heteranthera dubia* (Jacq.) Macmill.  
*Hippuris vulgaris* L.  
*Hydrilla verticillata* (L.) Royle  
*Iris pseudacorus* L.  
*Isoetes* L.  
*Juncus supiniformis* Engelm.  
*Kobresia simpliciuscula* (Wahl.) Mackensie  
*Lagarosiphon major* Ridley  
*Leersia oryzoides* (L.) Swartz  
*Lemna gibba* L.  
*Lemna minor* L.  
*Lemna trisulca* L.

*Lilaea scilloides* (Poir.) Hauman  
*Lilaeopsis occidentalis* Coult. and Rose  
*Limnophila sessiliflora* Blume  
*Limosella aquatica* L.  
*Limosella subulata* Ives.  
*Lobelia dortmanna* L.  
*Ludwigia palustris* (L.) Eli.  
*Lysichiton americanum* Hulten and St. John  
*Lysimachia thyrsoflora* L.  
*Marsilea vestita* Hook. and Grev.  
*Megalodonta beckii* Greene  
*Menyanthes trifoliata* L.  
*Mimulus glabratus* H. B. K.  
*Mimulus guttatus* D. C.  
*Montia fontana* L.  
*Myosotis laxa* Lehm.  
*Myosotis scorpioides* L.  
*Myriophyllum aquaticum* (Veil. ) Verd.  
*Myriophyllum farwellii* Morong  
*Myriophyllum heterophyllum* Michx.  
*Myriophyllum hippuroides* Nutt.  
*Myriophyllum quitense* H. B. K.  
*Myriophyllum sibiricum* Kom.  
*Myriophyllum spicatum* L.  
*Myriophyllum ussuriense* (Regel) Maxim.  
*Myriophyllum verticillatum* L.  
*Najas flexilis* (Willd.) R. and S.  
*Nephrophyllidium crista-galli* (Menzies) Gilg  
*Nitella acuminata* A. Br.  
*Nitella clavata* Kutz.  
*Nitella flexilis* (L.) Ag.  
*Nitella furcata* (Roxb.) Ag.  
*Nitella gracilis* (Sm.) Ag.  
*Nuphar polysepalum* Engelm.  
*Nuphar variegatum* Engelm.

*Nymphaea mexicana* Zuccarini  
*Nymphaea odorata* Ait.  
*Nymphaea tetragona* Georgi  
*Nymphoides aquatica* (Gmelin) O. Kuntze  
*Nymphoides peltata* (Gmelin) O. Kuntze  
*Oenanthe sarmentosa* Presl  
*Paspalum distichum* L.  
*Phalaris arundinacea* L.  
*Phragmites communis* (L. ) Trin.  
*Phyllospadix scouleri* Hooker  
*Phyllospadix serrulatus* Rupr.  
*Phyllospadix torreyi* S. Wats.  
*Pilularia americana* R. Br.  
*Pistia stratiotes* L.  
*Pleuropogon refractus* (Gray) Bentham  
*Polygonum amphibium* L.  
*Polygonum hyropiper* L.  
*Polygonum hydropiperoides* Michx.  
*Polygonum lapathifolium* L.  
*Pontederia cordata* Lour.  
*Potamogeton alpinus* Balbis  
*Potamogeton amplifolius* Tucker.  
*Potamogeton crispus* L.  
*Potamogeton diversifolius* Raf.  
*Potamogeton epihydrus* Raf.  
*Potamogeton foliosus* Raf.  
*Potamogeton friesii* Rupr.  
*Potamogeton gramineus* L.  
*Potamogeton illinoensis* Morong  
*Potamogeton natans* L.  
*Potamogeton nodosus* Poir.  
*Potamogeton oakesianus* Robbins  
*Potamogeton obtusifolius* Mertens and Koch

*Potamogeton pectinatus* L.  
*Potamogeton perfoliatus* L.  
*Potamogeton praelongus* Wulf.  
*Potamogeton pusillus* L.  
*Potamogeton robbinsii* Oakes  
*Potamogeton strictifolius* Benneu  
*Potamogeton zosteriformis* Fern.  
*Potentilla palustris* (L.) Scop.  
*Puccinellia maritima* (Huds.) Parl.  
*Puccinellia pumila* (Vasey) A. S. Hitchc.  
*Ranunculus aquatilis* L.  
*Ranunculus flabellaris* Raf.  
*Ranunculus flammula* L.  
*Ranunculus hyperboreus* Rottb.  
*Ranunculus lobbii* (Hiern.) Gray  
*Rhynchospora alba* (L.) Vahl.  
*Riccia fluitans* L.  
*Ricciocarpus natans* (L.) Corda  
*Rorippa nasturtium-aquaticum* (L.) S. and T.  
*Ruppia maritima* L.  
*Sagittaria cuneata* Sheld.  
*Sagittaria latifolia* Willd.  
*Salvinia* Seguiet  
*Scheuchzeria palustris* L.  
*Scirpus americanus* Pers.  
*Scirpus fluviatilis* (Torr.) Gray  
*Scirpus heterochaetus* Chase  
*Scirpus lacustris* L.  
*Scirpus subterminalis* Torr.  
*Scolochloa festucacea* (Willd.) Link  
*Sium sauve* Walt.  
*Sparganium angustifolium* Mich.  
*Sparganium eurycarpum* Engelm.  
*Sparganium fluctuans* (Morong) Robbins.  
*Sparganium minimum* Fries

*Spartina patens* (Ait.) Muhl.  
*Spirodela polyrhiza* (L.) Schleid.  
*Subularia aquatica* L.  
*Tillaea aquatica* L.  
*Tolypella intricata* (Trent.) Leonh.  
*Trapa natans* L.  
*Triglochin maritimum* L.  
*Typha angustifolia* L.  
*Typha latifolia* L.  
*Utricularia gibba* L.  
*Utricularia intermedia* Hayne  
*Utricularia minor* L.  
*Utricularia vulgaris* L.  
*Vallisneria spiralis* L.  
*Veronica americana* Schw.  
*Veronica anagallis-aquatica* L.  
*Veronica catenata* Pennel  
*Veronica scutellata* L.  
*Wolffia borealis* (Engelm.) Landolt  
*Wolffia columbiana* Karsten  
*Wolffiella gladiata* Hegelm.  
*Zannichellia palustris* L.  
*Zizania aquatica* L.  
*Zostera japonica* Ascher and Grahn.  
*Zostera marina* L.

## General Key to the Aquatic Plants of British Columbia

### —Part 1

—Portions of this key are adapted from the keys in the 'Aquatic Plant Book'  
by C. D. K. Cook, 1990.

1—at least some finely divided submerged leaves are present,—See:  
**Key to the Aquatic Plants with Finely Dissected Submerged Leaves.**

2—submerged leaves pinnately divided 1-5 cm long.

3—submerged leaves simply pinnate, ( native and introduced plants widely used in aquaria and outdoor pools).—*Myriophyllum* sp.

3—submerged leaves bipinnate or simply pinnate with at least the lowest segments forked, one fork pinnate and the other simple, (aquarium plant, naturalized in Texas).—*Limnophila sessiliflora* .

2—submerged leaves palmately or di- to trichotomously divided but not pinnate, length is variable.

4—leaves in whorls

5—sessile in whorls of 5-12, toothed or serrate, no roots. —*Ceratophyllum* sp.

5—petiolate in whorls of 3, decussate, entire, rooted. —*Cabomba caroliniana* .

4—leaves alternate or opposite

6—leaves opposite, 2-6 cm long, many times dichotomously divided into ultimately filiform segments.

7—leaves 2-4 cm long, sessile, leaflet tips remain filiform. —*Megalodonta beckii*.

7—leaves up to 6 cm long, petiolate, leaflet tips flattened. —*Cabomba caroliniana*.

6—leaves alternate, 0.3-8 cm long, few to many times divided into flat or filiform segments.

8—leaves with bladders, sessile, petiolar base not swollen. —*Utricularia* sp.

8—no bladders, sessile or petiolate, petiolar base is swollen. —*Ranunculus* sp.

1—if submerged leaves are present they are not finely dissected.

9—vegetative parts thalloid, (the plant body is not differentiated into stems and leaves).

10—thalli not repeatedly and regularly forked, elongate to orbicular, flat or globose, flowering plants.—*Lemnaceae* (duckweeds).

10—thalli repeatedly and regularly forked, bryophytes (liverworts).

11—thalli narrow and elongate, repeatedly dichotomously forked, not purple tinged or fringed with scales.—*Riccia fluitans*.

11—thalli broad, 2 to 3 times forked, tinged with purple, and fringed with tongue-shaped, toothed scales.—*Ricciocarpus natans*.

9—vegetative parts not thalloid, (the plant body is clearly differentiated into stems with leaves or scales).

12—normal laminate leaves are absent, if leaves are present they are reduced to scales and are not photosynthetic, stems and branches green and photosynthetic.

13—scales united at the base in regular whorls below the regular whorls of lateral branches.

14—algae, fully submerged, often foul smelling, often encrusted with marl, 'branched', spores reddish in spherical, axillary clusters.—*Characeae*.

14—horsetails, emergent vascular plants, silicious, stems grooved and jointed, branched or unbranched, spores in terminal, elongate 'cones', not reddish.—*Equisetum* sp.

13—scales spirally arranged at the base of the stem, solitary, or if united below and in regular whorls then the lateral branches are clustered but not whorled at the nodes—**Cyperaceae** and **Juncaceae**.

12—normal laminate and photosynthetic leaves are present.

15—leaves 'jointed' between sheath and blade (the base of the leaf is a cylindrical sheath enveloping the stem, the blade is free above and jointed to the sheath, there may be ligules, swellings or hairs at this joint).

16—leaf inserted at the base of the sheath, nerves irregularly branched. —*Polygonum* sp.

16—leaf inserted at or towards the apex of the sheath, nerves indistinct or parallel.

17—leaves in 3 rows, stems sometimes twisted.—**Cyperaceae**.

17—leaves in 2 rows or spirally arranged.

18—marine.—**Zosteraceae**.

18—fresh or brackish water.

19—styles of lower flowers at least 2 cm long with simple capitate stigmas, scapose annuals, female flowers sessile in leaf axils, male and bisexual flowers in simple spikes.

—*Lilaea scilloides*.

19—styles less than 1.5 cm long or with plumose stigmas.

20—perianth present.

21—perianth petaloid.—*Pontederiaceae*.

21—perianth scale-like.

22—leaves basal, stamens 6, emergent or marginal.—*Triglochin maritimum*.

22—leaves all cauline, stamens 4, obligate aquatics, rarely stranded.—*Potamogeton*. sp.

20—perianth absent or reduced to hairs and bristles.

23—the clusters of sessile, banana-shaped fruits are axillary. —*Zannichellia palustris*.

23—the fruits are in terminal inflorescences.

24—fruits in umbels.—*Ruppia maritima*.

24—fruits in spikes, racemes or heads.

25—flowers enclosed by 2 bracts, arranged in spikelets, stems hollow, round, solid swollen nodes, leaves cauline in 2 rows, grasses.—**Poaceae**.

25—flowers enclosed by only 1 bract, spikelets, stems usually solid and triangular, nodes not swollen, leaves mostly basal in 3 rows. —**Cyperaceae**.

15—leaves not jointed between sheath and blade.

26—leaf blades peltate, (attached to their petioles inside the margin).

27—leaf blades 3-lobed, often sagittate or hastate.

28—leaves cauline on flexible petioles, floating, finely divided submerged leaves present.—*Cabomba caroliniana*.

28—leaves basal, held above water on rigid petioles, no finely divided submerged leaves are present, flowers in a spadix. —*Calla palustris*.

27—leaf blades entire, orbicular to oval, with or without a sinus, sinus does not reach the petiole.

29—petioles without spines, leaf blade under 10 cm in diameter, flowers small and red, plants covered in mucilage. —*Brasenia schreberi*.

29—petioles spiny, leaf blade generally over 10 cm in diameter, flowers large and showy, colors vary, plants not mucilaginous. —*Nymphaeaceae*.

26—leaf blades not peltate, attached at the margin of the blade.

30—leaves, or the leaf whorls or clusters, cauline and more or less regularly dispersed along the entire length of the elongated stem.—See:

**The General Key to the Aquatic Plants of British Columbia—Part 2 .**

30—leaves, or the leaf whorls or clusters, basal or terminal, not regularly dispersed along an elongate stem which may be compressed to a corm-like structure or a rhizome.—See:

**The General Key to the Aquatic Plants of British Columbia—Part 3.**

## General Key to the Aquatic Plants of British Columbia

### —Part 2. (Cauline leaves)

1—leaves whorled or clustered, 3 or more at most nodes.

2—whorls with 2 different kinds of leaves, 2 floating, entire, green and laminate, 1 submerged, divided, brown and root-like.—*Salvinia* sp.

2—whorls with all leaves alike or nearly so.

3—submerged leaves finely dissected and bearing bladder-like traps. —*Utricularia* sp.

3—no bladders on the leaves.

4—leaves compound or divided into finely dissected ultimate segments.

5—leaves pinnately divided.

6—leaves 2-pinnate or 1-pinnate with at least the lower segments forked, petals tubular.—*Limnophila sessiliflora*.

6—leaves 1-pinnate, all segments simple, petals free. —*Myriophyllum* sp.

5—leaves and/or their segments repeatedly forked, dichotomously divided.

7—ultimate segments with marginal thorn-like projections or teeth and terminal bristles, all divisions bifid. —*Ceratophyllum* sp.

7—all segments smooth, lower divisions trifid. —*Cabomba caroliniana*.

4—leaves simple.

8—leaves lanceolate to orbicular.

9—stems semi-woody, whip-like, spongy at the base, flowers in axillary clusters, petals pink.—*Decodon verticillatus*.

9—stems not woody, flaccid, not spongy at the base, flowers not in axillary clusters, petals not pink.

10—fruit a head of nutlets, leaves of 2 kinds, ovate above and dissected below.—*Ranunculus* sp.

10—fruit a capsule, leaves generally lanceolate and all of 1 kind, often toothed or serrate.—*Hydrocharitaceae*.

8—leaves linear to capillary.

11—leaves in unequally spaced bunches at the nodes.

12—leaves flat, translucent and marginally toothed.—*Najas flexilis*.

12—leaves capillary, not translucent, margins entire.

13—leaf sheaths free above or leaves with 2 partly-free stipules, totally submerged.—*Zannichellia palustris*.

13—leaf sheaths not free or stipules absent, emergent, no petals, flowers numerous in ovoid heads subtended by spirally arranged glumes.—*Cyperaceae*.

11—leaves equally spaced around the nodes (due to extensive convergent evolution to this growth form, flowers are often necessary for identification).

14—flower buds enclosed in a spathe.—*Hydrocharitaceae*.

14—flower buds not in a spathe.

15—fruit a capsule.

16—petals united into a tube below.—*Scrophulariaceae*.

16—petals and sepals free.—*Elatine triandra*.

15—fruit composed of nutlets or mericarps.

17—petals yellow, fruit a head of nutlets, stamens 5 or more. —*Ranunculus* sp.

17—petals not yellow, fruit 4 mericarps, 1 stamen, sepals and petals reduced to a rim on the nut.—*Hippuris vulgaris*.

1—leaves alternate or opposite, 1 or 2 at each node.

18—stems creeping and rooting at most nodes, free-floating or bottom rooted, leaves alternate or opposite.

19—plants free-floating, leaves sessile or sub-sessile in 2 rows.

20—floating leaves opposite, upper surface with multicellular hairs. —*Salvinia* sp.

20—floating leaves alternate, upper surface without multicellular hairs.—*Azolla filiculoides*.

19—plants either not-free-floating or leaves not in 2 rows and sessile or subsessil.

21—leaves filiform, not differentiated into a petiole and broad blade.

22—leaves with transverse septae.—*Lilaeopsis occidentalis*.

22—leaves without transverse septae.

23—stems and leaves have bladders.—*Utricularia* sp.

23—plants without bladders.

24—leaves spirally wound from the apex in the bud, locally introduced ferns.—*Pilularia americana*.

24—leaves not spirally wound in the bud.

25—leaves are all in opposite pairs, petals united below, fruit a capsule. —**Scrophulariaceae**

25—leaves are alternate, at least in the flowering portion of the stem, petals free, fruit a head of nutlets.—**Ranunculaceae.**

26—leaves cordate, perianth segments all alike, fruit a group of follicles. —*Caltha* sp.

26—leaves lobed but not cordate, perianth of sepals and petals, fruit a head of nutlets.—*Ranunculus* sp.

21—leaves differentiated into a petiole and a flattened blade.

27—leaves compound.

28—an odd number of leaflets or lobes (3, 5 or 7) each with a midrib and reticulate veins, petiole base sheaths the stem, flowering plants.

29—leaflets (lobes) 3, petals white and fimbriate, united at the base, 5 stamens—*Menyanthes trifoliata*.

29—leaflets 5 or 7 (rarely 3), petals deep wine red, united at the base, 25 stamens.—*Potentilla palustris*.

28—an even number of leaflets (4) without midribs and with repeatedly forked veins, no sheathing petiole base, a fern.—*Marsilea vestita*.

27—leaves simple.

30—flowers in a fleshy spadix subtended by a showy white spathe, fruit of large red berries.—*Calla palustris*.

30—flowers not in a fleshy spadix subtended by a showy white spathe, fruit not consisting of red berries.

31—perianth completely petaloid.—**Pontederiaceae.**

31—perianth differentiated into petals and sepals.

32—petals united at the base, 1 cm long, white with erose-undulate membraneous ridges, leaves reniform with crenate teeth, 5 stamens.—*Nephrrophyllidium crista-galli*

32—petals free to the base, size and colour vary, 6 or more stamens.

33—4 sepals, numerous variously coloured petals, fruit a large capsule. —*Nymphaeae* sp.

33—3 or 5 sepals and petals, fruit a head of nutlets.

34—3 petals and sepals, leaf margins entire, flowers in terminal panicles or racemes, leaves basal, plants scapose emergents.—**Alismataceae**.

34—5 sepals and petals, leaf margins lobed or notched, flowers generally axillary on a cauline stem, often lax and creeping or floating. —*Ranunculus* sp.

18—stems erect, emergent, floating or submerged, rooted only at the lower nodes, leaves opposite and cauline.

35—leaves in opposite pairs and regularly dispersed along the whole stem.

36—leaves compound and palmately divided.

37—leaf segments all in one plane, flowers solitary. —*Cabomba caroliniana*.

37—leaf segments in several planes, flowers in composite heads. —*Megalodonta beckii*.

36—leaves simple.

38—leaves capillary with sheathing stipular bases, obligate submerged aquatics.

39—flowers axillary, unisexual, leaves opposite, fruits a cluster of banana-shaped achenes.—*Zannichellia palustris*.

39—flowers in terminal spikes, bisexual, leaves mostly alternate, fruits various.

40—fruits are sessile or nearly sessile achenes on an elongate, straight, erect peduncle and usually emergent. —*Potamogeton* sp.

40—fruits are clusters of long-stalked achenes on a long, coiled, lax peduncle, submerged at maturity.—*Ruppia maritima*.

38—leaves not capillary, without sheathing stipules, submerged or emergent plants.

41—flowers without a perianth (sepals or petals).—*Callitriche* sp.

41—flowers with a perianth (sepals and petals).

42—ovaries completely inferior.

43—fruits are many-seeded capsules.—*Ludwigia palustris*.

43—fruits are 1-seeded nuts or mericarps.—*Myriophyllum* sp.

42—ovaries superior or perigynous.

44—carpels several, free or splitting into 4 mericarps at maturity.

45—leaves succulent, margins entire, not differentiated into petiole and blade.—*Tillaea aquatica*.

45—leaves not succulent, margins lobed, differentiated into petiole and blade.—*Ranunculus* sp.

44—carpels 1, or if more then united, not splitting into 4 mericarps, fruit usually a capsule.

46—2 sepals free or jointed *below, small, fleshy, matted herbs, seasonally submerged*.—*Montia fontana*.

46—sepals more than 2 or 2-lobed and united below.

47—petals free to the base.

48—sepals united into a perigynous tube, stem erect, emergent, terete.—*Decodon verticillatus*.

48—sepals free or united only at the base, small inconspicuous herbs, seasonally or completely submerged. —*Elatine triandra*.

47—petals tubular or united at the base.

49—fruit opens by 2 valves, usually 4 or fewer stamens inserted between the petal lobes, inconspicuous herbs. —**Scrophulariaceae**.

49—fruit opens by 5 valves, 5 stamens, inserted opposite the petal lobes, flowers in dense axillary racemes. —*Lysimachia thyrsoiflora*.

35—leaves alternate, 1 to each node, regularly dispersed along the stem.

50—leaves compound, or simple but lobed, margin not entire.

51—leaves palmately divided and the segments repeatedly divided. —*Ranunculus* sp.

51—leaves pinnately divided.

52—leaves 2-or-more-pinnate.

53—racemose, several seeded fruit. —*Rorippa nasturtium-aquaticum* .

53—umbellate, 2 mericarps.—**Umbelliferae (Apiaceae)**.

52—leaves 1-pinnate.

54—umbellate, 2 mericarps, stems often hollow and constricted at the nodes.—**Umbelliferae (Apiaceae)**.

54—racemose, axillary or solitary, 4 mericarps or capsules, stems not both hollow and nodally constricted.

55—pinnae or leaflets linear, 4 mericarps.—*Myriophyllum* sp.

55—pinnae or leaflets lanceolate to ovate or sub-orbicular, very variable on any 1 stem.—*Rorippa nasturtium-aquaticum*.

50—leaves simple and margin entire.

56—nodes completely surrounded by a membranous or scarios sheath (ochrea), above the leaf insertion.—*Polygonum* sp.

56—nodes not surrounded by a sheath.

57—inflorescence a fleshy spadix subtended by a spathe.

58—leaves unifacial, reed-like, spadix stalk fused to the leaf, spathe long, green and leaf-like, a tall plant, erect and emergent. —*Acorus calamus*.

58—leaves bifacial, divided into a petiole and a wide blade, spadix borne on a distinct stalk, spathe broad white and showy, plant emergent but low and sprawling.—*Calla palustris*.

57—no spadix or spathe.

59—perianth segments dry and scarious.

60—perianth of 6 scales each attached to stamens.—*Juncus* sp.

60—perianth consists of 4 clawed scales each attached to a stamen. —*Potamogeton* sp.

59—perianth fleshy or absent.

61—no perianth.

62—mature fruits long-stalked in umbels from a coiled pedicel. —*Ruppia maritima*.

62—mature fruits sessile and banana-shaped from a short, straight pedicel in the leaf axils.—*Zannichellia palustris*.

61—perianth present, sepaloid and petaloid.

63—ovaries superior, plants monoecious.

64—ovaries of several free carpels, 5 sepals and petals, flowers white in *R. aquatilis*, or deep yellow and conspicuous. —*Ranunculus* sp.

64—ovaries of 1 or more united carpels, 3, 4 or 6 sepals and petals, flowers showy and purple, or pale yellow and small in *Heteranthera*.—**Pontederiaceae**.

63—not as above, either ovaries at least partly inferior or plants dioecious.

65—fruit of 4 mericarps.—*Myriophyllum* sp.

65—fruit of many seeded capsules.

66—flowers found within or between bifid, spathaceous, bracts, leaves totally submerged, male flowers 3-merous. —**Hydrocharitaceae**.

66—flowers not found within or between spathaceous bracts, leaves are emergent or floating, flowers bisexual.

67—4 stamens and sepals, flowers greenish, plants cauline with leafy stems. —*Ludwigia palustris*.

67—5 stamens and sepals; flowers white, plants essentially scapose with fleshy leaves and masses of white roots.—*Lobelia dortmanna*.

## General Key to the Aquatic Plants of British Columbia

—Part 3. (Leaves in a basal or terminal cluster or whorl)

1—at least some leaves are clearly differentiated into a petiole and a laminate, flattened blade.

2—leaves compound, or at least some lobed to the base or to the midrib.

3—leaves regularly 3-foliolate, 5 stamens, 2-locular ovary. —*Menyanthes trifoliata*.

3—leaves not regularly 3-foliolate with 5 stamens and a 2-locular ovary.

4—leaves palmately lobed, fruit of several free nutlets. —*Ranunculus* sp.

4—leaves pinnately lobed, fruit of 2 mericarps in an umbel. —**Umbelliferae (Apiaceae)**.

2—leaves simple.

5—leaf blades forming a circular mosaic of whorled rosettes floating on the surface.

6—petioles inflated, fruit a woody cylindrical nut with 4 sharp hard horns, 4 stamens, two sterile.—*Trapa natans*.

6—petioles not inflated, fruits bilobed achenes without lateral horns, no perianth, flowers unisexual, male flowers with 1 stamen. —*Callitriche* sp.

5—leaf blades not forming a circular mosaic of whorled rosettes floating on the surface.

7—inflorescence a fleshy spadix subtended by a spathe.—**Araceae**.

8—leaves lanceolate to elliptical and up to 1 m long, bases tapered to the petiole. spathe deep yellow and up to 2 dm long, spadix long and cylindrical with small greenish fruit. —*Lysichiton americanum*.

8—leaves ovate and up to 30 cm long, bases cordate, spathe white and up to 6 cm long, spadix short and clavate with large red berries.—*Calla palustris*.

7—inflorescence not a spadix and spathe.

9—2 or more carpels, free or united only at the very base.

10—leaf margins lobed, notched or cordate, flowers 5-merous. —**Ranunculaceae**.

11—sepals and petals undifferentiated, fruit a group of follicles, leaves cordate.—*Caltha* sp.

11—sepals and petals distinct, fruit a head of nutlets, leaves lobed or notched.—*Ranunculus* sp.

10—leaf margins entire, flowers 3-merous.—**Alismataceae**.

9—1 or more united carpels.

12—styles united into a disc with radiating stigmas, more than 6 stamens, leaves floating on the surface and peltate or cordate.—**Nymphaeaceae**.

12—styles and stigmas not as above, fewer than 6 stamens.

13—umbellate inflorescence, fruit 2 mericarps. —**Umbelliferae (Apiaceae)**.

13—inflorescence not umbellate, fruits solitary, 1-seeded carpels or many-seeded capsules.

14—ovaries inferior, male flowers 3-merous.—**Hydrocharitaceae**.

14—ovaries superior, male flowers 5-merous.

15—perianth differentiated into sepals and petals, petals white with eros-undulate membraneous ridges, the flowers 5-merous, leaves reniform with crenate teeth, inflorescence cymose.—*Neprophyllidium crista-galli*

15—perianth not differentiated, all petaloid, showy, purple, flowers 3-merous, leaves cordate, entire, inflorescence a spike or flowers solitary.—**Pontederiaceae**.

1—leaves- do not have a distinct petiole, the blades may or may not be flattened.

16—leaves flat over most of their length, parallel sides in transverse section.

17—leaves widest apically, spatulate, obovate or obtriangular.

18—leaves densely pubescent, thick and leathery, plants form free-floating rosettes.—*Pistia stratiotes*.

18—leaves glabrous, not thick or leathery, plants rooted on the bottom.

19—fruit of 4 mericarps, petals absent, 1 stamen.—*Callitriche* sp.

19—fruit a capsule, petals united into a tube below, stamens alternating with the petals—*Limosella* sp.

17—leaves widest basally or parallel sided.

20—midrib asymmetrical, displaced to one side of the blade. —*Acorus calamus*.

20—midrib symetric or absent.

21—flowers in compact spherical heads in simple or branched racemes, males above and females below.—*Sparganium* sp.

21—flowers not in compact spherical heads.

22—flowers densely packed in cylindrical spikes or spadices.

23—spikes superposed on a single axis, unisexual. —*Typha* sp.

24—staminate and pistillate spikes contiguous, pollen shed in tetrads, common.—*Typha latifolia*.

24—staminate and pistillate spikes separated, pollen shed as individual grains, rare introductions.—*Typha angustifolia*.

23—spikes lateral or terminal, not superposed, bisexual or male.

25—spikes apparently lateral from near the base of leaves, flowers not enclosed by scales.—*Acorus catamus*.

25—spikes terminal above the leaves, flowers enclosed in scales, grasses.—**Poaceae**.

22—flowers not densely packed in cylindrical spikes or spadices.

26—perianth of scarious bract-like segments, leaves usually transversely jointed and filiform, plants often reddish, decumbent, freely-rooting from the nodes and proliferous.—*Juncus supinifonnis*.

26—perianth of sepals and petals, leaves not transversely jointed, or proliferous.

27—ovary superior, carpels free or only united basally, fruit a head of 1-seeded nutlets or few-seeded follicles, plants generally emergent.—**Alismataceae**.

27—ovary inferior, carpels united, fruit a many-seeded capsule, plants generally fully submerged.—**Hydrocharitaceae**.

16—leaves not flauened over most of their length, cross section circular, ellipsoidal, triangular or rectangular.

28—leaves capillary (hair-like and flaccid).

29—6 perianth segments, dry and brown, scarious, flowers in clusters. —*Juncus*. sp.

29—no perianth, flowers solitary, subtended by 1 glume-like bract. —**Cyperaceae**.

28—leaves not capillary.

30—leaves subulate, rigid and curved, rarely over 10 cm long.

31—plants not connected by persistent rhizomes or stolons, rarely forming a turf.

32—leaves with 4 longitudinal gas canals, leaf bases swollen and bearing spores on the ventral surface.—*Isoetes* sp.

32—leaves without 4 longitudinal gas chambers, leaf bases not swollen, flowering plants.

33—leaf apices obtuse, 5 sepals, united below.—*Lobelia dortmanna*.

33—leaf apices acute, 4 free sepals.—*Subularia aquatica*.

31—plants connected by persistent rhizomes or stolons and forming a turf.

34—fruit a many-seeded capsule, petals united at the base.—*Limosella* sp.

34—fruit of numerous 1-seeded nutlets, petals free.

35—3 petals and sepals, no nectaries, may be unisexual. —**Alismataceae**.

35—5 sepals and petals, nectaries, all bisexual.—*Ranunculus* sp.

30—leaves not subulate, flaccid or rigid and erect, frequently over 10 cm long.

36—leaves with 4 longitudinal gas canals, leaf bases swollen and bearing spores on the ventral surface.—*Isoetes* sp.

36—leaves without 4 longitudinal gas chambers, leaf bases not swollen, flowering plants.

37—perianth dry, of scales or bristles, or absent.

38—flowers in spherical heads, the male heads above and female heads below.—*Sparganium* sp.

38—flowers not in unisexual spherical heads.

39—styles heteromorphic, those of the lower female flowers at least 2 cm long, scapose annuals.—*Lilaea scilloides*.

39—styles all alike and under 1 cm long.

40—leaves in 2 rows, equitant, inflorescence of 2 superposed spikes, male above and female below.—*Typha* sp.

41—staminate and pistillate spikes contiguous, pollen shed in tetrads, common natives.—*Typha latifolia*.

41—staminate and pistillate spikes separated, pollen shed singly, uncommon.—*Typha angustifolia*.

40—leaves in 3 rows or spiralled, not equitant, inflorescence not of superposed spikes.

42—perianth of 6 scarious segments.—*Juncus* sp.

42—perianth absent or composed of scales or bristles.—**Cyperaceae**.

37—perianth sepaloid and/or petaloid, not of scales or bristles.

43—all perianth segments petaloid and persistent in the fruit, superior ovary, 6 or more free carpels.—*Butomus umbellatus*.

43—at least the outer perianth segments sepaloid, soft and green.

44—fruit of numerous 1-seeded nutlets in a spherical head, leaves usually sagittate.—*Sagittaria* sp.

44—fruit of two 1-seeded mericarps in a complex spicate/racemose inflorescence, leaves terete and sheathing.—*Lilaea scilloides*.

## Key to the Aquatic Plants with Finely Dissected Submerged Leaves.

1—Submerged leaves pinnately divided, 1 to 5 cm long.

2—submerged leaves bipinnate or simply pinnate with at least the lowest segments forked, one fork pinnate and the other simple. (widely used in aquaria and naturalized in Texas).—*Limnophila sessiliflora*.

2—submerged leaves simply pinnate (native and introduced plants widely used in aquaria and outdoor pools).—*Myriophyllum* sp.

3—flowers in the axils of cauline submerged leaves.

4—leaves in whorls of 3-4 or scattered, fewer than 10 leaf segments on each side of the rachis, monoecious, 4 stamens, plants often reddish, fully submerged.—*Myriophyllum farwellii*.

4—leaves in whorls of 4-6, more than 10 leaf segments on each side of the rachis, dioecious, 8 stamens, plants pale yellowish-green, apical portion of stem often sprawled over the surface of the water or on adjacent land.—*Myriophyllum aquaticum* .

3—flowers in the axils of bracts on emergent, terminal spikes.

5—four stamens, 4-6 leaves per whorl, bracts conspicuous.

6—floral bracts delicate, deeply incised to serrate, spike short and delicate, only known from sloughs in the Fraser Valley. —*Myriophyllum hippuroides* .

6—floral bracts ovate and toothed, spike long, robust and inflated, introduced in several park and garden ponds of the south-west.—*Myriophyllum heterophyllum* .

5—eight stamens, 3-5 leaves per whorl, floral bracts various.

7—floral bracts smaller than the flowers, inconspicuous, and nearly entire (the lowest few may be larger and pinnate but the upper ones are small), leaf whorls in the central portion of the stem are over 1 cm apart and not crowded, monoecious.

8—no turions, rhizomatous, 10-16 leaf divisions less than 2 mm apart, leaves make right or obtuse angles with the stem, leaf tips 'squared', all leaf segments straight and all of nearly the same length. —*Myriophyllum spicatum*.

8—turions, not rhizomatous, 6-12 leaf segments over 2.5 mm apart, leaves make acute angles with the stem, leaf tips 'acute', basal leaf segments curved and much longer than the apical ones.—*Myriophyllum sibiricum*.

7—floral bracts usually longer than the flowers and rarely entire, leaf whorl spacing varies, monoecious or dioecious.

9—dioecious, flowering plants found only on exposed mud banks when water levels drop in summer, female bracts and leaves entire to scarcely and irregularly divided, male bracts and leaves entire to pectinate-pinnate, submerged leaves scattered and irregular. —*Myriophyllum ussuriense* .

9—dioecious or monoecious, flowering plants found in water, bracts large and conspicuous, variable.

10—floral bracts pinnate to pectinate, light green, leaves often crowded on the stem (short internodes) and delicate, usually with more than 10 leaf divisions.—*Myriophyllum verticillatum* .

10—floral bracts pectinately parted below becoming dentate in the middle and almost entire above, reddish, leaves well spaced on the stem (long internodes) and robust, leaves generally with fewer than 10 leaf divisions.—*Myriophyllum quitense* .

1—submerged leaves palmately or di- to trichotomously divided but not pinnate, length is variable.

11—leaves in whorls.

12—leaves sessile, in whorls of 5-12, up to 2 cm long, toothed or serrate, plants are fully submerged and have no roots—*Ceratophyllum* sp.

13—leaf segments subcapillary, mostly entire, delicate and light green, deeper water and not surfacing, achene with 3-5 lateral spines on each side.—*Ceratophyllum echinatum* .

13—leaf segments capillary to linear and flattened, serrate to coarsely toothed, usually coarse and robust, dark green to almost black, usually surfacing, achene without lateral spines, 2 basal spines and 1 terminal spine only.—*Ceratophyllum demersum* .

12—leaves petiolate, in whorls of 3, decussate, entire, plants rooted —*Cabomba caroliniana* .

11—leaves alternate or opposite, up to 8 cm long, toothed or entire, plants submerged or emergent and with or without roots.

14—leaves opposite, 2-6 cm long, many times divided into ultimately filiform segments.

15—leaves 2-4 cm long, sessile, many times dichotomously divided, the leaf segments remain filiform—*Megalodonta beckii* .

15—leaves up to 6 cm long, petiolate, many times palmately divided, leaflet tips are flattened and spatulate *Cabomba caroliniana* .

14—leaves alternate, 0.3-8 cm long, few to many times divided into flat or filiform segments.

16—leaves with bladders, sessile, petiolar base of leaves not swollen. —*Utricularia* sp.

17—leaves divided into ultimately terete or threadlike segments.

18—leaves divided into fewer than 5 final threadlike segments, leaf margins glabrous, bladders scarce on a small delicate plant usually floating at the surface or entangled in other rooted plants.—*Utricularia gibba* .

18—leaves 'pinnatifid', more than 20 terete final segments, hairy leaf margins, many bladders on the ordinary leaves, a robust plant up to several meters long and usually lying on the sediment surface.—*Utricularia vulgaris* .

17—leaves divided di- or trichotomously into ultimately flattened segments.

19—ordinary leaves generally with a few bladders, leaf margins glabrous, the terminal leaf segments are acuminate. —*Utricularia minor* .

19—ordinary leaves rarely with bladders bladders are found on separate subterranean branches, leaf margins hairy, the ultimate leaf segment tips are awned.—*Utricularia intermedia* .

16—no bladders, leaves sessile or petiolate, petiolar base of leaves is swollen.—*Ranunculus* sp.

20—sessile leaves finely dissected into many filiform segments, leaves hold their shape when removed from the water, no floating leaves present. —*Ranunculus aquatilis* .

20—petiolate leaves finely dissected or lobed, few to many ultimate segments, generally collapsing when removed from the water, floating leaves present.

21—submerged leaves lobed, parted or ternately dissected to filiform segments, stems fistulose, a terminal bracteate inflorescence. —*Ranunculus flabellaris* .

21—submerged leaves divided into filiform segments, stems not fistulose.

22—leaves 2-3 times divided into 8-12 ultimate segments, plants glabrous, 2-7 beakless achenes, pedicels only in axils of ternately lobed floating leaves.—*Ranunculus lobbii* .

22—leaves many times divided into more than 20 ultimate segments, plant may be hairy, 10-20 short-beaked achenes, pedicels in axils of floating leaves and submerged leaves.—*Ranunculus aquatilis* .

## Classification of Aquatics by Life-Form and Habitat

From an ecological point of view the growth form of a plant and its usual habitat are often more important than the specific identification. Communities can often be distinguished by the growth form of the plants present, which is constant world-wide, while species composition may vary from place to place. Due to the morphological plasticity of aquatic plants no classification can be more than approximate and many exceptions will be found. A number of such classification schemes exist for various purposes. The following one may prove useful in reducing the number of choices when trying to identify an unknown plant, and in defining which group of plants normally inhabit certain zones in recreationally valued areas. The key has been written to determine which group of plants is present, and under each group code mentioned in the key there is a list of species or genera which are applicable. Some plants appear in more than one group. Generally only intact mature plants are considered, since if fragments and seedlings were considered gross confusion would result and the key would be full of exceptions.

### Key to mature Aquatic Plants of British Columbia based on their Life and Growth Forms and their Habitats.

1—Floating in or on the water; rooted or anchored only when stranded by receding water levels.

2—Floating on the surface of the water.

3—Large plants with distinct roots, stems and leaves; may have an obvious swollen part used as a floatation organ.—**A**

3—Small thalloid plants with roots below; closely appressed to the water's surface.—**B**.

2—Floating beneath the surface of the water.

4—Found just under the surface tension of the water or free in the mid-water zone; often found tangled in other submerged or marginal vegetation.—**C**.

4—Found lying on or just above the sediment surface.—**D**.

1—Rooted or anchored in the sediment at all water levels. (fragments of *Elodea* sp., *Egeria densa*, *Najas flexilis*, *Ranunculus* sp., *Callitriche* sp., *Ceratophyllum* sp., *Limnophila sessiliflora* and *Myriophyllum* sp. may be found adrift with group **C**.)

5—All vegetative parts remain beneath the surface of the water. (several species begin the season submerged but as water levels drop end up in group **O**; these are primarily plants of groups **E** and **G** but include a few members of groups **I** and **J** as well).

6—Scapose plants with no leafy stem; leaves all arise from a basal rosette at the sediment surface.

7—Leaves with a broad blade, or compound and resembling a clover leaf in *Marsilea*.—**E**.

7—Leaves without a broad blade.

8—Leaves very long and thin; limp.—**F**.

8—Leaves short, often fleshy or terete; stiff.—**G**.

6—Leafy stems with leaves scattered throughout the water column.

9—Leaves all finely dissected, (in the **Characeae** there are no leaves, the analagous structures are branches and branchlets which are repeatedly forked).—**H**.

9—Leaves entire.

10—Leaves filiform, long and narrow with no obvious blade.—**I**.

10—Leaves more or less broad with an obvious blade or wider portion.—**J**.

5—Vegetative parts may be floating or emergent from the water. (in the spring immature plants may not have reached the waters surface; late season flooding may inundate plants that were previously floating on the surface).

11—Floating leaves present. (submerged leaves may also be present but generally no emergent leaves are present).

12—Only floating leaves are present.—**K**.

12—Submerged and floating leaves are present.

13—Leafy stems beneath the surface of the water with distinct floating leaves on the surface as well (the floating leaves of *Potamogeton alpinus* may not be distinctly different from the submerged leaves).—**L**.

13—Long, thin, limp leaves arise beneath the surface of the water and the upper ends of these leaves float on the surface of the water.—**M**.

11—Leaves and/or stems emergent into the air. (generally no floating leaves are present except in *Sparganium* but some floating-leaf plants with stiff petioles may resemble group **O** plants if water levels drop and the floating leaves are left emergent; *Nuphar* is an example).

14—Leaves and stems lax and decumbent; sprawling over the surface of the water or adjacent shore.—**N**.

14—Leaves and stems rigid, erect and emergent. These are generally marginal plants of shallow water and may grow completely out of the water in late summer when water levels drop.—**O**.

### The Species found in each Life - Form Group

- | <b>Group</b> | <b>Genera and Species</b>  |
|--------------|--|
| —A—          | <i>Eichhornia crassipes</i> , <i>Salvinia</i> sp., <i>Trapa natans</i> , <i>Pistia stratiotes</i> .  |
| —B—          | <i>Lemna minor</i> , <i>Lemna gibba</i> , <i>Spirodela polyrhiza</i> , <i>Riccia fluitans</i> , <i>Azolla filiculoides</i> , <i>Ricciocarpus natans</i> , <i>Wolffia borealis</i> , <i>Wolffiella gladiata</i> .   |
| —C—          | <i>Wolffia borealis</i> , <i>Ceratophyllum demersum</i> , <i>Lemna trisulca</i> , <i>Utricularia gibba</i> , <i>Utricularia minor</i> , <i>Utricularia vulgaris</i> , <i>Wolffiella gladiata</i> .   |
| —D—          | <i>Lemna trisulca</i> , <i>Utricularia vulgaris</i> , <i>Utricularia gibba</i> , <i>Utricularia minor</i> .  |
| —E—          | <i>Marsilea vestita</i> , <i>Limosella aquatica</i> , <i>Ranunculus flammula</i> , <i>Ranunculus cymbalaria</i> .  |
| —F—          | <i>Vallisneria spiralis</i> , <i>Sagittaria</i> sp., ( <i>Sparganium</i> sp. resemble this group but are, on close inspection, not scapose but have leafy stems).  |
| —G—          | <i>Lilaeopsis occidentalis</i> , <i>Lobelia dortmanna</i> , <i>Isoetes</i> sp., <i>Limosella subulata</i> , <i>Ranunculus flammula</i> , <i>Pilularia americana</i> .  |
| —H—          | <i>Myriophyllum</i> sp., <i>Megalodonta beckii</i> , <i>Ceratophyllum</i> sp., <i>Nitella</i> sp., <i>Utricularia intermedia</i> , <i>Chara</i> sp., <i>Tolypela intricata</i> , <i>Ranunculus flabellaris</i> , <i>Ranunculus sceleratus</i> , <i>Ranunculus aquatilis</i> , <i>Cabomba caroliniana</i> , <i>Limnophila sessiliflora</i> .  |
| —I—          | <i>Potamogeton robbinsii</i> , <i>Potamogeton pectinatus</i> , <i>Chara</i> sp., <i>Potamogeton zosteriformis</i> , <i>Potamogeton pusillus</i> , <i>Najas flexilis</i> , <i>Potamogeton friesii</i> , <i>Potamogeton foliosus</i> , <i>Potamogeton obtusifolius</i> , <i>Potamogeton strictifolius</i> , <i>Callitriche</i> sp., <i>Nitella</i> sp., <i>Juncus supiniformis</i> , <i>Fontinalis antipyretica</i> , <i>Ruppia maritima</i> , <i>Subularia aquatica</i> , <i>Hippuris vulgaris</i> , <i>Heteranthera dubia</i> , <i>Zannichellia palustris</i> , <i>Tolypela intricata</i> , <i>Zostera</i> sp. (marine), <i>Phyllospadix</i> sp. (marine). |
| —J—          | <i>Potamogeton crispus</i> , <i>Tillaea aquatica</i> , <i>Montia fontana</i> , <i>Ludwigia palustris</i> , <i>Elatine triandra</i> , <i>Egeria densa</i> , <i>Elodea</i> sp., <i>Hydrilla verticillata</i> , <i>Lagarosiphon</i> sp.   |

- K**— *Potamogeton natans*, *Polygonum amphibium*, *Nymphaea* sp., *Ranunculus lobbii*, *Ranunculus hyperboreus*, *Nuphar* sp., *Brasenia schreberi*, *Caltha natans*, *Nymphoides* sp.
- L**— *Ranunculus hyperboreus*, *Ranunculus lobbii*, *Ranunculus aquatilis*, *Potamogeton diversifolius*, *Callitriche* sp., *Potamogeton natans*, *Potamogeton praelongus*, *Potamogeton perfoliatus*, *Potamogeton amplifolius*, *Potamogeton alpinus*, *Potamogeton nodosus*, *Potamogeton illinoensis*, *Potamogeton gramineus*, *Potamogeton epihydrus*, *Potamogeton oakesianus*.
- M**— *Sparganium* sp., *Vallisneria spiralis*, *Sagittaria* sp., *Scirpus subterminalis*, *Glyceria* sp.
- N**— *Myriophyllum aquaticum*, *Heteranthera dubia*, *Mimulus* sp., *Rorippa nasturtium-aquaticum*, *Ludwigia palustris*, *Juncus supiniformis*, *Fontinalis antipyretica*, *Myosotis* sp., *Veronica* sp., *Callitriche* sp.
- O**— *Myriophyllum ussuriense*, *Ranunculus cymbalaria*, *Calla palustris*, *Cicuta* sp., *Sparganium* sp., *Alisma* sp., *Sagittaria* sp., *Veronica* sp., *Hippuris vulgaris*, *Elatine triandra*, *Menyanthes trifoliata*, *Polygonum lapathifolium*, *Iris pseudacorus*, *Polygonum hydropiper*, *Polygonum hydropiperoides*, *Berula erecta*, *Gratiola* sp., *Equisetum fluviatile*, *Equisetum palustre*, *Scirpus* sp., *Lilaea scilloides*, *Acorus calamus*, *Marsilea vestita*, *Scheuchzeria palustris*, *Sium suave*, *Oenanthe sarmentosa*, *Decodon verticillatum*, *Typha latifolia*, *Lysimachia* sp., *Phragmites communis*, *Potentilla palustris*, *Mimulus* sp., *Dulichium arundinaceum*, *Triglochin* sp., *Eleocharis* sp., *Butomus umbellatus*, *Montia fontana*, *Crassula aquatica*, *Zizania aquatica*, *Veronica* sp., *Myosotis* sp., *Pontederia* sp., *Leersia oryzoides*, *Echinochloa crusgalli*, *Spartina pectinata*, *Distichlis spicata*, *Catabrosa aquatica*, *Agrostis* sp., *Pleuropogon refractus*, *Zizania aquatica*, *Beckmannia syzigachne*, *Paspalum distichum*, *Puccinellia* sp., *Alopecurus* sp., *Calamagrostis crassiglumis*, *Scolochloa festucacea*, *Phalaris arundinacea*, *Carex* sp., *Eriophorum* sp., *Kobresia simpliciuscula*, *Rhynchospora alba*, *Typha angustifolia*, *Lysichiton americanum*, *Nephrophyllidium crista-galli*, *Caltha palustris*.

**Keys to the Species of the Life-Form Groups**  
**Group A**

1—plants with long stems and leaves distributed along the stems.—*Salvinia* sp.

1—plants with all leaves in a compact rosette arising from a common point.

2—petioles inflated to serve as floats.

3—leaf bases cordate or abruptly narrowed to the petiole, flowers large, showy and purple, leaves glabrous and margins entire, rounded in outline, parallel veined.—*Eichhornia crassipes*.

3—leaf bases cuneate to truncate, flowers short-petiolate and inconspicuous, leaves rhombic and angular, apical margins at least toothed.—*Trapa natans*.

2—leaves sessile or subsessile, no inflated petiole, leaves pubescent, obovate and apically notched, flowers in short inflorescences, shorter than the leaves.—*Pistia stratiotes*.

**Group B**

1—plants reduced to thalli with no stems or leaves, roots may be present.

2—thalli not repeatedly and regularly forked, elongate to orbicular, flat or globose, flowering plants (duckweeds).—**Lemnaceae**.

2—thalli repeatedly and regularly forked, bryophytes (liverworts).

3—thalli broad, 2 to 3 times forked, tinged with purple, and fringed with tongue-shaped toothed scales.—*Ricciocarpus natans*.

3—thalli narrow and elongate, repeatedly dichotomously forked, not purple tinged nor fringed with scales.—*Riccia fluitans*.

1—stems with leaves and roots, leaves scale-like and overlapping, often reddish, ferns.—*Azolla filiculoides*.

**Group C**

1—plants reduced to thalli with no stems or leaves, roots may be present. —**Lemnaceae**.

1—plants with roots, stems and dissected leaves.

2—plants with bladders on the alternate leaves.—*Utricularia* sp.

2—plants without bladders on the whorled leaves.—*Ceratophyllum* sp.

**Group D**

1—plants reduced to thalli with no stems or leaves, roots may be present. —**Lemnaceae**.

1—plants with roots, stems and dissected leaves bearing bladders. —*Utricularia* sp.

**Group E**

1—ferns with peltate, 4-lobed, 'clover-like' leaves coiled in the bud, long petioles.—*Marsilea vestita*.

1—flowering plants, leaves not 4-lobed and clover-like, leaves not coiled in the bud, short-petiolate or sessile.

2—leaves broad, lobed or crenate, cordate, flowers yellow, fruit a head of achenes.—*Ranunculus cymbalaria*

2—leaves entire and linear.

3—flowers white, fruit a capsule.—*Limosella aquatica*.

3—flowers yellow, fruit a head of achenes.—*Ranunculus flammula*.

**Group F**

1—plants rhizomatous and tuberous, flowers white and showy in emergent racemes.—*Sagittana* sp.

1—plants rhizomatous but not tuberous, flowers small and inconspicuous, on the end of a very long coiled pedicel which retracts below the water surface in fruit, flaccid leaves with many small longitudinal veinlets and cross-septa. —*Vallisneria spiralis*.

Juvenile or sterile specimens may be difficult to distinguish.

**Group G**

1—ferns, leaves coiled in the bud, hairy sporocarps on the rhizome. —*Pilularia americana*.

1—not ferns, leaves not coiled in the bud, no hairy sporocarps.

2—leaves sharply terete, sheathing bases with spores on the inside face of the base, each with 4 transversely septate, longitudinal gas chambers, stems short and tuberous.—*Isoetes* sp.

2—leaves not with 4 transversely septate, longitudinal gas chambers, flowering plants.

3—leaves reduced to elongate, narrow, entire, hollow, transversely septate phyllodes, flowers in short umbels.—*Lilaeopsis occidentalis*.

3—leaves not as above, flowers not umbellate.

4—plants solitary but usually colonial, a large cluster of white roots, white flowers in scapose racemes.—*Lobelia dortmanna*.

4—plants stoloniferous, no large conspicuous cluster of white roots, flowers on pedicels and solitary.

5—several flower pedicels arise from the basal leaf clusters, flowers inconspicuous, fruit a capsule.—*Limosella subulata*.

5—flower pedicels solitary from near the ends of the stolons, flowers yellow and showy, fruit a head of achenes. —*Ranunculus flammula*.

**Group H**

1—flowering plants with roots, stems and leaves.—See: **Key to the Aquatic Plants with Finely Dissected Leaves.**

1—algae, no roots or leaves, only branches, produces clusters of reddish spores. **Characeae.**

**Group I**

1—algae and mosses, produce spores but no flowers

2—moss, a stem with leaves but no roots, attached to logs or rocks, often emergent and dry, leaves in 3 rows, only in acidic waters. —*Fontinalis antipyretica.*

2—algae, no roots or leaves, only branches, produces clusters of reddish spores, anchored in muddy lake bottoms. **Characeae.**

1—flowering plants with roots, stems and leaves.

3—marine plants.—**Zosteraceae.**

3—freshwater or brackishwater plants.

4—inflorescence an umbel on a long coiled pedicel, brackish water. —*Ruppia maritima.*

4—inflorescence not umbellate, pedicel not coiled in fruit.

5—leaves in a basal cluster, flowers racemose.—*Subularia aquatica.*

5—leaves cauline.

6—leaves whorled or opposite.

7—leaves in whorls of (4) 6 or more, submerged leaves to 5 cm long or more, flowers axillary, stem apex often emergent. —*Hippuris vulgaris.*

7—leaves opposite, submerged leaves 2 (2.5) cm long, flowers axillary, stem apices may form a rosette floating on the surface.—*Callitriche* sp.

6—leaves alternate.

8—plants stoloniferous and proliferous, form a dense, often reddish, tangled mat on the surface, leaves auriculate, perianth brown. —*Juncus supiniformis*.

8—plants not stoloniferous, proliferous or mat-forming, leaves not auriculate.

9—fruits a cluster of banana-shaped achenes in the leaf axils, female flowers in a cup-shaped sheath.—*Zannichellia palustris*.

9—fruits not a cluster of banana-shaped achenes, flowers not in cup-shaped sheaths.

10—plants sprawling and rooted at the lower nodes at least, flower pedicels arising from the stipulate leaf axils, solitary yellow flowers from spathes, fruit a capsule.—*Heteranthera dubia*.

10—plants erect, not rooting at the nodes, flowers small, numerous and inconspicuous in terminal, pedunculate spikes, no spathes, fruit an achene.—*Potamogeton* sp.

### Group J

1—leaves opposite or whorled.

2—leaves whorled, may be toothed, membranous.—**Haloragaceae**.

2—leaves opposite, entire, often fleshy.

3—flowers 3 to 7 in lax racemes or cymes, flowers white, seeds shiny and black.—*Montia fontana*.

3—flowers solitary in the leaf axils.

4—flowers 4-merous, 4 erect purplish follicles with 6 to 12 seeds. —*Tillaea aquatica*.

4—flowers 2 or 3-merous, capsules with extensively pitted, curved seeds.—*Elatine triandra*.

1—leaves alternate.

5—leaves sessile and clasping, crispate, finely serrulate, leaves oblong 3 to 8 cm long and 3 to 10 mm wide, flowers in a terminal emergent inflorescence.—*Potamogeton crispus*.

5—leaves not clasping or crispate, inflorescence axillary.

6—leaves strongly recurved, serrate or toothed, sessile, linear to linear-lanceolate.—*Lagarosiphon* sp.

6—leaves straight, entire, petiolate, ovate-elliptic.—*Ludwigia palustris*.

### Group K

1—leaves peltate, submerged portions of the plants mucilaginous. —*Brasenia schreberi*.

1—leaves not peltate, petiole attached at the leaf margin, plants not mucilaginous.

2—leaves lobed, up to about 1 cm long, flowers yellow, fruit a head of achenes.—*Ranunculus*. sp.

2—leaves entire, over 1 cm long, flowers not yellow.

3—leaves orbicular, bases hastate or cordate.

4—fruit is a berry, 4 to 6 green sepals, many white, yellow or red petals and many stamens, rhizome massive.—**Nymphaeaceae**.

4—fruits a cluster of follicles, 5 or 6 small white sepals, no petals and up to 20 stamens, slender creeping stolons.—*Caltha natans*.

3—leaves not orbicular, longer than broad, bases cordate, reniform or tapered.

5—leaves cordate or reniform at the base, ovate to elliptic.

6—leaves acute at the apex and cordate at the base, usually reddish, petioles reflexed at the leaf junction, leaf margin entire. —*Potamogeton natans*.

6—leaves rounded at the apex and reniform to cordate at the base, greenish, leaf margin toothed.—*Caltha natans*.

5—leaves obtuse to basally tapered, laceolate to narrowly-elliptic, apex acute, green, flowers rose or pink in compact panicles.—*Polygonum amphibium*.

### Group L

1—leaves opposite, entire, 1 or 3 nerved, up to 2 (2.5) cm long, no stipules, flowers sessile in the axils and submerged.—*Callitriche* sp.

1—leaves alternate, entire or lobed, usually more than 3 veins, stipulate or with an inflated petiole base, flowers pedicellate, emergent.

2—floating leaves entire, flowers inconspicuous in terminal, emergent inflorescences, leaves generally well over 2 cm long, stipules present. —*Potamogeton* sp.

2—floating leaves lobed, flowers solitary, axillary, yellow or white, leaves 1 to 2 cm long, base of petiole inflated and sheathing.—*Ranunculus* sp.

### Group M

1—leaves filiform or terete, usually under 3 mm wide, solitary subterminal spikelet in the axil of a prominent bract.—*Scirpus subterminalis*.

1—leaves usually broader than 3 mm, not filiform or terete.

2—swollen nodes, closed sheathing leaf bases, prominent ligules, hollow culms, articulated panicles, leaves often wavy-margined on the surface of the water, grasses.—*Glyceria* sp.

2—nodes not swollen, no closed sheathing leaf base or ligules, stems not hollow, inflorescence not an articulated panicle.

3—leaves thin and flat, 3 to 10 mm wide, with numerous longitudinal veinlets and cross septa, pistillate flowers solitary on the end of a long pedicel which coils and retracts beneath the surface in fruit. —*Vallisneria spiralis*.

3—flowers in emergent inflorescences.

4—individual flowers numerous and inconspicuous in heads, fruit achenes.—*Sparganium* sp.

4—individual flowers few with showy petals in whorled bracteate racemes.—*Sagittaria* sp.

**Group N**

1—leaves finely dissected, pale yellowish-green, flowers small, in axillary whorls.—*Myriophyllum aquaticum*.

1—leaves not dissected.

2—leaves, at least the upper ones, compound, apical lobe much larger than the laterals, flowers white in racemes, fruit a long silique. —*Rorippa nasturtium-aquaticum*.

2—leaves simple, fruits not siliques.

3—leaves opposite.

4—leaves entire, flowers sessile in the axils.

5—leaves elliptic to ovate, 2 to 6 cm long, petiolate, flowers 4 merous and sepaloid, fruit a capsule.—*Ludwigia palustris*.

5—leaves linear or spatulate to ovate, up to 2 (2.5) cm long, flowers naked, 1 stamen, 2 styles, 2-lobed achene-like fruit, often winged.—*Callitriche* sp.

4—leaves dentate.

6—leaves broadly ovate to obovate, coarsely toothed, flowers solitary on long pedicels in the leaf axils, flowers yellow, large, showy and zygomorphic.—*Mimulus* sp.

6—leaves linear-lanceolate to ovate, finely toothed, many pedicellate flowers in axillary racemes, flowers blue, small and zygomorphic.—*Veronica* sp.

3—leaves alternate.

7—leaves filiform, terete, auriculate, plants proliferous and often reddish, 3 or 6 stamens, flowers brown, the perianth is undifferentiated.—*Juncus supiniformis*.

7—leaves linear to lanceolate, not filiform, terete or auriculate, plants not proliferous or reddish, stamens 3 or 5, perianth differentiated and showy.

8—linear stipulate leaves, flowers yellow, stamens 3, solitary long-pedicellate flowers from a spathe.—*Heteranthera dubia*.

8—lanceolate exstipulate leaves, flowers blue, stamens 5, many flowers in one-sided racemes from upper leaf axils.—*Myosotis* sp.

### Group O

1—no leaves present, whorls of branches on a hollow segmented stem, toothed sheaths below the nodes, terminal cones with spores, no flowers. —*Equisetum* sp.

1—leaves present, no toothed sheath on a hollow segmented stem, no terminal cone.

2—leaves coiled in the bud, clover-like with 4 leaflets, ferns with sporangia in hairy sporocarps on the rhizomes.—*Marsilea vestita*.

2—leaves not coiled in the bud, not clover-like with 4 leaflets, flowering plants.

3—leaves in whorls of 3 or more at a node on an elongate stem.

4—leaves dissected, plants 1 to 2 dm tall, small and inconspicuous, 3 (4) leaves in a whorl, flowers 4 merous.—*Myriophyllum ussuriense*.

4—leaves entire, plants over 2 dm tall and conspicuous, 3, 6, or more leaves in a whorl.

5—solitary and generally sessile axillary flowers with 1 stamen and 1 pistil, no perianth, leaves linear and sessile in whorls of 6 or more.—*Hippuris vulgaris*.

5—flowers axillary in 1 to 3 flowered short-stalked cymes, 3 styles and 10 stamens, 4 to 5 (7) sepals and petals, leaves lanceolate and petiolate in whorls of 3 or sometimes opposite. —*Decodon verticillatus*.

3—leaves alternate, opposite or basal, not whorled with 3 or more at a node.

6—leaves opposite and simple.

7—leaves toothed.

8—flowers in axillary racemes, leaf teeth small and sometimes few. —*Veronica* sp.

8—flowers solitary on long pedicels in the leaf axils, leaf teeth vary.

9—leaves sessile and entire or with a few small teeth, 2 stamens and stigmas, 5 equal, distinct sepals.—*Gratiola* sp.

9—leaves petiolate, coarsely toothed, 4 stamens, upper tooth of calyx tube larger than the others.—*Mimulus* sp.

7—leaves entire.

10—flowers in an axillary inflorescence.

11—yellow flowers, crowded and subsessile in short, dense, pedunculate racemes in the axils of the largest leaves at midstem, leaves lanceolate above and reduced to small scales below.—*Lysimachia thyrsoiflora*.

11—white or pink flowers in lax cymes or racemes in the axils of upper or middle leaves, lower leaves not reduced.

12—3 to 7 white flowers in lax racemes in the axils of the sessile upper leaves, long pedicels, plant short, small and sprawling, freely branched, 1 style.—*Montia fontana*.

12—1 to 3 pink flowers in cymes in the axils of short petiolate middle leaves, short pedicels or sessile, plant tall and erect, not branching, 3 styles. —*Decodon verticillatus*.

10—flowers solitary in the axils.

13—flower pedicels over 1 cm long, plants erect, 5 sepals, 2 stamens on an enlarged and flattened connective. —*Gratiola* sp.

13—flowers sessile or short pedicellate in fruit, 2 to 4 sepals, no enlarged and flattened connective.

14—flowers sessile and 2 or 3 merous, leaf bases not joined, plant not fleshy, fruit a capsule, seeds reticulate.—*Elatine triandra*.

14 flowers subsessile becoming short pedicellate in fruit, flowers 4-merous, leaves joined at the base by a wing, plant fleshy, fruit of 4 follicles.—*Tillaea aquatica*.

6—leaves alternate, or in basal tufts or clusters, simple or compound.

15—leaves compound.

16—leaves trifoliolate, basal, margins entire to undulate-dentate, with sheathing stipules, flowers racemose, showy and white. —*Menyanthes trifoliata*.

16—leaves odd-pinnate to bipinnate.

17—leaves (3) 5 to 7 pinnate, leaflets strongly serrate, stems and flowers reddish, flowers few, long-pedicillate in cymes. —*Potentilla palustris*.

17—leaves with many pinnae, lower leaflets again pinnate with the exception of *Sium sauve*, flowers numerous in umbels. —*Umbelliferae*.

15—leaves simple.

18—leaves with an expanded blade and a petiole (except *Myosotis*).

19—leaves sagittate, hastate, reniform or cordate, abruptly narrowed to the petiole.

20—leaves entire, cordate-hastate or sagittate.

21—leaves sagittate, white flowers in a whorled, bracteate raceme, no spathe, roots with tubers.—*Sagittaria* sp.

21—leaves cordate-hastate, inflorescence a spike or spadix with a spathe, no tubers.

22—flowers very showy and purple, the spathes inconspicuous and leaf or scale-like, plant a rare introduction.—*Pontederia cordata*.

22—flowers small and inconspicuous embedded in a spadix, spathe large, white and showy, a native northern species.—*Calla palustris*.

20—leaf margins crenate, base cordate or reniform.

23—leaves reniform to orbicular with many small crenate teeth, fruit a capsule or follicles.

24—leaves wider than long, reniform, white flowers in open cymes, fruit an elongate capsule, sepals narrowly triangular. —*Nephrophyllidium crista-gallii*.

24—leaves orbicular to longer than wide, cordate, yellow flowers in bracteate cymes, fruit a group of elongate follicles, sepals obovate.—*Caltha palustris*.

23—leaves rhombic and irregular with a few large crenate lobes, longer than wide, yellow flowers in open cymes, fruit a head of many achenes.—*Ranunculus cymbalaria*.

19—leaves gradually tapered to the petiole or sessile.

25—petioles as long as, or longer than, the blade, the flowers in compound, bracteate, terminal panicles with the branches of the panicle whorled, leaves and peduncles basal.—*Alisma* sp.

25—leaves short-petiolate to sessile, flowers in a spathe, raceme or simple panicle, no whorls of panicle branches, leaves cauline or basal, inflorescence terminal or axillary.

26—flowers in a spadix, spathe very large, showy and yellow, leaves up to 1 meter or more long and ovate to elliptical.—*Lysichiton americanum*.

26—flowers in axillary or terminal racemes or panicles, leaves lanceolate or narrower and up to 20 cm long.

27—leaves articulate at the base of the sheathing stipules, nodes swollen, loose axillary and terminal panicles of white flowers. —*Polygonum* sp.

27—leaves sessile to sessile, no sheathing stipules or swollen nodes, inflorescence of blue flowers in a one-sided raceme which is terminal or axillary in the upper leaf axils.—*Myosotis* sp.

18—leaves linear, terete, tape-like, or grass-like, no expanded blade, very much longer than wide, may be basally triangular and clasping.

28—leaves jointed between the sheath and the blade (the base of the leaf is a cylindrical sheath enveloping the stem, the blade is free above and jointed to the sheath, there may be ligules, swellings or hairs at this joint).

29—leaves in 3 rows, stems may be twisted. —**Cyperaceae**.

29—leaves in 2 rows or spirally arranged.

30—styles of lower flowers at least 2 cm long with simple capitate stigmas, scapose annuals, flowers sessile, female in the leaf axils, male and bisexual in spikes.—*Lilaea scilloides*.

30—styles less than 1.5 cm long or with plumose stigmas.

31—perianth present, 6 stamens, fruits are follicles in a raceme, prominent ligules on the leaf sheaths.

32—perianth scale-like, leaves mostly basal, inflorescence an elongate, ebracteate, densely-flowered, raceme, the inflorescence greatly surpasses the leaves. —*Triglochin maritimum*.

32—perianth sepeloid and greenish-white, leaves cauline, inflorescence a short, few-flowered, bracteate raceme, the upper leaves surpassing the inflorescence, basal leaves marcescent.—*Scheuchzeria palustris*.

31—perianth absent or reduced to hairs and bristles, fruits in terminal spikelets.

33—flowers enclosed by 2 bracts, stems hollow and round, solid swollen nodes, leaves cauline in 2 rows, grasses. —**Poaceae**.

33—flowers enclosed by 1 bract, stems usually solid and triangular, nodes not swollen, leaves mostly basal in 3 rows.—**Cyperaceae**.

28—leaves not jointed between sheath and blade.

34—flowers in a terminal involucrate umbel; showy, 9 red stamens, 6 pistils, perianth rose, follicles inflated.—*Butomus umbellatus*.

34—flowers not in a terminal umbel.

35—midrib asymmetric, flowers in a spadix with a long slender, green, leaf-like spathe.—*Acarus calamus*.

35—midrib symmetric if present, flowers not in a spadix and lacking a spathe.

36—flowers in compact spherical heads borne in simple or branched racemes, male heads above and female heads below.—*Sparganium* sp.

36—flowers in densely packed cylindrical spikes or bracteate racemes.

37—flowers in densely packed cylindrical spikes superposed on a single axis, individual flowers small and inconspicuous, naked and subtended by hairs, staminate above and pistillate below. —*Typha* sp.

37—flowers in terminal bracteate racemes, large showy and zygomorphic, yellow, fruit a capsule.—*Iris pseudacorus*.

**Keys to Aquatic Genera and Species within Families**  
**Key to the Alismataceae of British Columbia**

In *Sagittaria* the usual non-achene key characters of bract length and shape and pedicel lengths have been found to be inconsistent and sufficiently variable even within one population as to be virtually useless as key characters. Many flowering, but not fruiting, collections are difficult to identify.

1—leaves basally sagittate or hastate, stamens 7-25, achenes densely packed on the receptacle.—*Sagittaria* sp.

2—monoecious, mature achenes 2.0-2.5 mm long with a beak less than 0.5 mm long pointing forward from the tip of the achene. —*Sagittaria cuneata*.

2—monoecious or dioecious, mature achenes (2.5) 3.0-3.5 (4.0) mm long with a beak about 1 mm long at right angles to the body of the achene. —*Sagittaria latifolia*.

1—leaves gradually tapered or cordate at the base; broadly ribbon-like if submerged.

3—leaves completely submerged in deep water or floating on the surface, ribbon-like or tapered at the base and oval, flaccid, plants generally sterile.—*Sagittaria* sp.

3—leaves emergent and erect, ovate to lanceolate, stamens 6 (9), achenes in a single whorl on the receptacle.—*Alisma* sp.

4—leaf blades lanceolate to ovate, scapes longer than the leaves (petiole plus blade), achenes centrally grooved at the top. —*Alisma plantago-aquatica*.

4—leaf blades narrowly lanceolate to linear, scapes shorter than the leaves (petiole plus blade), achenes 2-grooved at the tip. —*Alisma gramineum*.

### Key to the Aquatic Araceae of British Columbia

1—plants free-floating, leaves thick and leathery, hairy, sub-sessile and cuneate, in a rosette, tropical aquarium and garden pool plants, not yet known to overwinter outdoors in BC.—*Pistia stratiotes*.

1—plants bottom-rooted, leaves glabrous, petiolate or linear and reed-like, native.

2—leaves unifacial, reed-like, spadix on a tall emergent stem and apparently borne directly on the leaf, spathe long, green and leaf-like. —*Acorus calamus* .

2—leaves bifacial with broad blades and petioles, spadix basal and stalked, distinct showy spathes.

3—leaves lanceolate to elliptical and up to 1 m long, bases tapered to the petiole, spathe deep yellow, and up to 2 dm long, spadix long, cylindrical with small greenish fruit.—*Lysichiton americanum* .

3- leaves ovate and up to 30 cm long, bases cordate, spathe white and up to 6 cm long, spadix short, clavate with large red berries. —*Calla palustris*.

### Key to the Cabombaceae of British Columbia

1—leaves peltate and entire, floating on the surface, plant muscilaginous, flowers red, native.—*Brasenia schreberi*.

1—leaves dissected and submerged, plants not muscilaginous, flowers with white sepals and yellow petals, aquarium plant, not yet found out of cultivation.—*Cabomba caroliniana*.

## Key to the Characeae of British Columbia

1—branchlets simple, not further branched or segmented, coronula 5-celled. —*Chara* sp.

2—stem not corticate, stipulodes in 1 tier, and alternating with the branchlets, branchlets tipped with a corona, no spine cells.—*Chara braunii*.

2—stems, and at least basal branchlet segment, corticate.

3—spine cells in fascicles, axial cortex haplostichous, 1 corticate, stipulodes in 2 tiers, spiny looking, found in saline or brackish waters.—*Chara canescens*.

3—spine cells solitary or geminate, axial cortex diplostichous or triplostichous, 2 or 3 corticate.

4—axial cortex diplostichous, stipulodes in 2 tiers, spine cells absent or small, rarely geminate, quite variable and widespread in hard-water lakes, smooth but marl encrusted.—*Chara vulgaris*.

4—axial cortex triplostichous, stipulodes usually in 2 tiers but may be in 1 tier, obscure or absent, spine cells usually absent or obscure but may be clustered, variable and widespread in hard-water and soft-water lakes, smooth appearance.—*Chara globularis*.

1—branchlets compound, rebranched and/or segmented.

5—branchlets simple but segmented like a string of sausages, end cells reduced and acute, heads coarse and like a bird's nest. —*Tolypella intricata*.

5—branchlets compound, rebranched, may be segmented or apparently so. —*Nitella* sp.

6—the end segment of the branchlets is 1-celled.

7—heteroclemous, 2 kinds of branchlets in a whorl, 1-forked alternating with 1-celled, bright green, compact, branchlets swollen.—*Nitella clavata*.

7—homeoclemous, all branchlets in a whorl the same, generally 1-forked.

8—fertile heads small and densely compact, no mucous, generally no terminal dactyls on the sterile branchlets. —  
*Nitella acuminata*.

8—fertile heads absent or loose and not compact.

9—dactyl apices not long acuminate, may be acute, blunt or apiculate, (a small variety may have 2-forked branchlets occasionally).—*Nitella flexilis*.

9—dactyl apices are long acuminate, gametangia on branchlets, generally not marl covered.—*Nitella acuminata*.

6—the end segment of the branchlets is 2-or-more-celled, the end cells are very much smaller than the penultimate cell.

10—lowest branchlet node fertile, dactyls 2 to 3-celled, heads may have mucous, oospore membrane granular or feltlike. —*Nitella gracilis*.

10—lowest branchlet node sterile, dactyls 2-celled, no mucous in the heads, oospore membrane reticulate.—*Nitella tenuissima*.

### Key to the Aquatic Cyperaceae of British Columbia

1—achenes enclosed in a perigynium as well as subtended by a scale.

2—perigynium open, margins free.—*Kobresia simpliciuscula*.

2—perigynium closed, a dorsal suture may be evident.—*Carex* sp.(no key provided to the species of *Carex*).

1—achenes not enclosed in a perigynium, simply subtended by a scale.

3—scales distichous, in 2 vertical ranks, perianth of 6-9 bristles, stem leafy, upper leaves with axillary inflorescences.—  
*Dulichium arundinaceum* .

3—scales of the spikelet spirally arranged.

4—style basally thickened and persistent on the achene as a tubercle.

5—several to many spikelets, 1 or 2 fertile flowers or achenes per spikelet, 10 to 12 perianth bristles.—*Rhynchospora alba*.

5—spikelet solitary, several to many fertile flowers or achenes per spikelet, 0 to 6 perianth bristles.—*Eleocharis* sp.

6—3 stigmas, trigonous achenes, anthers 0.7 to 1.3 mm long, scale up to 2.2 mm long, small plant, filiform culms to 12 cm tall. —*Eleocharis acicularis*.

6—2 stigmas, lenticular, anthers 1.3 to 2.5 mm long, scales 2 to 4.5 mm long, robust plant with slender to stout culms 1 to 10 dm tall. —*Eleocharis palustris*.

4—style not thickened, achene may be apiculate..

7—achenes subtended by more than 10 conspicuous and elongate white bristles, trifold stigmas and trigonal achenes.—*Eriophorum* sp.

8—1 spikelet, rhizomatous, white to rufous bristles, anthers over 1.0 to 2.5 mm long, plant 3 to 7 dm tall.—*Eriophorum chamissonis*.

8—2 or more spikelets, rhizomatous, bristles white, anthers 2.5 to 4.0 mm long, plant 2 to 6 dm tall.—*Eriophorum polystachion*.

7—achenes subtended by 6 or fewer inconspicuous perianth bristles, stigmas bifid or trifold, achenes lenticular or trigonal.—*Scirpus* sp.

9—two or more well-developed involucre bracts, green, leafy and spreading, inflorescence thus evidently terminal, culms sharply triquetrous, spikelets 12-20 mm long and fewer than 50, pistil tricarpellate.—*Scirpus fluviatilis*.

9—one well-developed involucre bract, green, leafy, erect and resembling a prolongation of the culm, inflorescence apparently lateral.

10—spikelets solitary, plants fully submerged with floating, filiform, flaccid leaves and stems.—*Scirpus subterminalis*.

10—spikelets 2 or more, plants erect emergents.

11—spikelets 1 to 6, sessile in a sessile cluster, culms triangular, up to 10 dm tall.—*Scirpus americanus*.

11—spikelets numerous in a branched inflorescence, culms terete.

12—spikelets sessile in small clusters, culms 1 to 5 m tall, most flowers bicarpellate.—*Scirpus lacustris*. (a species complex).

12—spikelets mostly individually pedunculate, culms 1 to 3 m tall, flowers tricarpellate, uncommon.—*Scirpus heterochaetus*.

### Key to the Hydrocharitaceae of British Columbia

1—leaves very long and narrow in basal rosettes, pedicel arises from the rosette and reaches the surface, spirally coiled—*Vallisneria spiralis*.

1—leaves short, up to 4 cm long, arising from the elongated stem.

2—leaf arrangement irregular, margins serrate or toothed, tip with 2 enlarged spines—*Lagarosiphon major*.

2—leaves arranged in regular whorls.

3—leaf margins serrate or toothed.

4—leaf tip with 2 enlarged spines, no turions, 3 or more strongly recurved leaves up to 3 cm long per whorl.—*Lagarosiphon major*.

4—no enlarged spines on the leaf tip, turions present on the rhizome or on the stem, 3-8 (12) nearly straight leaves up to 2.5 cm long per whorl.—*Hydrilla verticillata*.

3—leaf margins entire.

5—basal leaves in whorls of 3 but upper ones up to 6 per whorl and up to 4 cm long, 2-3 flowers in the staminate spathes, petals to 10 mm.—*Egeria densa*.

5—basal leaves in pairs, the upper ones usually in whorls of 3 and up to 2.5 cm long, flowers solitary in the staminate spathes, petals up to 5 mm long.—*Elodea* sp.

6—leaves in the upper and middle part of the stem in pairs, lower ones irregular or alternate, (1.7) 2.0-2.6 cm long.—*Elodea longivaginata*.

6—leaves in whorls of 3.

7—leaves (1.7) 2.0-2.6 cm long.—*Elodea longivaginata*.

7—leaves rarely over 1.5 cm long.

8—leaves 2 (1-4) mm wide, tapered abruptly to a blunt point, staminate flowers stalked and persistent—*Elodea canadensis*.

8—leaves 1.5 (0.3-1.5) mm wide, tapered to a slender point, staminate flowers sessile and deciduous at anthesis—*Elodea nuttallii*.

### Key to the Aquatic Juncaginaceae of British Columbia

1—no perianth, flowers bracteate, pistillate flowers axillary, perfect flowers in pedunculate spikes, long styles, fruit 3-lobed, an annual plant. —*Lilaea scilloides*.

1—perianth 6-parted, flowers ebracteate, all perfect in terminal racemes, no styles, carpels 6, heavy, often woody, rhizomes.—*Triglochin maritimum*.

### Key to the Lemnaceae (duckweeds) of British Columbia

1—one or more roots and nerves on each thallus (frond).

2—each thallus bears two or more clustered roots from the base and 4-12 nerves.—*Spirodela polyrhiza*.

2—each thallus bears one root at the base and 1-5 nerves—*Lemna* sp.

3—fronds oblong to lanceolate, 6-12 mm long and connected in small groups by stalks of the same length, matted, generally submerged, colonies.—*Lemna trisulca*.

3—fronds oval to round, less than 6 mm long, no stalks, solitary or in small attached groups, floating on the surface.

4—fronds often papilose and purplish mottled, bulged on the upper surface, 2-5 mm long, 3-5 nerved.—*Lemna gibba*.

4—fronds smooth and green, nearly flat on the upper surface, 2-4 mm long, usually only 1 nerved.—*Lemna minor*.

1—no roots or nerves on the thalli.

5—thalli subglobose to oval, up to 1 mm long.—*Wolffia* sp.

6—plants floating just below the surface, subglobose, upper surface rounded, green, not punctulate, 0.5-1.0 mm long. —*Wolffia columbiana*.

6—plants floating on the surface, ellipsoidal, upper surface flattish, white or brown-punctilate, 0.5-1.2 mm long and about 1/2 as wide. —*Wolffia borealis*.

5—thalli long and narrow, sickle-shaped, several mm long but very narrow, flattened, submerged except at the base and aggregated into clusters. —*Wolffiella gladiata*.

### Key to the Menyanthaceae of British Columbia

1—leaves trifoliate and usually entire, corolla with a mass of fimbriate scales, spicate.—*Menyanthes trifoliata* .

1—leaves simple, reniform, hastate or cordate.

2—leaves reniform, margin finely to coarsely crenate, the corolla with longitudinal erose-undulate membranous ridges, flowers white and cymose.—*Nephrophyllidium crista-galli*.

2—leaves hastate or cordate, the white or yellow flowers are either solitary or clustered and appearing to arise from the petiole or base of the leaf, leaves small to about 15 cm long.—*Nymphoides* sp.

3—flowers yellow, solitary and axillary.—*Nymphoides peltata*.

3—flowers white, clustered at the base of the leaf.—*Nymphoides aquatica*.

### Key to the Nymphaeaceae of British Columbia

1—large discoid stigma, superior ovary, about 6 large yellowish conspicuous sepals, flowers yellow, leaves flat, dark green, entire margined and leathery, native, large robust plants.—*Nuphar* sp.

2—stamens reddish, petiole round in cross section, primarily a western and coastal BC species.—*Nuphar polysepalum*.

2—stamens yellow, petiole flattened in cross section, primarily an eastern BC species.—*Nuphar variegatum*.

1—several to many spreading stigmas, partially inferior ovary, 4 greenish inconspicuous sepals, flowers red, pink, white and yellow, leaves often suffused with red especially below and often wavy margined but not leathery, many horticultural varieties are naturalized and cause confusion. —*Nymphaea* sp.

3—petals yellow or red, pink or reddish.

4—about 25 yellow petals, flowers 6-10 cm in diameter. —*Nymphaea mexicana*.

4—petals redj pink, reddish.—*Nymphaea* sp. (horticultural varieties)

3—petals white.

5—flowers 2-5 cm in diameter, 7-18 petals, 6-9 styles. —*Nymphaea tetragona*.

5—flowers 7-12 cm in diameter, over 20 petals, over 8 styles.

6—white petals gradually transitional to the staminodia and stamens, spirally arranged, stigmatic disc with 8-24 radial stigmas, not fragrant.—*Nymphaea alba*.

6—20 -30 thick white elliptic petals followed by 70-100 yellow stamens and staminodia, about 20 styles, flowers very fragrant, open in the early morning and close later in the day, commonly. —*Nymphaea odorata*.

### **Key to the Aquatic Poaceae of British Columbia**

1—no ligules or auricles, weeds of irrigation ditches, 6 to 17 dm tall, nodes glabrous.—*Echinochloa crusgallii*.

1—ligules present.

2—ligules consisting at least in part of a fringe of hairs at least as long as any membranous basal portion.

3—culms 2 to 3 m tall, hollow, reed-like plants, leaves 1 to 4 cm wide. —*Phragmites communis*.

3—culms up to 1.5 m tall, hollow or solid, blades up to 1.5 cm wide, not reed-like.

4—culms hollow, rhizomatous, blades narrow, ligules 1 to 3 mm long, plants of coastal brackish areas, up to 75 cm tall.—  
*Spartina patens*

4—culms solid or filled with pith, blades 2 to 4 mm wide, ligules 0.5 mm long, coastal salt marshes, up to 40 cm tall—  
*Distichlis spicata*.

2—ligules entirely or mostly membranous, may be erose, lacerate or ciliate but not fringed.

5—sheaths partially to completely closed from the base up, margins rarely overlapping where closed.

6—tip of the blades blunt, turned up and somewhat prow-like, blades 2 to 13 mm wide, culms 1 to 6 dm long.—  
*Catabrosa aquatica*.

6—tip of the blades narrowed to a slender point and not at all prow-like, culms usually over 6 dm long, blades various.

7—inflorescence racemose, culms 10 to 15 dm tall, blades 3 to 7 mm wide, 5 to 12 widely spaced, reflexed spikelets, 7 to 11 flowers. —*Pleuropogon refractus*.

7—inflorescence paniculate.—*Glyceria* sp.

8—spikelets flattened and usually under 1 cm long, ovate to broadly oblong and rarely over 3 times as long as broad.

9—sheaths smooth, open above, ligules glabrous, lemmas purplish leaf blades about 10 mm wide.—*Glyceria grandis*.

9—sheaths scabridulous, closed in front, ligules pubescent, lemmas greenish, leaf blades up to 6 mm wide. —*Glyceria striata*.

8—spikelets terete and usually well over 1 cm long, linear to narrowly oblong and several times as long as thick.

10—lowest lemma about 5.5 mm long and anthers over 1.2 mm long, plant up to 1.5 m tall, leaf blades 4 to 8 (12) mm wide.—*Glyceria occidentalis*.

10—lowest lemma 3 to 4 mm long and anthers under 1.2 mm long, plants rarely over 1 m tall, leaf blades up to 7 mm wide.

11—lemma scabridulous over the back, blades scabridulous on the ventral surface, ligules lacerate, spikelets 12 to 18 mm long, first glume 1.2 to 1.5 mm long, second glume twice as long, sheaths mostly closed but open for 1 cm.—*Glyceria leptostachya*.

11—lemma scabridulous only on the nerves, blades minutely papillate on the ventral surface, ligules entire, spikelets 10 to 12 (15) mm long, first glume (1.5) 2 to 2.5 mm long, second glume just over 3 mm long, sheaths open for 1 to 4 cm.—*Glyceria borealis*.

5—sheaths open almost or all the way to the base, margins usually overlapping.

12—plants annuals, no remains of previous years culms or leaves, small root systems.

13—plants 1 to 3 m tall, ligules 4 to 15 mm long and glabrous, nodes and collars pubescent, blades flat, 6 to 40 mm wide, inflorescence an open panicle 2 to 5 dm long, anthers 1 to 1.4 mm long.—*Zizania aquatica*.

13—plants up to 1 m tall, ligules 6 to 11 mm long and pubescent, nodes and collars glabrous, blades flat, 5 to 10 mm wide, inflorescence narrow and congested, up to 3 dm long, anthers 6 to 7 mm long. —*Beckmannia syzigachne*.

12—plants perennials, usually with remains of previous years culms and leaves, extensive root systems, blades usually rolled in the bud, leaf tips usually flat but not prowded, auricles lacking.

14—culms solid, 4 to 10 dm tall, nodes pubescent, sheaths pilose, ligules 1 to 1.5 mm long and erose, leaf blades 3 to 8 (10) mm wide, 2 terminal spikes 2 to 7 (9) cm long, anthers and stigma purple. —*Paspalum distichum*.

14—culms hollow.

15—plants tufted, not rhizomatous nor with freely rooting decumbent culms which resemble rhizomes.

16—ligules 0.8 to 2 mm long, obtuse to acute, sometimes higher at the sides than at the center (shortest opposite the throat).

17—blades filiform to 1.5 mm wide, anthers 0.3 mm long, swampy freshwater in the mountains.—*Agrostis idahoensis*.

17—blades 1 to 2.5 mm wide, anthers 0.7 to 1.2 mm long, salt marshes and tide flats.—*Puccinellia pumila*.

16—ligules over 2.5 mm long, often acute to acuminate, rarely higher on the sides than at the center (longest opposite the throat).—*Alopecurus* sp.

18—straight awn arising from the middle of the lemma is up to 1.5 mm longer than the glumes which are less than 2.5 mm long, anthers between 0.5 and 1.0 mm long.—*Alopecurus aequalis*.

18—bent awn arising from just above the base of the lemma and is at least 1.5 mm longer than the glumes which are 2.5 to 3.5 mm long, anthers 1.2 to 2.2 mm long.—*Alopecurus geniculatus*.

15—plants extensively rhizomatous or stoloniferous, decumbent, nodally rooting culms are rhizome-like.

19—blades 10 to 40 mm wide, flat, ligules 1.5 to 3 mm long and fringed, old culms 20 to 30 dm tall.—*Phragmites communis*.

19—blades rarely over 15 mm wide, often involute or folded, ligules of broad-leaved plants over 3 mm long, culms rarely as much as 20 dm tall.

20—ligules truncate, 0.5 to 1 (1.5) mm long, finely erose or ciliolate.

21—leaves hirsute on the throat, collar or ventral surface, plants of coastal salt marshes.—*Distichlis spicata*.

21—leaves not hirsute but retrorse-scabrous along the margins, unequally veined, flat blades 6 to 10 mm wide, narrowed abruptly at the base.—*Leersia oryzoides*.

20—ligules obtuse to acute, 1.5 to 10 mm long, not ciliolate.

22—ligules finely ciliolate and often minutely erose, collars glabrous, leaves firm and tough, not pilose, basal blades less than 3 to 5 mm wide, ligules 1.5 to 3 mm long, plant 1.5 to 4 dm tall.—*Calamagrostis stricta*.

22—ligules entire to erose but not ciliolate, may be lacerate or glabrous.

23—ligules average at least 3 mm long, leaf blades flat, some at least 5 mm wide.

24—margins of the sheath projecting upward as a tooth higher than the ligule, culms 9 to 15 dm tall, leaf blades with very slender tips, introduced.—*Scolochloa festucacea*.

24—margins of the sheath not projecting above the ligule.

25—blades thick and firm, nerves numerous and broad, leaf margins often freed from the sheath at different levels.—*Phalaris arundinacea*.

25—blades thin and less than 6 mm wide, nerves slender, leaf margins all freed from the sheath at about the same level.—*Alopecurus aequalis*.

23—ligules averaging less than 3 mm wide, leaf blades often involute, rarely as much as 5 mm wide.

26—plants of tidflats and salt marshes, leaves 1 to 2 mm wide, ligules glabrous, 2 to 7 dm tall, stoloniferous.—*Puccinellia maritima*.

26—plants of coastal freshwater bogs, blades 1.5 to 3 mm wide, ligules truncate to deeply lacerate, 3 to 8 dm tall.—*Agrostis aequalis*.

### Key to the Aquatic Pontederiaceae of British Columbia

1—plants erect and emergent, fruit a 1-seeded nut enclosed by the base of the perianth tube, locally introduced and usually in cultivation, 6 stamens, inflorescence geniculate at anthesis, flowers blue.—*Pontederia cordata*.

1—plants submerged, sprawling or floating on the surface, fruit a 3-locular capsule.

2—floating on the surface, petiole inflated, conspicuous purple flowers, 6 stamens, introduced in garden pools but not surviving outdoors over winter.—*Eichhornia crassipes*

2—submerged or sprawling at the surface, petiole not inflated, inconspicuous yellow flowers, 3 stamens, native.—*Heteranthera dubia*.

### Key to the Aquatic Ranunculaceae of British Columbia

1—leaves dissected, compound or lobed, petals white or yellow, sepals green and often deciduous, fruit a head of achenes.—*Ranunculus* sp.

1—leaves simple, petals absent, sepals showy and white or yellow, fruit a cluster of elongate follicles, leaves finely crenate margined.—*Caltha* sp.

2—stems stout, erect or sprawling, leaves erect, over 5 cm wide, flowers yellow.—*Caltha palustris*.

2—stems slender, creeping or floating, leaves floating, under 5 cm wide, flowers white.—*Caltha natans*.

### Key to the Aquatic Scrophulariaceae of British Columbia

1—petal tube very short and the lobes apparently free, flat and spreading, lower lobe smaller than the rest, 2 stamens which spread laterally.—*Veronica*.

2—leaves all short-petiolate.—*Veronica americana*.

2—leaves, at least those on the middle and upper portions of the flowering shoots, sessile.

3—capsule flattened, notched, wider than high, 5-9 seeds per locule, 1 to 2 mm long, leaves 4 to 20 times as long as wide.—*Veronica scutellata*.

3—capsule turgid, scarcely notched, barely wider than high, many seeds less than 0.5 mm long, leaves 1.5 to 5 times as long as wide.

4—leaves 1.5 to 3 times as long as wide, fruiting pedicels ascending, capsules higher than wide if not equal, flowers blue or violet.—*Veronica anagallis-aquatica*.

4—leaves 2.5 to 5 times as long as wide, fruiting pedicels spreading, capsules wider than high, flowers white to pink or pale blue. —*Veronica catenata*.

1—petal tube long or short but lobes not apparently free and all the same size, 2, 4 or 5 erect stamens.

5—stamen connective developed into a wide flap partially surrounding the anthers.—*Gratiola*.

6—pedicels with a pair of sepeloid bracteoles and 5 sepals at the summit.—*Gratiola neglecta*.

6—pedicels without bracteoles, only 5 sepals at the summit. —*Gratiola ebracteata*.

5—stamen connective not developed into a flap.

7—sepal tube 5-angled, abaxial petal lip with 2 hairy patches at the base. —*Mimulus*.

8—corolla throat open, lateral and lower calyx teeth blunt and short, the lower not folded upward, corolla 1 to 2 cm long, stems weak and decumbent, floating.—*Mimulus glabratus*.

8—corolla throat nearly closed by the palate, lateral and lower calyx teeth acute and the lower tending to fold up in fruit, corolla 2 to 4 cm long, stems erect.—*Mimulus guttatus*.

7—sepal tube not 5-angled and no hairy patches on the abaxial petal lip.

9—petal tube not 2-lipped, lobes equal or nearly so, leaves not finely dissected.—*Limosella* sp.

10—leaves with an obvious petiole and blade, widespread. —*Limosella aquatica*.

10—leaves filiform and bladeless, coastal.—*Limosella subulata*.

9—petal tube 2-lipped, lobes unequal, leaves finely dissected. —*Limnophila sessiliflora*.

### Key to the Aquatic Umbelliferae of British Columbia

1—leaves bladeless, reduced to linear or spatulate, septate stalks, plants creeping and rooting at most nodes, umbels simple. —*Lilaeopsis occidentalis*.

1—leaves with compound blades, plants erect and rooting at lower nodes only, umbels compound.

2—base of the stem thickened, hollow and with well-developed transverse septa, some roots tuberous thickened, veins of the leaflets directed to the sinuses between the teeth.—*Cicuta* sp.

3—plants bulbiferous in the axils of the upper reduced leaves, segments of principal leaves under 5 mm wide.—*Cicuta bulbifera*.

3—plants not bulbiferous, leaflets of the principal leaves 5 to 35 mm wide.—*Cicuta douglasii*.

2—base of the stem without transverse septa, roots not tuberous thickened, veins not directed to the sinuses.

4—ribs of the fruit inconspicuous, calyx teeth tiny or absent.—*Berula erecta*.

4—ribs of the fruit prominent, corky-thickened.

5—primary lateral veins of the leaflets tend to be directed to the teeth, reclining or scrambling-ascending.—*Oenanthe sarmentosa*.

5—primary lateral veins of the leaflets not directed in any particular direction, plants erect, calyx teeth tiny or absent.—*Sium sauve*.

The lower-most leaves may be under water, especially in the spring, and they will then be finely dissected with filiform segments. *Sium sauve* is especially prone to being found completely under water in the spring with all leaves filiform-dissected. Such plants will not key out properly in the general key. *Cicuta* is poisonous, use care when cutting open tubers to check for transverse septa. Wash your hands and your knife afterwards.

### Key to the Zosteraceae of British Columbia

These are all marine plants.

1—leaf sheaths deciduous, sometimes leaving a few scaly parts behind, leaf blades thin and translucent, rhizome with elongate internodes (1 to 3 cm long or more), with 2 thin roots at each internode, monoecious, spadix border projections inconspicuous, if present, usually established on sand or mud.—*Zostera*.

2—leaves 3-veined, 1 to 1.5 mm wide, sheaths split to the base, rare and probably introduced from Asia, known only from Boundary Bay and Tsawwassen.—*Zostera japonica*.

2—leaves 5-veined or more, 1.5 to 12 mm wide, sheaths on sterile shoots are closed at the base, widespread native species.—*Zostera marina*.

1—basal portions of the leaf sheaths decay with age to bundles of fine, wooly fibres, leaf blades leathery, rhizome has short, thick internodes with 2 or more thick roots at each internode, dioecious, spadix bordered by conspicuous flap-like projections, usually established only on hard or rocky substrates.—*Phyllospadix*.

3—fertile stems branched, 4 to 12 dm long, spathes usually paired at the nodes.—*Phyllospadix torreyi*.

3—fertile stems unbranched, 0.5 to 4 dm long, spathes usually solitary at the nodes.

4—leaves with 3, rarely 5, veins, margins entire.—*Phyllospadix scouleri*.

4—leaves with 5 or 7 veins, margins toothed towards the apex. —*Phyllospadix serrulatus*.

## Keys to Aquatic Species within Genera

### Key to the Callitriche of British Columbia

(Mature fruits are generally needed for positive identification).

1—fruit encircled by a conspicuous wing-like margin, leaf bases joined by winged ridges.—*Callitriche stagnalis*.

1—fruit not winged or with only a narrow wing at the tip, leaf bases various.

2—leaves all linear, 1-nerved, light green, leaf bases not joined by a wing, floral bracts absent, common species.—*Callitriche hermaphrodita*.

2—leaves various, upper often ovate and 3-nerved, bases joined by a wing-like ridge, floral bracts present.

3—carpel face markings in regular vertical lines, fruit slightly wing-margined at the top and longer than broad.—*Callitriche verna*.

3—carpel face markings scattered, fruit not winged and as long as broad.

4—fruits widest above the middle (obovate) leaves bidentate, midvein barely thickened at the end, emergent leaves may be over 5 mm wide, stems long.—*Callitriche heterophylla*.

4—fruits round or oblong, midvein thickened at the tip and protruding, leaves never over 5 mm wide, plants short and slender.—*Callitriche anceps*.

### Key to the Ceratophyllum of British Columbia

1—leaf segments subcapillary, mostly entire, delicate and light green, in deeper water and not surfacing, achene with 3-5 lateral spines on each side, not a 'weedy' species.—*Ceratophyllum echinatum*.

1—leaf segments capillary to linear and flattened, serrate to coarsely toothed, plant usually coarse and robust, dark green to almost black, usually surfacing, achene without lateral spines, 2 basal spines and 1 terminal spine only, a very 'weedy' species in eutrophic waters.—*Ceratophyllum demersum*.

### Key to the Aquatic Equisetum of British Columbia

1—central cavity well over 1/2 the diameter of the stem which has 10-40 fine grooves, 4-6 angled branches, vallecular cavities are basal only, teeth of sheaths not hyaline margined.—*Equisetum fluviatile* .

1—central cavity much less than 1/2 the diameter of the stem which has up to 12 coarse grooves, 5-6 angled branches, vallecular cavities throughout, teeth of sheaths hyaline margined.—*Equisetum palustre* .

### Key to the Limosella of British Columbia

1—leaves elliptic to spatulate, distinct blade and petiole, fresh water. —*Limosella aquatica*.

1—leaves very narrow and not differentiated into petiole and blade, estuarine. —*Limosella subulata*.

### Key to the Aquatic Mimulus of British Columbia

1—corolla throat open, lateral and lower calyx teeth blunt and short, the lower not folded up, corolla 1 to 2 cm long, leaves reniform to rotund-ovate, 1 to 3 cm long, palmately 3 to 7 nerved.—*Mimulus glabratus*.

1—corolla throat nearly closed by the palate, lateral and lower calyx teeth acute, the lower folding upward in fruit to partially close the orifice, corolla (1) 2 to 4 cm long, leaves ovate to reniform-cordate, up to 1 dm long, 3 to 7 main veins all arise at or near the base.—*Mimulus guttatus*.

### Key to the Aquatic Myosotis of British Columbia

1—corolla limb 2 to 5 mm wide, style shorter than the nutlets, not stoloniferous, often recumbent.—*Myosotis laxa*.

1—corolla limb 5 to 10 mm wide, style as long as or longer than the nutlets, stoloniferous, mostly erect and not creeping or recumbent. —*Myosotis scorpioides*.

## Key to the *Myriophyllum* of British Columbia

Submerged leaves are simply pinnate. The key includes both native and an introduced species which is widely used in aquaria and outdoor garden pools.

1—flowers in the axils of cauline submerged leaves.

2—leaves in whorls of 3-4, or scattered, fewer than 10 leaf segments on each side of the rachis, monoecious, 4 stamens, plants often reddish, fully submerged.—*Myriophyllum farwellii*.

2—leaves in whorls of 4-6, more than 10 leaf segments on each side of the rachis, dioecious, 8 stamens, plants a palid yellowish-green, apical portion of stem often sprawled over the surface of the water or on adjacent land. —*Myriophyllum aquaticum* .

1—flowers in the axils of bracts on emergent, terminal spikes.

3—four stamens, 4-6 leaves per whorl, bracts conspicuous.

4—floral bracts delicate, deeply incised to serrate, spike short and delicate, widespread in sloughs of the lower Fraser Valley. —*Myriophyllum hippuroides*.

4—floral bracts ovate and toothed, spike long, robust and inflated, introduced in several park and garden ponds of south-western British Columbia.—*Myriophyllum heterophyllum* .

3—eight stamens, 3-5 leaves per whorl, floral bracts various.

5—floral bracts smaller than the flowers, inconspicuous, and nearly entire (the lowest few may be larger and pinnate but the upper ones are small), leaf whorls in the central portion of the stem are over 1 cm apart and not crowded, monoecious.

6—no turions, rhizomatous, 10-16 leaf divisions less than 2 mm apart, leaves make right or obtuse angles with the stem, leaf tips 'squared', all leaf segments straight and all of nearly the same length.—*Myriophyllum spicatum*.

6—turions present, not rhizomatous, 6-12 leaf segments over 2.5 mm apart, leaves make acute angles with the stem, leaf tips 'acute', basal leaf segments curved and much longer than the apical. —*Myriophyllum sibiricum* (=M. exalbescens).

5—floral bracts usually longer than the flowers and rarely entire, the leaf whorl spacing varies, monoecious or dioecious.

7—dioecious (male and female flowers on separate small plants) found only on exposed mud banks when the water level drops in summer, female bracts and leaves entire to scarcely and irregularly divided, male bracts and leaves entire to pectinate-pinnate, submerged leaves scattered and irregular.—*Myriophyllum ussuriense* .

7—dioecious or monoecious, flowering plants found in water, bracts large and conspicuous, shape variable.

8—floral bracts pinnate to pectinate, greenish, leaves often crowded on the stem and delicate, usually more than 10 leaf divisions. —*Myriophyllum verticillatum* .

8—floral bracts pectinately parted below becoming dentate in the middle and almost entire above, reddish, leaves well spaced on the stem and robust, generally with fewer than 10 leaf divisions. —*Myriophyllum quitense* .

### Key to the Potamogeton of British Columbia

1—submersed leaves with stipules adnate to the base of the leaf and forming a sheath around the stem, leaves thus not attached directly at the nodes.

2—submersed leaves 3-8 mm wide, 20-35 nerved, crowded on the sprawling stem, leaves minutely serrulate at the tip, common. —*Potamogeton robbinsii*.

2—submersed leaves less than 3 mm wide, 1-3 nerved, usually not crowded on the erect stem.

3—floating leaves may be present, adnate portion of the stipule up to 5 mm long and shorter than the free portion, rare. —*Potamogeton diversifolius*.

3—no floating leaves, adnate portion of the stipule over 5 mm long, subtends 1-2 nodes, and longer than the free portion, common and variable.—*Potamogeton pectinatus* .

1—stipules of the submersed leaves free of the leaves which are attached directly at the nodes.

4—submersed leaves lanceolate or broader (not filiform or linear).

5—submersed leaves petiolate, floating leaves present.

6—submersed leaves broad, folded and falcate and sometimes arcuate, over 22 nerves, common.—  
*Potamogeton amplifolius*.

6—submersed leaves not folded or falcate, fewer than 22 nerves.

7—width to length ratio of submersed leaves from 1 to 9 through 1 to 24, petiole of floating leaves longer than the blades, no interlacunar bundles, endodermis of 'O' cells. —*Potamogeton nodosus*.

7—width to length ratio of submersed leaves from 1 to 3 through 1 to 9, petiole of floating leaves shorter than the blades, interlacunar bundles present, endodermis of 'U' cells. —*Potamogeton illinoensis*.

5—submersed leaves sessile, floating leaves may be present.

8—submersed leaves clasping at the base, no floating leaves.

9—leaf margins serrulate, crispate, an obvious air chamber beside the midvein, leaves 3-12 mm wide, achene beak 2-3 mm long, plants generally of marginal or shallow water sites, stems somewhat flattened and less than 1 m long, introduced and locally abundant to weedy.—*Potamogeton crispus*.

9—leaf margins not serrulate or crispate, no air chambers beside the mid-vein, leaves over 10 mm wide, achene beak less than 1.5 mm long, plants often of open deep water, stems terete to slightly flattened and may exceed 4 m.

10—leaf margins entire, tip hooded, less than 8-nerved, stems zigzag, stipules persistent, leaves over 10 cm long and 2 cm wide, in deep open water with stems up to 4 m long, common.—  
*Potamogeton praelongus*.

10—leaf margins crisped, not hooded, over 10-nerved, not, or rarely a little, zigzag, stipule ephemeral; leaves rarely as much as 10 cm long or 2 cm wide, shallower water with stems not often over 1 m long, common and widespread throughout British Columbia.—*Potamogeton perfoliatus*.

8—submersed leaves narrowed at the base and not clasping, floating leaves may be present.

11—submersed leaves with over 9 nerves, stipules over 2.5 cm long, petiole of floating leaf is shorter than the blade, the width to length ratio of submersed leaves from 1 to 9 through 1 to 3, floating leaves present.—*Potamogeton illinoensis*.

11—submersed leaves up to 9-nerved, stipules and petiole of floating leaves various, width to length ratio of submersed leaves from 1 to 10 or narrower.

12—stipules thin and broadened basally, over 1.5 cm long, plant often reddish tinged, floating leaves gradually transitional to the 7-9 nerved submersed leaves, no interlacunar bundles, endodermis of 'O' cells.—*Potamogeton alpinus*.

12—stipules firm and persistent, sometimes under 1.5 cm long, plants green, floating leaves abruptly dissimilar to the submersed leaves which are 3-9 nerved, interlacunar bundles present, endodermis of 'O' cells, common, widespread and extremely variable.—*Potamogeton gramineus*.

4—submersed leaves linear or filiform (no broadened blade).

13—stems flattened and winged, more than half as wide as the leaves which are 2-5 mm wide, (10) 15-30 nerves, no floating leaves. —*Potamogeton zosteriformis*.

13—stems more or less terete and not winged, fewer than 13 nerves, floating leaves may be present.

14—submersed leaves over 2 mm wide, ~13 nerves, sessile, stipules membranous, floating leaves present, submersed leaves long and flaccid, collapsing and clumping when the plant is removed from the water.—*Potamogeton epibydrus*.

14—submersed leaves generally under 2 mm wide, fewer than 8 nerves.

15—submersed leaves usually well over 10 cm long, especially in *Potamogeton natans*, 1-nerved, deciduous by the time floating leaves and flowers appear, stipules usually over 4 cm long, especially in *Potamogeton natans*, floating leaves usually reddish, acute blade-to-petiole angle.

16—spikes 3-6 cm long, floating leaves 3-10 cm long and 2.5-6 cm wide, base of floating leaves usually cordate, side of fruit concave, stipules generally over 4 cm long, generally a large robust plant, common. —*Potamogeton natans*.

16—spikes 1-3 cm long, floating leaves 2-5 cm long and 1-3 cm wide, base of floating leaves may be rounded to wedged, side of fruit flat, stipules may be under 4 cm long, a small less robust plant, rare. —*Potamogeton oakesianus*.

15—submersed leaves under 10 cm long, persistent, nerves various, stipules under 4 cm long, no floating leaves.

17—paired nodal glands present.

18—stipules persistent, at least basally connate initially, under 2 cm long.

19—stems and peduncles flattened, leaves 1.5-3.5 mm wide, stipules whitish, fibrous and shredding.—*Potamogeton friesii*.

19—stems and peduncles terete, leaves 0.5-2.5 mm wide, stipules not whitish and fibrous, usually membranous.

20—leaves acute but not bristle tipped, rigid or revolute, stipule usually membranous, common and widespread throughout British Columbia.—*Potamogeton pusillus*.

20—leaves gradually tapering to bristle tips and rigidly revolute, stipule firm, rare.—*Potamogeton strictifolius*.

18—stipule deciduous, not connate, may be over 3 cm long.

21—stipules over 3 cm long, leaves up to 2 mm wide, leaf tips acute, common and widespread.—*Potamogeton pusillus*.

21—stipules up to 2 cm long, leaves over 2 mm wide, leaf tips obtuse or rounded, uncommon.—*Potamogeton obtusifolius*.

17—paired nodal glands absent.

22—stipules over 3 cm long, not connate, deciduous, widespread and very common.—*Potamogeton pusillus*.

22—stipules under 2 cm long, connate but often ruptured and shredded.

23—leaves not rigid or revolute, 1 to 5 nerved, peduncles up to 3 cm long, stipules may be firm and fibrous with persistent fibres or membranous and completely deciduous, the achenes have an undulate-toothed dorsal keel.—*Potamogeton foliosus*.

23—leaves gradually tapering to bristle tips and rigidly revolute, usually 3-nerved, peduncles thread-like and enlarged towards the tip, dorsal keel smooth or absent but not toothed, rare, found in a few scattered locations.—*Potamogeton strictifolius*.

### Key to the Aquatic Ranunculaceae of British Columbia

1—flowers white, submerged leaves dissected into ultimately filiform segments.

2—submerged leaves are sessile and hold their shape when removed from the water, no floating leaves present, flowers white.—*Ranunculus aquatilis* .

2—submerged leaves are petiolate and collapse when lifted from the water, floating leaves are present.

3—leaves 2-3 times divided into 8-12 ultimate segments, plants glabrous, 2-7 beakless achenes, pedicels only in the axils of ternately lobed floating leaves.—*Ranunculus lobbii* .

3—leaves many times divided into more than 20 ultimate segments, plant may be hairy, 10-20 short-beaked achenes, pedicels in the axils of floating and submerged leaves.—*Ranunculus aquatilis* .

1—flowers yellow, submerged leaves, if present, simple, lobed or ternately divided.

4—leaves simple and entire, linear to oblanceolate, tapered to the base, often found on bars or banks when water levels drop, spreads by 'runners' like a strawberry.—*Ranunculus flammula* .

4—leaves lobed, parted or ternately dissected to filiform segments.

5—leaves 3-5 times ternately dissected and up to 8 cm long, 30-80 achenes, stems fistulose and nodally rooting.—*Ranunculus flabellaris* .

5—leaves only lobed, notched or parted, leaves usually shorter and achenes may be fewer.

6—leaves deeply lobed or parted.

7—leaves 10-80 mm long, 30-80 achenes, the stems are fistulose and floating, recumbent or emergent.—  
*Ranunculus flabellaris* .

7—leaves 5-15 mm long, 15-50 achenes, the stems are not fistulose and are either floating or prostrate.—  
*Ranunculus hyperboreus* .

6—leaves apically crenulate or notched, cordate at the base. —*Ranunculus cymbalaria*.

### Key to the Sparganium of British Columbia

1—inflorescence usually branched, 2 (1) stigmas, the achenes truncate-pyriform and narrowed abruptly to the beak, large robust plants. —*Sparganium eurycarpum*.

1—inflorescence simple, 1 stigma, achenes fusiform and tapering to the beak.

2—leaves (2) 3-6 (9) mm wide, 1 (2) staminate heads, anthers 0.3-0.6 (0.8) mm long and half as wide, achene beak 1-1.5 mm long. —*Sparganium minimum*.

2—leaves usually over 6 mm wide, 2 or more staminate heads, anthers over 1.0 mm long or more than twice as long as wide, achene beak over 1.5 mm long.

3—achene beaks flattened and strongly curved, anthers up to 0.8 mm long.—*Sparganium fluctuans*.

3—achene beaks terete and not strongly curved, anthers at least 1.0 mm long.

4—inflorescence usually branched, stem erect and emergent from shallow water, leaves 8-15 mm wide, stigma 2 mm long, large robust plants. —*Sparganium eurycarpum*.

4—inflorescence simple, stem erect if emergent or lax if submersed and floating, leaves often less than 8 mm wide, stigma 1-1.5 mm long. —*Sparganium angustifolium*.

### Key to the Utricularia of British Columbia

1—leaves divided into ultimately terete or threadlike segments.

2—leaves divided into fewer than 5 final threadlike segments, leaf margins glabrous, bladders scarce on a small delicate plant usually floating at the surface or entangled in other rooted plants.—*Utricularia gibba* .

2—leaves 'pinnatifid', more than 20 terete final segments, hairy leaf margins, many bladders on the ordinary leaves, a robust plant to several meters long, usually lying on the sediment surface.—*Utricularia vulgaris* .

1—leaves divided di- or trichotomously into ultimately flattened segments.

3—ordinary leaves generally with a few bladders, leaf margins glabrous, the terminal leaf segments are acuminate.—*Utricularia minor* .

3—ordinary leaves rarely, if ever, with bladders which are found on separate subterranean branches, leaf margins hairy, the ultimate leaf segment tips are awned.—*Utricularia intermedia* .

## Notes on the Aquatic Plant Species of British Columbia

Not all of the plants on this list are native or naturalized in British Columbia. Some are garden or aquarium plants that are introduced from time to time but do not persist, or are in cultivation but do not survive long when they escape. Others are major invasive weeds in other parts of the world and, although they have not yet been found in British Columbia, they are expected. People deliberately or inadvertently introduce many aquatic plants and some of which do eventually become established. The following brief notes give an indication of the present status of native and introduced aquatic plants in British Columbia and their general distribution range.

*Acorus calamus* L.

This species includes *A. americanus* and is rare, found mostly in the southeast corner of BC.

*Agrostis aequivallis* (Trin.) Trin.

A native coastal grass species in BC.

*Agrostis idahoensis* Nash

A native coastal grass species in BC.

*Alisma gramineum* Gmel.

A native species found mostly in south-eastern BC, rarely on the coast

*Alisma plantago-aquatica* L.

A native species found right across southern BC, mostly below 52° latitude.

*Alopecurus aequalis* Sobol.

A common grass species throughout BC.

*Alopecurus geniculatus* L.

A fairly common grass species of southwestern BC, perhaps an introduction from Eurasia.

*Azolla filiculoides* Lam.

A rare species, apparently native, known from only a few widely scattered sites but with large populations where it is found. Commonly available in garden shops and aquatic plant nurseries.

*Beckmannia syzigachne* (Steud.) Fernald

A common grass species throughout BC, except on the coast.

*Berula erecta* (Huds.) Cov.

A native species but rarely collected from a few scattered sites in BC.

*Brasenia schreberi* Gmel.

A native species most common in the southwest but also known from other areas of BC.

*Butomus umbellatus* L.

A rare introduction known only from the Fraser Valley.

*Cabomba caroliniana* Gray

An commonly introduced aquarium and garden pond plant, sometimes dumped but not known to overwinter outdoors in BC.

*Calamagrostis stricta* (Timm) Koel.

A fairly common, widespread, grass species throughout BC. This is a morphologically variable species-complex.

*Calla palustris* L.

A native species generally found in north-central BC, but known from scattered sites in the south.

*Callitriche anceps* Fern.

A native species with only a few known scattered locations in BC.

*Callitriche hermaphroditica* L.

A fairly common native species, most prevalent in the southeast of BC.

*Callitriche heterophylla* Pursh

A common native species, most prevalent in the southwest of BC.

*Callitriche stagnalis* Scop.

A native species but rarely collected in the southern portion of BC.

*Callitriche verna* L.

A native species but rarely collected in the southern portion of BC.

*Caltha natans* Pallas

A boreal species found in the Peace River basin east of the Rockies.

*Caltha palustris* L.

Known primarily from coastal bogs and lake shores.

*Carex* L. sp.

A widespread and common native genus containing many marginal and wetland species.

*Catabrosa aquatica* (L.) Beauv.

A grass species not yet reported from BC but it may be expected in the southeast.

*Ceratophyllum demersum* L.

A native species very common throughout BC and a surfacing weed in eutrophic conditions.

*Ceratophyllum echinatum* Gray

A rare native species, not surfacing, and primarily confined to the extreme southwest corner of BC.

*Chara vulgaris* L.

Little data is available on the abundance and distribution of charophytes in BC.

*Chara canescens* Desv. and Lois.

Little data is available on the abundance and distribution of charophytes in BC.

*Chara globularis* Thuill.

Little data is available on the abundance and distribution of charophytes in BC.

*Chara braunii* Gm.

Little data is available on the abundance and distribution of charophytes in BC.

*Cicuta bulbifera* L.

A rarely collected native species known from scattered sites in BC.

*Cicuta douglasii* (DC.) Coult. and Rose

A common native species from scattered locations in BC.

*Decodon verticillatus* (L.) Ell.

An introduced species known from only a few scattered locations in BC.

*Distichlis spicata* (L.) Greene

A native grass species of south coastal and central BC in saline habitats.

*Dulichium arundinaceum* (L.) Briu.

A common native species in appropriate habitats, more prevalent on the coast.

*Echinochloa crusgalli* (L.) Beauv.

A common introduced grass species in southern BC.

*Egeria densa* Planch.

A rare and introduced species known only from a few sites in southwestern BC. It is naturalized and prolific where present and of concern as a weed displacing native species.

*Eichhornia crassipes* (Mart.) Solms

An often introduced garden pond species, but not yet known to overwinter outdoors in BC.

*Elatine triandra* Schkur.

A rarely collected small native species from a few scattered sites in BC.

*Eleocharis acicularis* (L.) R. and S.

A common native species more prevalent in the south.

*Eleocharis palustris* (L.) R. and S.

A common, native, variable, polyploid species complex throughout BC.

*Elodea canadensis* Rich.

A common native species throughout BC and of concern as a weed in some habitats.

*Elodea longivaginata* St. John

A rare species, if present, reported for the Fraser Valley but not confirmed or found recently.

*Elodea nuttallii* (Planch.) St. John

A rare native species in southern BC.

*Equisetum palustre* L.

A native species commonly found in subalpine lakes throughout BC.

*Equisetum fluviatile* L.

A common native species widespread throughout BC, often in extensive colonies.

*Eriophorum chamissonis* C. A. Mey.

A common native species throughout BC in cold bog habitats.

*Eriophorum polystachion* L.

A common native species throughout BC in cold bog habitats.

*Fontinalis antipyretica* L.

A fairly common native species in acidic lakes and thus most prevalent on the coast.

*Glyceria borealis* (Nash) Batchelder

A native grass species but not often collected in BC.

*Glyceria grandis* Wats.

A native grass species fairly common in southern BC.

*Glyceria leptostachya* Buckl.

A rare native grass species of coastal BC.

*Glyceria occidentalis* (Piper) J. C. Nels.

A rare native grass species of coastal BC.

*Glyceria striata* (Lam.) A. S. Hitch.

A fairly common grass species in southern BC, less common northwards.

*Gratiola ebracteata* Benth

A rarely collected small species from a few locations in BC.

*Gratiola neglecta* Torr.

A rarely collected small species from a few locations in BC.

*Neteranthera dubia* (Jacq.) Macmill.

A native species most common in the southeast of BC.

*Hippuris vulgaris* L.

A common native species widely distributed throughout BC.

*Hydrilla verticillata* (L.) Royle

This serious pest has not yet been found in BC. It is expected to overwinter and become a weed if introduced.

*Iris pseudacorus* L.

An introduced species and garden escape, found throughout southern BC.

*Isoetes* sp.

A common genus throughout southern BC, less frequent in the north.

*Juncus supiniformis* Engelm.

A fairly common species scattered throughout BC.

*Kobresia simpliciuscula* (Wahl.) Mackensie

A native species found throughout BC in appropriate habitats.

*Lagarosiphon major* Ridley

This weedy species is distributed as an aquarium plant but it has not yet been found out of cultivation in BC.

*Leersia oryzoides* (L.) Swartz

A rare grass species found in the Fraser Valley.

*Lemna gibba* L.

Rarely reported from the southwest of BC.

*Lemna minor* L.

A common native species throughout BC.

*Lemna trisulca* L.

A common native species throughout BC.

*Lilaea scilloides* (Poir.) Hauman

A rarely reported native coastal species of south and central BC.

*Lilaeopsis occidentalis* Coult. and Rose

This native species is fairly rare in the southwestern coastal area of BC.

*Limnophila sessiliflora* Blume

This weedy species is distributed as an aquarium plant but it has not yet been found out of cultivation in BC.

*Limosella aquatica* L.

This native species is uncommon and found only in suitable sites in the southern portion of BC.

*Limosella subulata* Ives.

This species is known from only 1 coastal site in BC.

*Lobelia dortmanna* L.

This native species is common in the southwest corner of BC and virtually unknown elsewhere.

*Ludwigia palustris* (L.) Ell.

This native species is most common in the southwest but there are scattered sites elsewhere.

*Lysichiton americanum* Hulten and St. John

A common species in BC but more prevalent on the coast.

*Lysimachia thyrsoflora* L.

This native species is uncommon in the southwest of BC and scattered elsewhere.

*Marsilea vestita* Hook. and Grev.

This fern is at the extreme of its range and known from only a few sites in the south-central interior of BC.

*Megalodonta beckii* Greene

This native species is most common in the southeast but it is also found in the southwest.

*Menyanthes trifoliata* L.

This native species is very common in the southwest but is found scattered throughout the rest of BC.

*Mimulus glabratus* H. B. K.

This species is not often collected from aquatic habitats in BC.

*Mimulus guttatus* D. C.

This native species is not often collected from aquatic habitats in BC.

*Montia fontana* L.

This species is rare in BC and few records have been reported.

*Myosotis laxa* Lehm.

This native species is quite common in scattered locations throughout BC.

*Myosotis scorpioides* L.

This native species is fairly common in scattered locations throughout BC.

*Myriophyllum aquaticum* (Vell. ) Verd.

This is an introduced subtropical species which has become naturalized in several locations in the Fraser Valley and survives below-freezing conditions.

*Myriophyllum farwellii* Morong

This is a native species found primarily in the southwest coast lakes but a few interior locations are known.

*Myriophyllum heterophyllum* Michx.

This introduced species is known only from garden ponds in the Fraser Valley and Victoria.

*Myriophyllum hippuroides* Nutt.

This apparently native species is widespread in the sloughs of the Fraser Valley but not known elsewhere.

*Myriophyllum quitense* H. B. K.

This species is apparently native but known from only a few lakes on Vancouver Island.

*Myriophyllum sibiricum* Kom.

This native species is common and widespread throughout all of BC (better known as *M. exalbescens*).

*Myriophyllum spicatum* L.

This introduced weed is now known from a number of sites right across southern BC, including Vancouver Island.

*Myriophyllum ussuriense* (Regel) Maxim.

This native species is rare and found across southern BC but only in a few suitable habitats where water levels drop in the summer to expose mud flats.

*Myriophyllum verticillatum* L.

This is a common native species found throughout BC.

*Najas flexilis* (Willd.) R. and S.

This native species is common and widespread throughout BC but more prevalent in the south.

*Nephrophyllidium crista-galli* (Menzies) Gilg

This native species is found in bogs and swamps and other suitable habitats, mostly on the coast.

*Nitella flexilis* (L.) Ag.

Very little data is available on the abundance and distribution of charophytes in BC.

*Nitella acuminata* A. Br.

Very little data is available on the abundance and distribution of charophytes in BC.

*Nitella clavata* Kutz.

Very little data is available on the abundance and distribution of charophytes in BC.

*Nitella furcata* (Roxb.) Ag.

Very little data is available on the abundance and distribution of charophytes in BC.

*Nitella gracilis* (Sm.) Ag.

Very little data is available on the abundance and distribution of charophytes in BC.

*Nuphar polysepalum* Engelm.

This native species is the most common aquatic plant in BC.

*Nuphar variegatum* Engelm.

This native species is common in eastern BC.

*Nymphaea mexicana* Zuccarini

The widespread introduction of garden varieties of *Nymphaea* has caused identification problems in this genus.

*Nymphaea odorata* Ait.

The widespread introduction of garden varieties of *Nymphaea* has caused identification problems in this genus.

*Nymphaea tetragona* Georgi

The widespread introduction of garden varieties of *Nymphaea* has caused identification problems in this genus.

*Nymphoides aquatica* (Gmelin) O. Kuntze

This species is found in garden ponds but has not yet been found naturalized.

*Nymphoides peltata* (Gmelin) O. Kuntze

This species is found in garden ponds but has not yet been found naturalized.

*Oenanthe sarmentosa* Presl

This native species is rarely collected in aquatic habitats.

*Paspalum distichum* L.

A grass species not yet reported from BC but to be expected in the southeast.

*Phalaris arundinacea* L.

A native grass species commonly found in southern BC.

*Phragmites communis* (L.) Trin.

Includes *P. australis* and is found scattered throughout BC, probably as an introduction.

*Phyllospadix scouleri* Hooker

A common native marine species of exposed rocky shores.

*Phyllospadix serrulatus* Rupr.

A common native marine species of sheltered coastal areas.

*Phyllospadix torreyi* S. Wats.

A rare native marine species of exposed rocky shores.

*Pilularia americana* R. Br.

An introduced fern known from only one site in the Fraser Valley.

*Pistia stratiotes* L.

This is a free-floating tropical species introduced in the aquarium and garden pool trade but it has not yet been found out of cultivation. It is not expected to overwinter in BC.

*Pleuropogon refractus* (Gray) Benth

A rarely found grass species from the southwest corner of BC.

*Polygonum amphibium* L.

This native species is common and widespread in BC.

*Polygonum hydropiper* L.

This native species is a marginal aquatic and is poorly collected in these habitats.

*Polygonum hydropiperoides* Michx.

This native species is a marginal aquatic and is poorly collected in these habitats.

*Polygonum lapathifolium* L.

This native species is a marginal aquatic and is poorly collected in these habitats.

*Pontederia cordata* Lour.

This introduced subtropical species is often found in garden pools and is known from one lakeshore site in the southwest where it has overwintered successfully for several years.

*Potamogeton alpinus* Balbis

A common native species throughout BC.

*Potamogeton amplifolius* Tucker.

A common native species throughout BC, more prevalent in the south.

*Potamogeton crispus* L.

An introduced species quite common in southern BC and rare in north and central areas.

*Potamogeton diversifolius* Raf.

This species has been reported but BC specimens or sites are unknown.

*Potamogeton epihydrus* Raf.

A native species most common in southern and coastal BC.

*Potamogeton foliosus* Raf.

A fairly common native species of southern BC, but rare on the coast.

*Potamogeton friesii* Rupr.

A widely scattered native species throughout the southern half of BC.

*Potamogeton gramineus* L.

A very common and widespread species throughout BC, morphologically diverse.

*Potamogeton illinoensis* Morong

A native species confined primarily to the southeast corner of BC.

*Potamogeton natans* L.

A very common and widespread species of the southern half of BC.

*Potamogeton nodosus* Poir.

A rare native species with scattered locations in southern BC.

*Potamogeton oakesianus* Robbins

A very rare species known from only two sites in southern BC.

*Potamogeton obtusifolius* Mertens and Koch

A rare native species with few scattered locations known from the southern half of BC.

*Potamogeton pectinatus* L.

Includes *P. filiformis* and *P. vaginatus* and is very common and widespread throughout BC.

*Potamogeton perfoliatus* L.

Includes *P. richardsonii*, a widespread native species and very common throughout BC.

*Potamogeton praelongus* Wulf.

A common native species throughout BC.

*Potamogeton pusillus* L.

Includes *P. berchtoldii*, a common native species throughout BC.

*Potamogeton robbinsii* Oakes

A common native species throughout the southern half of BC.

*Potamogeton strictifolius* Bennett

A rare species known from only 3 widely scattered southern lakes in BC.

*Potamogeton zosteriformis* Fern.

A common native species widely distributed throughout BC.

*Potentilla palustris* (L.) Scop.

This native species is a marginal plant common in coastal lakes and marshes.

*Puccinellia maritima* (Huds.) Parl.

A coastal grass species introduced from Europe to Washington State but not yet confirmed for BC

*Puccinellia pumila* (Vasey) A. S. Hitchcock

A fairly common coastal grass species in BC.

*Ranunculus aquatilis* L.

This is a very common and widespread species throughout BC.

*Ranunculus flabellaris* Raf.

Includes *R. gmelinii*, a native species known from a number of sites, primarily in southeastern BC.

*Ranunculus flammula* L.

This native species is very common and widespread throughout BC.

*Ranunculus hyperboreus* Rottb.

Includes *R. natans*, rare in BC, known from only a few sites in the southeast.

*Ranunculus lobbii* (Hiern.) Gray

This native species has been reported but no sites are known.

*Rhynchospora alba* (L.) Vahl.

A common native species more prevalent in the south west in appropriate habitats.

*Riccia fluitans* L.

This native liverwort is rarely collected or reported in aquatic habitats, but is known from a number of scattered sites in BC.

*Ricciocarpus natans* (L.) Corda

This native liverwort is rarely collected or reported in aquatic habitats, but is known from a number of scattered sites in BC.

*Rorippa nasturtium-aquaticum* (L.) S. and T.

This is watercress and has been introduced in a number of locations. It is known from all over BC and often found in ditches and roadside locations.

*Ruppia maritima* L.

A fairly common native species widely scattered throughout BC in suitable saline habitats, a highly variable species or species-complex.

*Sagittaria cuneata* Sheld.

A common native species found mostly in the southern portion of BC.

*Sagittaria latifolia* Willd.

A common native species, more prevalent in northern BC.

*Salvinia* sp.

An introduced tropical free-floating fern common in the aquarium and water garden trade, occasionally dumped but not yet known to overwinter in BC.

*Scheuchzeria palustris* L.

A rarely collected native species widely scattered throughout BC.

*Scirpus americanus* Pers.

A common native species of southwestern and southcentral BC.

*Scirpus fluviatilis* (Torr.) Gray

A rare native species in southwestern and southcentral BC.

*Scirpus heterochaetus* Chase

A rare species in BC, if present.

*Scirpus lacustris* L.

A common native species-complex throughout BC. Includes *S. validus*, *S. acutus* and *S. occidentalis*.

*Scirpus subterminalis* Torr.

An uncommon southcoastal native species in BC.

*Scolochloa festucacea* (Willd.) Link

A native grass species rarely found in the interior of BC.

*Sparganium angustifolium* Mich.

A highly variable species or species-complex native to BC, both common and widespread.

*Sparganium eurycarpum* Engelm.

A native species with a few widely scattered locations throughout BC.

*Sparganium fluctuans* (Morong) Robbins.

A rare species primarily found in southwestern BC.

*Sparganium minimum* Fries

Includes *S. hyrboreum* and *S. glomeratum*. A native species scattered throughout BC but more common in the southwest.

*Sium sauve* Walt.

This native species is quite common in coastal lakes and known from scattered locations around BC.

*Spartina patens* (Ait.) Muhl.

An introduced grass species of tidal mudflats.

*Spirodela polyrhiza* (L.) Schleid.

A common native species throughout BC, more prevalent in the south.

*Subularia aquatica* L.

This native species is quite common all across southern BC and on the coast.

*Tillaea aquatica* L.

This small native species is poorly collected in aquatic habitats in BC.

*Tolypella intricata* (Trent.) Leonh.

Very little data is available on the abundance and distribution of charophytes in BC.

*Trapa natans* L.

This species has not yet been found in BC but if introduced it should be able to overwinter and could become a pest.

*Triglochin maritimum* L.

A common native plant throughout the southern half of BC, less common northwards.

*Typha angustifolia* L.

A rare introduction to the Fraser Valley.

*Typha latifolia* L.

A very common, widespread, native species found throughout BC.

*Utricularia gibba* L.

This native species is rare and confined primarily to the southwest corner of BC.

*Utricularia intermedia* Hayne

This native species is fairly common in appropriate habitats across the southern part of BC and scattered elsewhere along the coast.

*Utricularia minor* L.

This native species is quite common in the southern half of BC with scattered locations elsewhere.

*Utricularia vulgaris* L.

This is a very common species in BC, widespread, but more prevalent in the south.

*Vallisneria spiralis* L.

Includes *V. americana* and is common throughout southern BC where introduced, but spreading and becoming a weed in some habitats.

*Veronica americana* Schw.

This small native species is poorly collected in aquatic habitats in BC; its distribution is not well known.

*Veronica anagallis-aquatica* L.

This small native species is poorly collected in aquatic habitats in BC; its distribution is not well known.

*Veronica catenata* Pennel

This small native species is poorly collected in aquatic habitats in BC; its distribution is not well known.

*Veronica scutellata* L.

This small native species is poorly collected in aquatic habitats in BC; its distribution is not well known.

*Wolffia borealis* (Engelm.) Landolt

This species is probably more common than its rare reports indicate. Found throughout BC but more prevalent in the south.

*Wolffia columbiana* Karsten

This species is probably more common than its rare reports indicate. Found throughout BC but more prevalent in the south.

*Wolffiella gladiata* Hegelm.

This species is probably more common than its rare reports indicate. Found throughout BC but more prevalent in the south.

*Zannichellia palustris* L.

A native species found primarily in southern BC and less common on the coast.

*Zizania aquatica* L.

Wild rice is introduced from time to time but has not yet become established. It could be expected in the southeast or the lower Fraser Valley.

*Zostera japonica* Ascher and Grabn.

An introduced marine species from Asia known only from the extreme southwest corner of BC.

*Zostera marina* L.

A common native marine species all along the west coast.

## Partial Synonymy of British Columbia Aquatic Plants

Many subspecific names and less important synonyms have been omitted to try and keep this list to a manageable size. Some list is necessary in order to make clear the authors philosophy with regard to what is a distinct species and what is reduced to a synonym. The basic philosophy is pragmatic and 'lumping' is the rule. Experience in the field indicates that many herbarium species are just that, herbarium species, and not distinct when viewed in the context of the field continuum where all the intermediate forms are apparent. In addition from a practical point of view, identification becomes an activity restricted to specialists when minor cultural differences are segregated out as distinct taxa.

*Acorus calamus* L.

*Acorus angustifolius* Schott

*Agrostis aequivalvis* (Trin) Trin.

*Agrostis canina* var. *aequivalvis* Trin.

*Deyeuxia aequivalvis* Benth

*Podagrostis aequivalvis* Scrib. and Merr.

*Agrostis idahoensis* Nash

*Agrostis tenuis* Vasey

*Agrostis tenuiculmis* Nash

*Alisma gramineum* Gmelin

*Alisma circinatum* var. *angustissimum* Lunell

*Alisma geyeri* Torrey

*Alisma gramineum* Lejone

*Alisma plantago* var. *angustifolium* Decandolle

*Alisma plantago* var. *angustissimum* Decandolle

*Alisma plantago* var. *graminifolia* Wahlenb.

*Alisma validum* Greene

*Alisma plantago-aquatica* L.

*Alisma brevipes* Greene

*Alisma lanceolatum* Withering

*Alisma michaletii* Ascher and Grabner

*Alisma plantago* L.

*Alisma subcordatum* Raf.

*Alisma trivialis* Pursh

*Alopecurus aequalis* Sobol.

*Alopecurus aristulatus* Michaux  
*Alopecurus caespitosus* Trin.  
*Alopecurus fulvus* Smith  
*Alopecurus geniculatus* ssp. *fulvus* Sonder  
*Alopecurus geniculatus* var. *aristulatus* Torrey  
*Alopecurus geniculatus* var. *natans* Wahlenb.  
*Alopecurus geniculatus* var. *robustus* Vasey  
*Tozzettia fulva* Lunell

*Alopecurus geniculatus* L.

*Alopecurus pallescens* Piper and Beattie  
*Tozzettia geniculatus* Bubani

*Azolla filiculoides* Lamarck

*Azolla rubra* R. Brown

*Beckmannia syzigachne* (Steud.) Fernald

*Beckmannia baicalensis* Hulten  
*Beckmannia erucaeformis* American authors but not (L.) Host.  
*Beckmannia erucaeformis* ssp. *baicalensis* Hulten  
*Beckmannia erucaeformis* ssp. *syzigachne* Breit.  
*Beckmannia erucaeformis* var. *baicalensis* Kuzn.  
*Panicum syzigachne* Steud.

*Berula erecta* (Hudson) Cov.

*Berula angustifolia* Mertens and Koch.  
*Berula pusilla* (Nuttall) Fernald  
*Sium angustifolium* L.  
*Sium erectum* Hudson  
*Sium pusillum* Nuttall

*Brasenia schreberi* Gmelin

*Brasenia peltata* Pursh  
*Brasenia purpurea* Casper  
*Hydropeltis purpurea* Michaux

*Butomus umbellatus* L.*Cabomba caroliniana* Gray*Calamagrostis stricta* (Timm) Koel.

*Calamagrostis crassiglumis* Thurb.  
*Calamagrostis inexpansa* Gray  
*Calamagrostis neglecta* var. *crassiglumis* Beal  
*Deyeuxia crassiglumis* Vasey

*Calla palustris* L.

*Callitriche anceps* Fernald

*Callitriche hermaphroditica* L.

*Callitriche autumnalis* L.

*Callitriche bifida* Morong.

*Callitriche palustris* var. *bifida* L.

*Callitriche heterophylla* Pursh

*Callitriche austini* Engelman

*Callitriche bolanderi* Hegelm.

*Callitriche deflexa* var. *austini* Hegelm.

*Callitriche palustris* var. *bolanderi* Jepson

*Callitriche stagnalis* Scopoli

*Callitriche verna* L.

*Callitriche androgyna* L.

*Callitriche palustris* L.

*Callitriche papuana* Merr. and Perry

*Callitriche vernalis* L.

*Callitriche vernalis* Kutz.

*Caltha natans* Pallas

*Caltha palustris* L.

*Caltha asarifolia* DC.

*Catabrosa aquatica* (L.) Beauv.

*Aira aquatica* L.

*Catapodium aquaticum* Trin.

*Colpodium aquaticum* Trin.

*Diarrhena aquatica* Raspail

*Glyceria airoides* Reichenb.

*Glyceria aquatica* Presl

*Glyceria catabrosa* Klett.

*Hydrochloa airoides* Hartm.

*Melica aquatica* Loisel.

*Molinia aquatica* Wibel

*Poa airoides* Koel.

*Ceratophyllum demersum* L.

*Ceratophyllum oxyacanthum* Chamisso

*Ceratophyllum echinatum* Gray*Ceratophyllum floridanum* Fasset*Ceratophyllum muricatum* Chammisso*Cicuta bulbifera* L.*Cicutaria bulbifera* Lamarck*Keraskomion bulbiferum* Raf.*Cicuta douglasii* (DC.) Coulter and Rose*Cicuta californica* Gray*Cicuta cincola* A. Nels*Cicuta fimbriata* Greene*Cicuta occidentalis* Greene*Cicuta purpurata* Greene*Cicuta subfalcata* Greene*Cicuta vagans* Greene*Chara vulgaris* L.*Chara contraria**Chara crassicaulis**Chara excelsa**Chara fetidissima**Chara foetida**Chara hypnoides**Chara inconnexa**Chara intumescens**Chara kieneri**Chara schaffneri**Chara tehua canescens**Chara canescens* Desv. and Lois.*Chara crinita**Chara evoluta**Chara hirsuta**Chara globularis* Thuill.*Chara aspera**Chara deliculata**Chara fragilis**Chara hedwigii**Chara leptosperma**Chara macounii**Chara pulchella**Chara verrucosa**Chara virgata*

*Chara braunii* Gm.

*Chara coronata*  
*Chara foliosa* Schweinitz  
*Chara pallida*  
*Chara schweinitzii*  
*Nitella coronata*

*Decodon verticillatus* (L.) Ell.

*Nesaea verticillata* (L.) Kunth

*Distichlis spicata* (L.) Greene

*Brizia spicata* Lam.  
*Brizopyrum americanum* Link  
*Brizopyrum boreale* Presl  
*Brizopyrum spicatum* Hooker and Arn.  
*Distichlis maritima* Raf.  
*Poa borealis* Kunth  
*Uniola spicata* L.

*Dulichium arundinaceum* (L.) Britton

*Cyperus arundinaceus* L.

*Echinochloa crusgalli* (L.) Beauv.

*Echinochloa colonum* var. *frumentaceum* Ridl.  
*Echinochloa frumentacea* Link  
*Echinochloa muricata* var. *occidentalis* Wieg.  
*Echinochloa occidentalis* Rydb.  
*Echinochloa pungens* var. *occidentalis* Fernald and Griscom  
*Echinochloa pungens* var. *wiegandii* Fassett  
*Echinochloa zeylayensis* Schult.  
*Milium crusgalli* Moench  
*Oplismenus frumentaceus* Kunth  
*Oplismenus zeylayensis* H. B. K.  
*Orthopogon crusgalli* Sprengler  
*Panicum crusgalli* L.  
*Panicum frumentaceum* Roxb.  
*Panicum grossum* Salisb.  
*Pennisetum crusgalli* Baumg.

*Egeria densa* Planchon

*Anacharis densa* Marie-Victorin  
*Philotria densa* (Planchon) Small

*Eichhornia crassipes* (Martius) Solms.*Alsinastrum brachyspermum* Greene*Eichhornia speciosa**Heteranthera formosa* Miq.*Piaropus crassipes* Britton*Pontederia azurea* Hooker*Pontederia crassipes* Martius*Pontederia elongata* J. A. Balfour*Elatine triandra* Schkuhr.*Elatine americana* Arn.*Elatine brachysperma* Gray*Elatine chilensis* C. Gray*Elatine gracilis* Mason*Elatine heterandra* Mason*Elatine minima* (Nuttall) Fisch. and Mey.*Elatine obovata* (Fass.) Mason*Elatine rubella* Rydb.*Peplis americana* Pursh*Eleocharis acicularis* (L.) Roem. and Schultes*Clavula acicularis* Dumort*Eleocharis bella* (Piper) Svenson*Eleocharis lindheimeri* Svenson*Eleocharis radicans* (Poiret) Kunth*Eleocharis reverchonii* Svenson*Eleocharis rivularis* Philippi.*Isolepis acicularis* Schlecht.*Limnochloa acicularis* Reich.*Mariscus acicularis* Moench.*Scirpidium aciculare* Nees.*Scirpus acicularis* L.*Scirpus radicans* Poiret*Scirpus uliginosus* C. Koch.

*Eleocharis palustris* (L.) R. and S.

*Bulbostylus palustris* Steven  
*Clavula palustris* Dumort  
*Clavula uniglumis* Dumort  
*Eleocharis calva* Torrey  
*Eleocharis erythropoda* Steud.  
*Eleocharis fallax*  
*Eleocharis macrostachya* Britton  
*Eleocharis mamillata*  
*Eleocharis smallii* Britton  
*Eleocharis uniglumis* Schultes  
*Eleocharis xyridiformis* Fernald and Brack.  
*Scirpus mamillatus* Lindb.  
*Scirpus palustris* L.  
*Scirpus uniglumis* Link  
*Trichophyllum palustre* Farw.

*Elodea canadensis* Rich.

*Anacharis alsinastrum* Babington  
*Anacharis canadensis* Planchon  
*Anacharis planchonii* Rydberg  
*Elodea canadensis* Michaux  
*Elodea ioensis* Wylie  
*Elodea iowensis* Wylie  
*Elodea latifolia* Caspary  
*Elodea planchonii* Caspary  
*Philotria angustifolia* (Muhl.) Britton  
*Philotria canadensis* Britton  
*Philotria iowensis* Wylie  
*Philotria linearis*  
*Philotria planchonii* Rydberg  
*Serpicula canadensis* Eaton  
*Serpicula occidentalis* Pursh  
*Udora canadensis* Nuttall

*Elodea longivaginata* St. John*Elodea nuttallii* (Planchon) St. John

*Anacharis nuttallii* Planchon  
*Anacharis occidentalis* Marie-Victorin  
*Elodea columbiana* St. John  
*Elodea occidentalis* St. John  
*Philotria minor* (Engelmann) Small  
*Philotria nuttallii* Rydberg  
*Philotria occidentalis* House  
*Serpicula occidentalis* Pursh

*Equisetum fluviatile* L.

*Equisetum limosum* L.

*Equisetum palustre* L.

*Eriophorum chamissonis* C. A. Mey.

*Eriophorum altaicum* var. *neoeum* Raymond

*Scirpus chamissonis* T. Koyama

*Eriophorum polystachion* L.

*Eriophorum angustifolium* Honck.

*Eriophorum latifolium* var. *viridicarinatum* Engelman

*Eriophorum ocreatum* A. Nels.

*Eriophorum viridicarinatum* (Engelman) Fernald

*Linagrostis polystachia* Scop.

*Fontinalis antipyretica* L.

*Fontinalis trifaria* Volt.

*Hypnum antipyreticum* Necker.

*Pilotrichum antipyreticum* C. Mull.

*Glyceria borealis* (Nash.) Batchelder

*Glyceria fluitans* var. *angustata* Vasey

*Panicularia borealis* Nash.

*Glyceria grandis* S. Wats.

*Glyceria americana* Pammel.

*Glyceria flavescens* M. E. Jones

*Glyceria maxima* ssp. *grandis* Hulten

*Glyceria maxima* var. *grandis* Breit.

*Panicularia americana* Macmill.

*Panicularia grandis* Nash.

*Poa aquatica* var. *americana* Torrey

*Glyceria leptostachya* Buckl.

*Panicularia leptostachya* Piper

*Glyceria occidentalis* (Piper) J. C. Nels.

*Panicularia occidentalis* Piper

*Glyceria striata* (Lam.) A. S. Hitch.  
*Briza canadensis* Nuttall  
*Glyceria michauxii* Kunth  
*Glyceria nervata* Trin.  
*Glyceria rigida* Rydb.  
*Panicularia nervata* Kuntze  
*Panicularia rigida* Rydb.  
*Panicularia striata* A. S. Hitch.  
*Poa lamarckii* Kunth  
*Poa lineata* Pers.  
*Poa nervata* Willdenom  
*Poa striata* Lam.  
*Poa striata* Michx.  
*Poa sulcata* R. and S.

*Gratiola ebracteata* Benth

*Gratiola neglecta* Torrey  
*Gratiola virginiana* (western American Authors, but not L.)

*Heteranthera dubia* (Jacquin) Macmill.  
*Commelina dubia* Jacquin  
*Heteranthera graminea* Vahl  
*Phrynium dubium* Farwellii  
*Schollera dubia* O. Ktze.  
*Scollera graminea* Gray  
*Zosterella dubia* Small

*Hippuris vulgaris* L.  
*Hippuris flaviatilis* Hoffm.  
*Hippuris maritima* Hellenius  
*Hippuris montana* Ledeb.  
*Hippuris tetraphylla* L.

*Hydrilla verticillata* (L.) Royle  
*Hydrilla alternifolia* Miquel  
*Hydrilla dentata* Caspary  
*Hydrilla ovalifolia*  
*Hydrilla verticillata* (L.) Presl  
*Hydrilla verticillata* (L.) Caspary  
*Serpicula verticillata* L.

*Iris pseudacorus* L.

*Isoetes* L.

*Juncus supiniformis* Engelmann

*Juncus oreganus* S. Watson

*Kobresia simpliciuscula* (Wahl.) Mackenzie

*Carex simpliciuscula* Wahl.

*Elyna caricina* Mertens and Koch

*Kobresia caricina* Willdenom

*Lagarosiphon* Harvey

*Lagarosiphon major* (Ridley) Moss

*Elodea crispa* Hort.

*Lagarosiphon muscoides* Harvey var. *major* Ridley

*Leersia oryzoides* (L.) O. Swartz

*Asprella oryzoides* Lamarck

*Ehrhartia clandestina* Web.

*Homalocenchrus oryzoides* Poll.

*Laertia oryzoides* Gromow.

*Leersia asperrima* Willdenom

*Oryza clandestina* A. Brown

*Oryza oryzoides* Brand.

*Phalaris oryzoides* L.

*Lemna gibba* L.

*Lemna minor* L.

*Hydrophace minor* Bubani

*Lemna obscura* (Aust.) Daubs.

*Lemna turionifera* Landolt

*Lemna trisulca* L.

*Hydrophace trisulca* Bubani

*Staurogeton trisulcus* Schur.

*Lilaea scilloides* (Poir.) Hauman

*Anthericum scilloides* Schultes

*Heterostylus gramineus* Hooker

*Lilaea subulata* Humboldt and Bonpland

*Phalangium scilloides* Poiret

*Lilaeopsis occidentalis* Coulter and Rose

*Crantziola occidentalis* (Coulter and Rose) Koso-Polinsky

*Lilaeopsis lineata* var. *occidentalis* (Coulter & Rose) Jepson

*Limnophila sessiliflora* Blume  
*Ambulia sessiliflora*

*Limosella aquatica* L.  
*Limosella acaulis* Sesse and Mocino

*Limosella subulata* Ives.

*Lobelia dortmanna* L.  
*Dortmanna lacustris* G. Don.  
*Lobelia lacustris* Salisb.  
*Rapuntium dortmanna* Presl

*Ludwigia palustris* (L.) Eli.  
*Dantia palustris* Petit.  
*Isnardia intermedia*  
*Isnardia palustris* L.  
*Isnardia repens*  
*Ludwigia apetala* Walter  
*Ludwigia natans* Ell.  
*Ludwigia repens* Forster

*Lysichiton americanum* Hulten and St. John

*Lysimachia thyrsoflora* L.  
*Naumbergia guttatus* Moench  
*Naumbergia thyrsoflora* Duby  
*Naumbergia thyrsoflora* Reichb.

*Marsilea vestita* Hooker and Grev.  
*Marsilea longipes* Austin  
*Marsilea mucronata* A. Brown  
*Marsilea oligospora* Gooding  
*Zaluzanskya vestita* O. Ktze.

*Megalodonta beckii* Greene  
*Bidens beckii* Torrey  
*Megalodonta remota* Greene

*Menyanthes trifoliata* L.

*Mimulus glabratus* H. B. K.

*Mimulus geyeri* Torrey  
*Mimulus jamesii* T. and G.  
*Mimulus guttatus* Decandolle  
*Mimulus bakeri* Gand.  
*Mimulus decorus* Suksd.  
*Mimulus grandiflorus* Howell  
*Mimulus grandis* Heller  
*Mimulus hallii* Greene  
*Mimulus hirsutus* Howell  
*Mimulus langsdorfii* Donn.  
*Mimulus laxus* Pennell  
*Mimulus longulus* Greene  
*Mimulus luteus* Greene  
*Mimulus microphyllus* Bentham  
*Mimulus nasutus* Greene  
*Mimulus puberulus* Gand.  
*Mimulus puncticalyx* Gand.  
*Mimulus rivularis* Nuttall  
*Mimulus scouleri* Hooker  
*Mimulus thermalis* A. Nels

*Montia fontana* L.

*Claytonia fontana* Davis  
*Claytonia hallii* Gray  
*Montia dipetala* Suksd.  
*Montia humilis* Suksd.  
*Montia lamprosperma* Chammissso  
*Montia minor* K. C. Gmelen

*Myosotis laxa* Lehm.

*Myosotis caespitosa* var. *laxa* Decandolle  
*Myosotis palustris* ssp. *laxa* Hegi  
*Myosotis palustris* var. *laxa* Gray

*Myosotis scorpioides* L.

*Myosotis palustris* Lamarck  
*Myosotis palustris* Withering

*Myriophyllum aquaticum* (Vell.) Verd.

*Herpestes reflexa* Moenk.  
*Myriophyllum brasiliense* Cambessedes  
*Myriophyllum proserpinacoides* Gill.

*Myriophyllum farwellii* Morong.

*Myriophyllum heterophyllum* Michx.

*Myriophyllum hippuroides* Nuttall

*Myriophyllum mexicanum* S. Watson

*Myriophyllum scabratum* C. and S.

*Myriophyllum quitense* H. B. K.

*Myriophyllum chiquitense* Meyen.

*Myriophyllum elatinoides* Gaud.

*Myriophyllum ternatum* Gaud.

*Myriophyllum titikakense* Remy

*Myriophyllum viridescens* Gill.

*Myriophyllum sibiricum* Kom.

*Myriophyllum exalbescens* Fernald

*Myriophyllum magdalense*

*Myriophyllum spicatum* L. ssp. *exalbescens* Hulten

*Myriophyllum spicatum* L. var. *exalbescens* Jepson

*Myriophyllum spicatum* L.

*Myriophyllum ussuriense* (Regel) Maxim.

*Myriophyllum japonicum*

*Myriophyllum verticillatum* L.

*Myriophyllum limosum* Hect.

*Myriophyllum siculum* Gusonne

*Myriophyllum spicatum* Gmelin

*Najas flexilis* (Willd.) R. and S.

*Caulinia flexilis* (Willdenom) R. and S.

*Najas caespitosus* (Maguire) Reveal

*Najas canadensis* Michx.

*Nephrophyllidium crista-galli* (Menzies) Gilg

*Menyanthes crista-galli* Menzies

*Nitella flexilis* (L.) Ag.

*Acinaria coccifera*

*Nitella californica*

*Nitella laxa*

*Nitella mexicana*

*Nitella monodactyla*

*Nitella montana*

*Nitella opaca*

*Nitella spanioclema*

*Nitella acuminata* A. Br.

*Acinaria flexuosa*  
*Chara globerulifolia*  
*Nitella belangeri*  
*Nitella blankinshipii*  
*Nitella glomerulifera*  
*Nitella gollmeriana*  
*Nitella lindheimeri*  
*Nitella missouriensis*  
*Nitella occidentalis*  
*Nitella stellaris*  
*Nitella subglomerata*  
*Nitella subspicata*

*Nitella clavata* Kutz.

*Chara clavata*  
*Nitella dilatata*

*Nitella furcata* (Roxb.) Ag.

*Chara capitata*  
*Chara elliotii*  
*Leiacina capitata*  
*Nitella capitellata*  
*Nitella dictyosperma*  
*Nitella flabellata*  
*Nitella glaziovii*  
*Nitella megacarpa*  
*Nitella microcarpa*  
*Nitella mucronata*  
*Nitella oligospira*  
*Nitella pygmaea*

*Nitella gracilis* (Sm.) Ag.

*Nitella annularis*  
*Nitella asagrayana*  
*Nitella batrachosperma*  
*Nitella confervacea*  
*Nitella intermedia*  
*Nitella leibergia*  
*Nitella maxceana*  
*Nitella morongii*  
*Nitella nordstedtiana*

*Nuphar polysepalum* Engelm.*Nuphar lutea* (L.) Sibth. & Smith ssp. *polysepalum* (Engelmann) E. O. Beal*Nuphar luteum* ssp. *polysepalum* (Engelmann) E. O. Beal*Nymphaea polysepala* (Engelmann) Greene*Nymphozanthes polysepalus* Fernald*Nuphar variegatum* Engelm.*Nuphar advena* ssp. *variegatum* R T. Clausen*Nuphar americanum* Provincial Flora of Canada.*Nuphar lutea* (L.) Sibth. and Smith ssp. *variegatum* (Engelmann) E. O. Beal*Nuphar luteum* ssp. *variegatum* E. O. Beal*Nymphaea advena* Ait. var. *variegata* (Engelmann) Fernald*Nymphaea americana* Mill. and Standl.*Nymphaea variegata* (Engelmann) Fernald*Nymphaea variegata* Mill.*Nymphozanthus variegatus* Fernald*Nymphaea* L.*Castalia* Salish.*Nymphaea alba* L.*Nymphaea mexicana* Zuccarini*Nymphaea flava* Leitn.*Nymphaea odorata* Ait.*Castalia lekophylla* Small*Castalia minor* (Sims) Decandolle*Castalia odorata* Greene*Castalia tuberosa* (Paine) Greene*Leuconymphaea odorata* Macmill.*Nuphar odorata* f. *rubra* Guillon*Nymphaea lekophylla* (Small) Cory*Nymphaea spiralis* Raf.*Nymphaea tuberosa* Paine*Nymphaea tetragona* Georgi*Castalia leibergi* Morong.*Castalia tetragona* Laws*Nymphoides aquatica* (Gmelin) O. Kuntze*Nymphoides* (Walter) O. Kuntze*Nymphoides peltata* (Gmelin) O. Kuntze*Limnanthemum peltatum* Gmelin

*Oenanthe sarmentosa* Presl

*Paspalum distichum* L.

*Digitaria disticha* Fiori and Paol.

*Milium distichum* Muhl.

*Phalaris arundinacea* L.

*Arundo colorata* Ait.

*Arundo riparia* Salish.

*Baldingera arundinacea* Durn.

*Baldingera colorata* Gaertn.

*Calamogrostis variegata* Withering

*Digraphis americana* Ell.

*Digraphis arundinacea* Trin.

*Endallex arundinacea* Raf.

*Phalaridantha arundinacea* St. Lager

*Phalaris americana* var. *picta* Eaton and Wright

*Typhoides arundinacea* Moench

*Phragmites communis* (L.) Trin.

*Arundo palustris* Salish.

*Arundo phragmites* L.

*Arundo vulgaris* Lamarck

*Cynodon phragmites* Raspail.

*Oxyanthe phragmites* Nieuwl.

*Phragmites australis* (Cav.) Trin.

*Phragmites communis* Trin.

*Phragmites maximus* (Forsk.) Chiov. var. *berlanderi* (Fourn.) Moldenke.

*Phragmites phragmites* Karst.

*Phragmites vulgaris* Crep.

*Trichoon phragmites* Rendle

*Phyllospadix scouleri* Hooker

*Phyllospadix serrulatus* Rupr.

*Phyllospadix torreyi* S. Wats.

*Pilularia americana* R. Brown

*Calamistrum americanum* Kutze

*Pistia stratiotes* L.

*Pleuropogon refractus* (Gray) Bentham

*Lophochlaena refractus* Gray

*Polygonum amphibium* L.

*Persicaria chelanica* Greene  
*Persicaria coccinea* Greene  
*Persicaria cusickii* Greene  
*Persicaria emersa* Small  
*Persicaria fluitans* Greene  
*Persicaria hartwrightii* Greene  
*Persicaria muhlenbergii* (Meisn.) Small  
*Persicaria natans* Moldenke  
*Persicaria oregana* Greene  
*Persicaria rigidula* Greene  
*Persicaria villosula* Greene  
*Polygonum amphibium* Jepson  
*Polygonum chelanicum* Fedde  
*Polygonum coccineum* Muhl.  
*Polygonum cusickii* Fedde  
*Polygonum emersum* Britton  
*Polygonum fluitans* Eaton  
*Polygonum hartwrightii* Gray  
*Polygonum muhlenbergii* S. Watson  
*Polygonum natans* Eaton  
*Polygonum nebraskense* Greene  
*Polygonum oreganum* Fedde  
*Polygonum rigidulum* Sheld.  
*Polygonum terrestre* B. S. P.  
*Polygonum villosulum* Fedde

*Polygonum hydropiper* L.

*Persicaria hydropiper* Opiz.

*Polygonum hydropiperoides* Michx.

*Persicaria hydropiperoides* Small  
*Persicaria opelousanum* Small  
*Persicaria paludicola*  
*Persicaria setacea* Small  
*Polygonum fusiforme* Greene  
*Polygonum opelousanum* Ridd.  
*Polygonum setaceum* Baldwin

*Polygonum lapathifolium* L.*Persicaria lapathifolium* s. F. Gray*Persicaria tomentosa* Bicknell*Polygonum incanum* Schmidt.*Polygonum nodosum* Pers.*Polygonum persicaria* var. *incanum* Meisn.*Polygonum persicaria* var. *lapathifolium* Meisn.*Polygonum scabrum**Polygonum tomentosum* Schrank.*Pontederia cordata* Lour.*Pontederia lanceolata* Nuttall*Pontederia sagittata* Seubert*Potamogeton alpinus* Balbis.*Potamogeton lucens* Michaux*Potamogeton microstachys* var. *subellipticus* Fernald*Potamogeton montanense* Gand.*Potamogeton tenuifolius* Raf.*Potamogeton amplifolius* Tucker.*Spirillus amplifolius* Nieuwl.*Potamogeton crispus* L.*Buccaferrea crispata* Bubani*Potamogeton diversifolius* Raf.*Potamogeton bicipulatus* Fernald*Potamogeton capillaceus* Poiret*Potamogeton dimorphus* (California authors)*Potamogeton dimorphus* Raf.*Potamogeton hybridum* Michaux*Potamogeton spirillus* Tucker.*Spirillus diversifolius* Nieuwl.*Potamogeton epihyrus* Raf.*Potamogeton nuttallii* C. and S.

*Potamogeton foliosus* Raf.

- Potamogeton californicus* Piper
- Potamogeton californicus* Morong.
- Potamogeton curtissi* Morong.
- Potamogeton fibrillosus* Fernald
- Potamogeton foliosus* Morong.
- Potamogeton gramineum* Michaux
- Potamogeton niagarensis* Tucker.
- Potamogeton pauciflorus* Gray
- Potamogeton pauciflorus* Pursh
- Spirillus foliosus* Lunell.
- Spirillus foliosus* (Raf.) Nieuwl.

*Potamogeton friesii* Rupr.

- Potamogeton compressus* Graeb.
- Potamogeton compressus* Oeder.
- Potamogeton major* (Fries.) Morong.
- Potamogeton mucronatus* Schrad.
- Potamogeton oderec* Meyer
- Spirillus friesii* Nieuwl.

*Potamogeton gramineus* L.

- Potamogeton heterophyllus* Jepson
- Potamogeton heterophyllus* Morong.
- Potamogeton heterophyllus* Nieuwl.
- Potamogeton heterophyllus* Schreber
- Potamogeton spathulaeformis* Morong.
- Spirillus heterophyllus* Nieuwl.

*Potamogeton illinoensis* Morong'

- Potamogeton angustifolius* C. and S.
- Potamogeton lucens* (American authors)
- Potamogeton zizii* (American authors)
- Potamogeton zizii* Nieuwl.
- Spirillus lucens* Nieuwl.
- Spirillus zizii* Nieuwl.

*Potamogeton natans* L.

- Buccaferea natans* Bubani
- Spirillus natans* Nieuwl.

*Potamogeton nodosus* Poiret

- Potamogeton americanus* Chammisso and Schlect.
- Potamogeton americanus* var. *novaeboracensis* Bennett
- Potamogeton fluitans* Tucker.
- Potamogeton indicus* Roxb.
- Potamogeton insulanus* Hagstr.
- Potamogeton lonchites* Tuckerman
- Potamogeton mexicanus* Benn.
- Potamogeton montanus* Presl
- Potamogeton occidentalis* Sieber.
- Potamogeton rotundatus* Hagstr.
- Spirillus lonchites* (Tucker.) Nieuwl.

*Potamogeton oakesianus* Robbins.*Potamogeton obtusifolius* Mertens and Koch.

- Potamogeton compressus* Roth.
- Spirillus obtusifolius* (Mertens and Koch.) Nieuwl.

*Potamogeton pectinatus* L.

- Buccaferrea pectinata* Bubani
- Potamogeton borealis* Raf.
- Potamogeton columbianus* Suksd.
- Potamogeton filiformis* Persoon
- Potamogeton flabellatus* Bab.
- Potamogeton interruptus* Kit.
- Potamogeton interior* Rydberg
- Potamogeton marianus* var. *macounii* Morong
- Potamogeton marianus* var. *occidentalis* Robbins
- Potamogeton moniliformis* St. John
- Potamogeton vaginatus* Turcz.
- Spirillus filiformis* Nieuwl.

*Potamogeton perfoliatus* L.

- Potamogeton bupleuroides* Fernald
- Potamogeton richardsonii* (Bennett) Rydberg
- Spirillus perfoliatus* var. *richardsonii* Nieuwl.

*Potamogeton praelongus* Wulf.

- Spirillus praelongus* Nieuwl.

*Potamogeton pusillus* L.

*Buccaferrea pusilla* Bubani  
*Potamogeton berchtoldii* Fieb.  
*Potamogeton gemmiparus*  
*Potamogeton lacunatus* Hagstr.  
*Potamogeton lateralis* Morong  
*Potamogeton panormitanus* Biv.  
*Potamogeton panormitanus* Fernald  
*Potamogeton pusillus* Fernald  
*Potamogeton pusillus* (American authors)  
*Potamogeton tenuissimus* (Mertens and Koch) Reichen  
*Spirillus pusillus* Nieuwl.

*Potamogeton robbinsii* Oakes

*Spirillus robbinsii* Nieuwl.

*Potamogeton strictifolius* Bennett

*Potamogeton pusillus* N. Taylor  
*Potamogeton rutilus* Morong.

*Potamogeton zosteriformis* Fernald

*Potamogeton compressus* (American authors)  
*Potamogeton zasterifolius* (American authors)

*Potentilla palustris* (L.) Scopoli

*Comarum palustre* L.  
*Fragaria palustris* Crantz.  
*Potentilla palustris* var. *villosus* Lehm.

*Puccinellia maritima* (Huds.) Parl.

*Atropis distans* var. *maritima* Coss. and Dur.  
*Diachroa maritima* Nuttall  
*Festuca distans* var. *maritima* Mutel  
*Glyceria maritima* Wahlb.  
*Panicularia maritima* Scribn.  
*Poa maritima* Huds.  
*Sclerochloa arenaria* var. *maritima* Gray  
*Sclerochloa maritima* Lindl.

*Puccinellia pumila* (Vasey) A. S. Hitchc.*Atropis alaskana* Krecz.*Atropis paupercula* Krecz.*Glyceria paupercula* Holm*Glyceria paupercula* Fernald and Weatherby*Glyceria pumila* Vasey*Puccinellia alaskana* Scribn. and Merr.*Puccinellia angustata**Puccinellia langeana* ssp. *alaskana* Sorens.*Puccinellia paupercula* var. *alaskana* Fernald and Weatherby*Ranunculus aquatilis* L.*Batrachium aquatile* (L.) Dumortier*Batrachium bakeri* Greene*Batrachium confervoides* Fries*Batrachium drouetii* (F. Schultz) Nym.*Batrachium flaccidum* (Persoon) Rupr.*Batrachium longirostre* Schultz.*Batrachium porteri* Rydberg*Batrachium trichophyllum* Schultz.*Batrachium trichophyllum* (Chaix.) Bosch.*Ranunculus amphibius* Benson*Ranunculus capillaceus* Thuill.*Ranunculus circinatus* Gray*Ranunculus circinatus* SiLth.*Ranunculus codyanus* Boivin*Ranunculus grayanus* Freyn.*Ranunculus heterophyllum* Weber*Ranunculus longirostris* Godr.*Ranunculus porteri* Britton*Ranunculus subrigidus* W. Drew*Ranunculus trichophyllum* Chaix.*Ranunculus flabellaris* Raf.*Ranunculus delphinifolius* Torrey*Ranunculus fluviatilis* Bigel.*Ranunculus gmelinii* Decandolle*Ranunculus limosus* Nuttall*Ranunculus multifidus* Pursh*Ranunculus purshii* Richard

*Ranunculus flammula* L.

- Ranunculus filiformis* Michaux
- Ranunculus intermedius* Heller
- Ranunculus microlonchus* Greene
- Ranunculus reptans* L.
- Ranunculus samolifolius* Greene
- Ranunculus unalaschensis* Besser

*Ranunculus hyperboreus* Rottb.

- Ranunculus hyperboreus* var. *natans* Regel
- Ranunculus intertextus* Greene
- Ranunculus natans* C. A. Meyer

*Ranunculus lobbii* (Hiern.) Gray

- Batrachium lobbii* Howell
- Ranunculus aquatilis* var. *lobbii* S. Watson
- Ranunculus hederaceus* var. *lobbii* Drew. and S. Watson

*Rhynchospora alba* (L.) Vahl.

- Dichromena alba* Macbride
- Phaeocephalum album* House
- Schoenus albus* L.
- Triodon albus* Farwell

*Riccia fluitans* L.

- Ricciella fluitans* A. Brown

*Ricciocarpus natans* (L.) Corda

- Riccia natans* L.

*Rorippa nasturtium-aquaticum* (L.) S. and T.

- Nasturtium officinale* R. Brown
- Radicula nasturtium-aquaticum* Britton and Rendl.
- Sisymbrium nasturtium-aquaticum* L.

*Ruppia maritima* L.

- Buccaferea maritima* Lunell.
- Ruppia cirrhosa* (Petagna) Grande
- Ruppia curvicarpa* A. Nels.
- Ruppia occidentalis* S. Watson
- Ruppia pectinata* Rydberg
- Ruppia rostellata* Koch.
- Ruppia spiralis* Dumort
- Ruppia spiralis* L.

*Sagittaria cuneata* Sheld.

*Sagittaria arifolia* Nuttall  
*Sagittaria paniculata* Blank  
*Sagittaria sagittifolia* var. *minor* Pursh  
*Sagittaria suksdorfii* Gand.

*Sagittaria latifolia* Willdenom

*Sagittaria esculenta* Howell  
*Sagittaria gracilis* Pursh  
*Sagittaria hastata* Pursh  
*Sagittaria latifolia* Nieuwl.  
*Sagittaria macrophylla* Zuccarini  
*Sagittaria obtusa* Muhl.  
*Sagittaria ornithorhyncha* Small  
*Sagittaria planipes*  
*Sagittaria pubescens* Muhl.  
*Sagittaria sagittaeifolia* var. *variabilis* Micheli  
*Sagittaria sagittifolia* var. *gracilis* Torrey  
*Sagittaria sagittifolia* var. *hastata* Torrey  
*Sagittaria sagittifolia* var. *macrophylla* Hooker  
*Sagittaria sagittifolia* var. *vulgaris* Hooker  
*Sagittaria variabilis* Engelm.

*Salvinia* Seguiet

*Salvinia* Adanson  
*Salvinia* L.

*Salvinia auriculata* Aublet

*Marsilea natans* L.  
*Salvinia biloba* Raddi.  
*Salvinia elegans*  
*Salvinia europea*  
*Salvinia herzogii* de la Sota  
*Salvinia hispida* HBD  
*Salvinia minima* Bak.  
*Salvinia natans* (L.) Allioni  
*Salvinia oblongifolia* Martius  
*Salvinia rotundifolius* Willdenom  
*Salvinia sprengeli*  
*Salvinia sprucei* Kuhn.  
*Salvinia vulgaris*

*Salvinia cacullata* Roxb.*Salvinia molesta* D.S. Mitchell

*Salvinia auriculata* Auctt.

*Scheuchzeria palustris* L.

*Scheuchzeria americana* G. N. Jones

*Scirpus americanus* Persoon

*Heleogiton pungens* Reichb.

*Heleophylax americanus* Schinz. and Thell.

*Schoenoplectus pungens* Palla

*Scirpus longispicatus* Smyth.

*Scirpus monophyllus* Presl

*Scirpus pungens* Vahl

*Scirpus fluviatilis* (Torrey) Gray

*Scirpus maritimus* var. *fluviatilis* Torrey

*Scirpus heterochaetus* Chase

*Scirpus lacustris* L.

*Juncus zebrinus*

*Schoenoplectus lacustris* (L.) Palla

*Schoenoplectus validus* Love and Love

*Scirpus acutus* Muhl.

*Scirpus malheurensis* Henderson

*Scirpus occidentalis* Chase

*Scirpus rubiginosus* Beetle.

*Scirpus tabernaemontani* Gmelin

*Scirpus validus* Vahl

*Scirpus subterminalis* Torrey

*Scirpus subterminalis* var. *terrestris* Paine

*Scolochloa festucacea* (Willdenom) Link

*Arundo festucacea* Willdenom

*Fluminea festucacea* Hitchcock

*Grappophorum festucaceum* Gray

*Triodia festucacea* Roth.

*Sium sauve* Walter

*Apium cicutaeifolium* Bentham and Hooker

*Sium cicutaeifolium* Schrank.

*Sium floridanum*

*Sparganium angustifolium* Michaux  
*Sparganium affine* Schnizl.  
*Sparganium chlorocarpum* Rydberg  
*Sparganium diversifolium* Graebn.  
*Sparganium emersum* Rehm.  
*Sparganium multipedunculatum* Rydberg  
*Sparganium natans* var. *angustifolium* Pursh  
*Sparganium simplex* Huds.  
*Sparganium subvaginatum* Meinsh.

*Sparganium eurycarpum* Engelmann  
*Sparganium californicum* Greene  
*Sparganium greenei* Morong.  
*Sparganium ramosum* Pursh

*Sparganium fluctuans* (Morong. ) Robbins  
*Sparganium androcladum* (Engelmann) Morong. var. *fluctuans* Morong

*Sparganium minimum* Fries.  
*Sparganium glomeratum* Laestad  
*Sparganium hyperboreum* Laestad

*Spartina patens* (Ait.) Muhl.

*Spartina pectinata* Link  
*Spartina michauxiana* Hitchcock

*Spirodela polyrhiza* (L.) Schleid.  
*Lemna polyrhiza* L.  
*Telmatophace polyrhiza* Godr.

*Subularia aquatica* L.  
*Crucifera subularia* Krause  
*Draba subularia* Lamarck  
*Nasturtium palustre* Grantz

*Tillaea aquatica* L.

*Bullarda aquatica* Decandolle  
*Crassula aquatica* (L.) Schoenl.  
*Crassula drummondii* Fedde.  
*Hydrophila aquatica* House  
*Hydrophila drummondii* House  
*Tillaea angustifolia* Nuttall  
*Tillaea aquaticum* (L.) Britton  
*Tillaea drummonii* T. and G.  
*Tillaea prostrata* Schkur.  
*Tillaea simplex* Nuttall  
*Tillaeastrum aquaticum* Britton  
*Tillaeastrum drummondii* Britton

*Tolypella intricata* (Trent.) Leonh.

*Nitella polysperma*  
*Tolypella californica*  
*Tolypella fimbriata*  
*Tolypella intertexa*  
*Tolypella prolifera*  
*Tolypella stipitata*

*Trapa natans* L.

*Trapa bicornis*  
*Trapa bispinosa* Roxb.  
*Trapa maximowiczii* Korsh.  
*Trapa maaximowitzii* Korsh.  
*Trapa quadrispinosa* Auct.

*Triglochin maritimum* L.

*Hexaglochin maritima* Nieuwl.  
*Juncago maritima* Bubani  
*Triglochin elata* Nuttall  
*Triglochin maritima* L.

*Typha angustifolia* L.

*Massula angustifolia* Dulac

*Typha latifolia* L.

*Massula latifolia* Dulac

*Utricularia gibba* L.

*Utricularia biflora* Lamarck  
*Utricularia exoleta* R. Brown  
*Utricularia fibrosa* Walter  
*Utricularia pumila* Walter

*Utricularia intermedia* Hayne  
*Lentibularia intermedia* Nieuwl. and Lunell.

*Utriculana minor* L.  
*Utricularia occidentalis* Gray

*Utricularia vulgaris* L.  
*Lentibularia vulgaris* Moench.  
*Utricularia macrorhiza* Leconte

*Vallisneria spiralis* L.  
*Vallisneria americana* Michaux

*Veronica americana* (Raf.) Schw.  
*Veronica beccabunga* var. *americana* Raf.

*Veronica anagallis-aquatica* L.  
*Veronica glandifera* Penn.  
*Veronica anagallis* L.

*Veronica catenata* Pennel.  
*Veronica comosa* Richt.  
*Veronica connata* Raf.  
*Veronica salina* Schur.

*Veronica scutellata* L.

*Wolffia borealis* (Engelmann) Landolt  
*Bruniera punctata* (Griseb.) Nieuwl.  
*Wolffia brasiliensis* Weddell  
*Wolffia papulifera* Thompson  
*Wolffia punctata* Griseb.

*Wolffia columbiana* Karsten

*Wolffiella gladiata* (Hegelm.) Hegelm.  
*Wolffiella floridana* (J. D. Smith) Thompson

*Zannichellia palustris* L.  
*Algoides palustre* Lunell

*Zizania aquatica* L.  
*Ceratochaete aquatica* Lunell  
*Zizania effusa* Munro  
*Zizania interior* Rydberg

*Zostera japonica* Aschers and GraeLn.  
*Zostera americana* den Hartog  
*Zostera nana* Roth.  
*Zostera noltii* Hornem

*Zostera marina* L.  
*Zostera latifolia* Morong  
*Zostera oregana* S. Wats.  
*Zostera pacifica* S. Wats.  
*Zostera stenophylla* Raf.

### Reference Materials for the Aquatic Plants of British Columbia.

Manuals, Texts, Floras, Papers, Keys, Books and other reference sources which contain information about the biology, common names, distribution, culture, identification and taxonomy of aquatic plants found, or expected, in British Columbia. This is only a partial list of useful references.

Affolter, J. M. 1985. A Monograph of the Genus *Lilaeopsis* (Umbelliferae). Systematic Botany Monographs. Vol. 6: 1-140.

Aiken, S. G. 1984. The Water-milfoils (*Myriophyllum*) of the Ottawa District and Ottawa River, Canada. Trail and Landscape. 18(1): 35-51.

Allen, G. O. 1954. An Annotated Key to the Nitelleae of North America. Bulletin Torrey Botanical Club. 81: 35~0.

Anderson, L. W. 1987. Exotic Pest Profile No. 11: Hydrilla (*Hydrilla verticillata*). Calif. Dep't. Food and Agric., Div. of Plant Industry, Sacramento, Calif.

Anon. 1974. Garden Pools. Fountains and Waterfalls. Sunset Books. Lane Books, Menlo Park, Calif.

Anon. 1975. Aquatic Plant List. Hyacinth Control Journal. Volume 13: 67-71. June.

Anon. 1980. Aquatic Plants and Algae Control. Ministry of the Environment, Ontario.

Anon. 1982. A Guide to Common Aquatic Plants in Urban Lakes. Florida Game and Fresh Water Fish Commission, Division of Fisheries and Department of Natural Resources, Bureau of Aquatic Plant Research and Control. Tallahassee, Florida.

Anon. 1989. Aquatic Plant and Algae Control. Ontario Ministry of the Environment. (revision of the 1980 publication).

Anon. Undated. Poster of Common Aquatic Weeds. CIBA/Geigy, Agrochem. Division.

Anon. Undated. Water Chestnut, A Problem Aquatic Plant You should Know in Lake Champlain. Vermont Dep't. Water Res. and Envir. Engin. Water Qual. Div., Montpelier, Vt. 05602.

Arber, A. 1920. Water Plants. A study of Aquatic Angiosperms. 1972 reprint by Verlag von J. Kramer, Germany.

- Asis, C. V. Editor. 1971. Plants of the Philippines. For: Science Education Center. By: University of the Philippines Press. Diliman, Quezon City.
- Aston, H. I. 1977. Aquatic Plants of Australia. Melbourne University Press. Australia.
- Aulbach-Smith, C. A. and S. J. De Kozlowski. 1990. Aquatic and Wetland Plants of Southern Carolina. S. C. Water Resources Commission.
- Beal, E. O. 1977. A Manual of Marsh and Aquatic Vascular Plants of North Carolina with Habitat Data. Technical Bulletin No. 247, North Carolina Agricultural Experiment Station.
- Beal, E. O. and P. H. Monson. 1954. Marsh and Aquatic Angiosperms of Iowa. State Univ. of Iowa Studies in Nat. Hist. Study Ser. No. 429. Vol. 19, No. 5.
- Beal, E. O. and J. W. Thieret. 1986. Aquatic and Wetland Plants of Kentucky. Kentucky Nature Preserves Commission, Scientific and Technical Series, Number 5. Frankfort, Kentucky, 40601.
- Benl, G. 1971. A Key to the Genera of Aquarium Plants based on Vegetative Characters. *Baileya* 18(4): 121-132.
- Bahdri, B., B. Singh and B. L. Desai. 1962. Water Plants. New Delhi.
- Bhaskar, V. and B. A. Razi. 1973. Hydrophytes and Marsh Plants of Mysore City. Prasaranga, University of Mysore.
- Bordner, J. S., W. W. Morris, L. M. Wood and J. H. Steenis. 1932. Land Economic Inventory of Northern Wisconsin: Sawyer County. Wisconsin Dep't. of Agriculture and Markets. 138.
- Brayshaw, T. C. 1985. Pondweeds and Bur-reeds, and their Relatives, of British Columbia. British Columbia Provincial Museum. No. 26. Occasional Paper Series, Province of British Columbia.
- Brayshaw, T. C. 1989. Buttercups, Waterlilies, and their Relatives: (the order Ranales) in British Columbia. Royal British Columbia Museum. Memoir No.1. Province of British Columbia.
- Brezina, E. R, W. J. Harmon, A. D. Bradford and R. B. Hesser. 1971. Aquatic Plants. A Guide for their Identification and Control in Pennsylvania. Pennsylvania Water Resources Coordinating Committee, Commonwealth of Pennsylvania.

- Bristow, J. M., J. Cardenas, T. M. Fullerton and J. Sierra. Undated. Malezas Acuaticas /Aquatic Weeds. Columbian Agricultural Institute/ International Plant Protection Center, Oregon State University/Agency for International Development.
- Brooks, R. E. and L. A. Hauser. 1978. Aquatic Vascular Plants of Kansas I: Submersed and Floating Leaved Plants. Technical Publication of the State Biological Survey of Kansas. The University of Kansas. No. 7. (1981 revised edition with supplement).
- Burbidge, N. T. 1963. Aquatic Plants of the Australian Capital Territory. Aust. Soc. Limnol. Newsletter 2: 21-4.
- Burlshalter, A. P., L. M. Curtis, R. L. Lazor, M. L. Beach and J. C. Hudson. Undated. Aquatic Weed Identification and Control Manual. Bureau of Aquatic Plant Research and Control. Florida Department of Natural Resources. Tallahassee, Florida.
- Burland, G. R. 1989. An Identification Guide to Alberta Aquatic Plants. Pesticide Management Branch, Alberta Environment.
- Bursche, E. M. 1968. A Handbook of Water Plants. English translation by H. Czech. 1971. Frederick Warne and Co. Ltd., London.
- Carlson, R. A. and J. B. Moyle. 1968. Key to the Common Aquatic Plants of Minnesota. Special Publication No. 53. Minnesota Department of Conservation. Division of Game and Fish. Technical Services Section.
- Ceska, A. and M. A. M. Bell. 1973 *Utricularia* (Lentibulariaceae) in the Pacific Northwest. Madrono 22(2): 74-84.
- Ceska, A. and P. Warrington. 1976. *Myriophyllum farwellii* (Haloragaceae) in British Columbia. Rhodora 78(813): 75-78.
- Ceska, O. 1977. Studies on Aquatic Macrophytes. Part XVII. Phytochemical Differentiation of Mynophyllum Taxa Collected in British Columbia. Water Investigations Branch, Ministry of Environment, Province of British Columbia.
- Cook, C. D. K., B. J. Gut, E. M. Rix, J. Schneller and M. Seitz. 1974. Water Plants of the World. A Manual for the Identification of the Genera of Freshwater Macrophytes. Dr. W. Junk, Publishers, The Hague.
- Cook, C. D. K. 1985. Range Extensions of Aquatic Vascular Plant Species. J. of Aquatic Plant Management 23: 1-6.

- Cook, C. D. K. and M. S. Nicholls. 1986. A Monographic Study of the Genus *Sparganium* (Sparganiaceae). Part 1. Subgenus *Xanthosparganium* Holmberg. Bot. Helv. 96(2): 213-267.
- Cook, C. D. K. 1987. Dispersion in Aquatic and Amphibious Vascular Plants. In: R M. M. Crawford. Plant Life in Aquatic and Amphibious Habitats. Special Publ. Brit. Ecol. Soc. (Blackwell, Oxford) 5: 179-190.
- Cook, C. D. K. and M. S. Nichols. 1987. A Monographic Study of the Genus *Sparganium* (Sparganiaceae). Part 2. Subgenus *Sparganium*. Bot. Helv. 97(1): 1-44.
- Cook, C. D. K. 1988. Wind Pollination in Aquatic Angiosperms. Ann. Missouri Bot. Gard. 75: 768-777.
- Cook, C. D. K. 1990. Aquatic Plant Book. SPB Academic Publishing, The Hague, Netherlands.
- Correll, D. S. and H. B. Correll. 1975. Aquatic and Wetland Plants of Southwestern United States. 2 vol. Stanford University Press. Stanford, Calif.
- Crow, G. E. and C. B. Hellquist. 1981. Aquatic Vascular Plants of New England: part 2. Typhaceae and Sparganiaceae. Bulletin No. 517. Agricultural Experiment Station, University of New Hampshire, Durham, New Hampshire.
- Crow, G. E. and C. B. Hellquist. 1982. Aquatic Vascular Plants of New England: part 4. Juncaginaceae, Scheuchzeriaceae, Butomaceae, Hydrocharitaceae. Bulletin No. 520. Agricultural Experiment Station, University of New Hampshire, Durham, New Hampshire.
- Crow, G. E. and C. B. Hellquist. 1983. Aquatic Vascular Plants of New England: part 6. Trapaceae, Haloragaceae, Hippuridaceae. Bulletin No. 524. Agricultural Experiment Station, University of New Hampshire, Durham, New Hampshire.
- Crow, G. E. and C. B. Hellquist. 1985. Aquatic Vascular Plants of New England: part 8. Lentibulariaceae. Bulletin No. 528. Agricultural Experiment Station, University of New Hampshire, Durham, New Hampshire.
- Daubs, E. H. 1965. A Monograph of Lemnaceae. Ill. Biol. Monographs. No. 34. Univ. Ill., Urbana.

- Dressler, R. D. W. Hall, K. D. Perkins and N. H. Williams. 1987. Identification Manual for Wetland Plant Species of Florida. Sp-35. Institute of Food and Agricultural Services, Florida Agricultural Experiment Station and Florida Cooperative Extension Service, University of Florida.
- Eyles, D. E., J. L. Robertson and G. W. Jax. 1944. A Guide and Key to the Aquatic Plants of the Southeastern United States. Public Health Bulletin No. 286. Federal Security Agency, U. S. Public Health Service, Division
- Fairbrothers, D. E. and E. T. Moul. 1965. Aquatic Vegetation of New Jersey. Part I. Ecology and Identification. Extension Bulletin 382. Extension Services, College of Agriculture, Rutgers State University, New Brunswick, New Jersey.
- Fasset, N. C. 1957. A Manual of Aquatic Plants. The University of Wisconsin Press. 1975 printing with 1956 revision appendix by E. C. Ogden.
- Fernald, M L. 1932. The Linear-leaved North American Species of *Potamogeton*, section Axillares. Memoirs of the Gray Herarium of Harvard University. III. Reprinted from: Memoirs of the American Academy of Arts and Sciences, vol. XVII, part 1.
- Godfrey, R. K and J. W. Wooten. 1979. Aquatic and Wetland Plants of Southeastern United States. Monocotyledons. The University of Georgia Press. Athens, Georgia. 712 p.
- Godfrey, R. K. and J. W. Wooten. 1981. Aquatic and Wetland Plants of Southeastern United States. Dicotyledons. The University of Georgia Press. Athens. 933 p.
- Gunawardenu, D. C. 1968. Genera et Species Plantarum Zeylandica. Lake House Investments Ltd., Pub. Columbo, Ceylon.
- Haslam, S. M., C. S. Sinker and P. A. Woseley. 1975. British Water Plants. Field Studies Council, London.
- Haslam, S. M. 1978. River Plants. The Macrophyte Vegetation of Watercourses. Cambridge University Press, Cambridge.
- Haynes, R R. and L. B. Holm-Nielsen. 1987. The Zannichelliaceae in the Southeastern United States. Journal Arnold Arboretum. 68: 259-268.
- Hellquist, C. B. and G. E. Crow. 1980. Aquatic Vascular Plants of New England: part 1. Zosteraceae, Potamogetonaceae, Zannichelliaceae, Najadaceae. New Hampshire Agricultural Experiment Station, University of New Hampshire, Durham, Station Bulletin No. 515.

- Hellquist, C. B. and G. E. Crow. 1981. Aquatic Vascular Plants of New England: part 3. Alismataceae. Bulletin No. 518. Agricultural Experiment Station, University of New Hampshire, Durham, New Hampshire.
- Hellquist, C. B. and G. E. Crow. 1982. Aquatic Vascular Plants of New England: part 5. Araceae, Lemnaceae, Xyridaceae, Eriocaulaceae, and Pontederiaceae. Bulletin No. 523. Agricultural Experiment Station, University of New Hampshire, Durham, New Hampshire.
- Hellquist, C. B. and G. E. Crow. 1984. Aquatic Vascular Plants of New England: part 7. Cabombaceae, Nymphaeaceae, Nelumbonaceae, and Ceratophyllaceae. Bulletin No. 527. Agricultural Experiment Station, University of New Hampshire, Durham, New Hampshire.
- Heritage, B. 1973. *The Lotus Book of Water Gardening*. Hamlyn, London.
- Hillman, W. S. 1961. The Lemnaceae, or duckweeds. *Bot. Rev.* 27: 221-287.
- Hitchcock, C. L., A. Cronquist, M. Ownbey and J. W. Thompson. 1969. *Vascular Plants of the Pacific Northwest*. University of Washington Press, Seattle. 5 volume set.
- Hotchkiss, N. 1970. *Common Marsh Plants of the United States and Canada*. Bureau of Sport Fisheries and Wildlife. Resource Publication No. 93. United States Department of the Interior. Fish and Wildlife, Washington, D. C.
- Hotchkiss, N. 1972. *Common Marsh, Underwater and Floating-leaved Plants of the United States and Canada*. Dover Publications, Inc., New York.
- Hutchinson, G. E. 1975. *A Treatise on Limnology*. Vol. 3. *Limnological Botany*. J. Wiley, N. Y. p. 1-660.
- Jones, S. B. 1974. Mississippi Flora I. Monocotyledon Families with Aquatic or Wetland Species. *Gulf Research Reports* 4(3): 357-379.
- Jones, S. B. 1975. Mississippi Flora IV. Dicotyledon Families with Aquatic or Wetland Species. *Gulf Research Reports* 5(1): 7-22.
- Katterns, L. B. 1972. *Garden Ponds and Indoor Water Gardens*. Pet and Fancy Series. Cassell and Co., Ltd. London
- Kawakarni, T. 1910. *A list of Plants of Formosa*. Bureau of Productive Industry, Government of Formosa.
- Kramer, J. 1971. *Water Gardening. Pools, Fountains and Plants*. Charles Scribner's Sons, New York.

- Landolt, E. 1975. Morphological Differentiation and Geographical Distribution of the *Lemna gibba-Lemna minor* group. Aquatic Botany. 1: 345-363.
- Landolt, E. 1980. Key to the Determination of Taxa within the Family of Lemnaceae. In :Vol 1, Biosystematische Untersuchungen in der Familie der Wasserlinsen (Lemnaceae). Veroffentlichungen des Geobotanischen Institutes der Eidg. Tech. Hochschule, Stiftung Rubel, in Zurich.
- Leach, G. J. and P. L. Osborne. 1985. Freshwater plants of Papua New Guinea. The University of Papua New Guinea Press.
- Lindstrom, L. 1968. The Aquatic and Marsh Plants of the Great Plains of Central North America. University Microfilms, Ann Arbor, Michigan.
- Lopinot, A. C. 1971. Aquatic Weeds: Their Identification and Methods of control. Fishery Bulletin #4. Department of Conservation, Division of Fisheries, Springfield, Illinois.
- Mabberly, D. J. 1987. The Plant Book. Cambridge University Press. Cambridge. p. 1-706.
- Martin, A. C. and F. M. Uhler. 1951. Food of Game Ducks in the United States and Canada. Research Report 30. (USDA Tech. Bull. 634-1939) Fish and Wildlife Service. U. S. Department of the Interior.
- Mason, H. L. 1957. A Flora of the Marshes of California. University of California Press, Berkeley.
- Matsumura, Y. and H. D. Harrington. 1955. The True Aquatic Vascular Plants of Colorado. Colorado Agricultural Experiment Station. Colorado Agricultural and Mechanical College, Fort Collins.
- Mitchell, D. S. and P. A. Thomas. 1972. Ecology of Waterweeds in the Neotropics. An Ecological Survey of the Aquatic Weeds *Eichhornia crassipes* and *Salvinia* species, and their Natural Enemies in the Neotropics. UNESCO, Paris. #12 in the series, Technical Papers in Hydrology. A contribution to the International Hydrological Decade.
- Montz, G. N. 1977. Wetland Plants of the New Orleans District. U. S. Army Corps of Engineers, New Orleans.
- Moore, E. 1913. The Potamogetons in Relation to Pond Culture. Bulletin of the Bureau of Fisheries Vol. 33. Document #815, July 28, 1915, U .S. A., Government Printing Office.

- Moss, B. 1980. Chapter 6. Aquatic Plant Habitats. In: Ecology of Fresh Waters. Blackwell Scientific Publications, Oxford.
- Moul, E. T. and D. E. Fairbrothers. 1955. Do You Know? New Jersey's Common Aquatic Plants. New Jersey Outdoors, August 1955. p.10-17
- Muenschler, W. C. 1944. Aquatic Plants of the United States. Cornell University Press. London, New York.
- Muenschler, W. C. 1959. Vascular Plants. Chapter 45. In: Ward, H. B., G. C. Whipple and W. T. Edmondson. Editors. Fresh Water Biology. Second Edition. John Wiley and Sons. p. 1170-1193.
- Muhlberg, H. 1982. The Complete Guide to Water Plants. A Reference Book. E. P. Publishing Ltd., Germany.
- Nelson, E. N. and R. W. Couch. 1985. Aquatic Plants of Oklahoma. I: Submersed, Floating-leaved and selected Emergent Macrophytes. Natural Science Department, Oral Roberts University, Tulsa, Ok. ,
- Ogden, E. C. 1943. The Broad-leaved Species of *Potamogeton* of North America North of Mexico. Rhodora 45(531): 57-105, 45(532): 119-163, 45(533): 171-214.
- Ogden, E. C. 1953. Key to the North American Species of *Potamogeton* . Circular. No. 31. New York State Museum, Albany. M394R-N52-2600 (34844).
- Ogden, E. C. 1974. Potamogeton in New York. Bulletin 423, New York State Museum and Sciences Service. The University of the State of New York. The State Education Department, Albany.
- Ogden, E. C. 1974. Anatomical Patterns of some Aquatic Vascular Plants of New York. Bulletin 424. New York State Museum and Sciences Service. The University of the State of New York. The State Education Department, Albany.
- Ohwi, J. 1965. Flora of Japan. Smithsonian Institution. Washington, DC
- Otto, N. E., T. R. Bartey and J. S. Thullen. 1980. Aquatic Pests on Irrigation Systems. Identification Guide. Second Edition. Water and Power Resources Service, U. S. Department of the Interior.
- Paijmans, K. Editor. 1976. New Guinea Vegetation. CSIRO/Aust. Nat. Univ. Press

- Pancho, J. V. and M. Soerjani. 1978. Aquatic Weeds of Southeast Asia. A Systematic Account of Common Southeast Asian Aquatic Weeds. University of the Philippines, Laguna and Seamo, Bogota, Indonesia. National Publishing Cooperative Incorporated, Quezon, Philippines.
- Parham, J. W. 1964. Plants of the Fiji Islands. Government Press. Suva, Fiji.
- Pennwalt. 1982. Aquatic Weed and Algae Guide. Pennwalt Corporation. Agchem Division, 3 Parkway, Philadelphia, Pennsylvania.
- Pennwalt. 1985. Submersed Aquatic Weeds and Algae Guide. Pennwalt Corporation. Agchem Division. 3 Parkway, Philadelphia, Pennsylvania.
- Perry, F. 1962. Water Gardens. Penquin Books.
- Prescott, G. W. 1969. How to Know The Aquatic Plants. Pictured Key Nature Series. Wm. C. Brown Co., Publishers. Dubuque, Iowa.
- Rataj, K. and T. J. Horeman. 1977. Aquarium Plants. Their Identification, Cultivation and Ecology. T. F. H. Publications, Inc. New Jersey.
- Reid, G. K. 1967. Pond life. A Guide to Common Plants and Animals of North American Ponds and Lakes. Golden Press, New York.
- Renlund, R. N. 1950. Aquatic Vegetation of some New Jersey Fresh-water Lakes. Appendix II New Jersey Fisheries Survey Report No.1: Lakes and Ponds. New Jersey Department of Conservation and Economic Development; Division of Fish and Game. 105-171.
- Riemer, D. N. 1984. Introduction to Freshwater Vegetation. Avi Books. Van Nostrand Reinhold Co., New York.
- Roe, C. D. 1966. A Manual of Aquarium Plants. Solihull.
- Rosaffi, T. J. 1987. The Genera of Pontederiaceae in the Southeastern United States. Journal Arnold Arboretum. 68: 35-71
- Sainty, G. R. and S. W. L. Jacobs. 1981. Water Plants of New South Wales. Water Resources Commission. NSW. p. 1-550
- Sainty, G. R. and S. W. L. Jacobs. 1988. Water Plants in Australia. Australian Water Resources Council. National Coordinating Committee on Aquatic Weeds. Royal Botanic Gardens, Sydney, Australia. Sainty and Associates.

- Schloesser, D W. and B. A. Manny. 1982. Distribution and Relative Abundance of Submerged Aquatic Macrophytes in the St. Clair-Detroit River Ecosystem. Admin. Report No. 82-7, Great Lakes Fish. Lab., U. S. Fish and Wildlife Serv., Ann Arbor, Mich.
- Schloesser, D. W. 1986. A Field Guide to Valuable Underwater Aquatic Plants of the Great Lakes. Contribution. 644. Great Lakes Fish. Lab., U. S. Fish. and Wildlife Serv., Ann Arbor, Mich. and Ext. Bull. E-1902, Co-op Ext. Serv. Mich. State Univ., East Lansing, Mich.
- Schmidt, J. C. Editor. 1987. How to Identify and Control Water Weeds and Algae. Applied Biochemistry, Inc. 5300 West County Line Road, Mequor, Wisconsin. (4th revised edition, 1st edition-1976).
- Schmitz, D. C. and K. M. Gilbert. Undated. Common Names and Synonyms of some Aquatic Plants used in the Aquarium Plant trade. Florida Department of Natural Resources. Bureau of Aquatic Plant Research and Control. Tallahassee, Florida.
- Schuyler, A. E. 1984. Classification of Life-forms and Growth-forms of Aquatic Macrophytes. *Bartonia* 50: 8-11.
- Sculthorpe, C. D. 1967. The Biology of Aquatic Vascular Plants. Edward Arnold Ltd., London.
- Smith, G. G. and N. G. Marchant. 1961. A Census of Aquatic Plants of Western Australia. *W. Aust. Nat.* 8: 5-17.
- Smith, S. G. 1973. Ecology of the *Scirpus lacustris* complex in North America. *Pol. Arch. Hydrobiol.* 20(1): 215-216.
- Smith, S. G. 1969. Natural Hybridization in the *Scirpus lacustris* complex in North Central United States. *Current Topics in Plant Science*. Academic Press. New York p. 175-200.
- Spence, D. H. N. 1964. The Macrophytic Vegetation of Freshwater lochs, swamps and associated fens. In: J. H. Burnett. Editor. *The Vegetation of Scotland*. Oliver and Boyd, Edinburgh. p. 306-425.
- Spencer-Jones, D. and M. Wade. 1986. *Aquatic Plants-A Guide to Recognition*. Professional Products, Surrey. Borcombe Printers, Britain. ISBN 0-901747-03-3.
- Stanley, R. A. 1966. Genealogy of the Genus *Myriophyllum*. Duke Univ., Durham, North Carolina. (term paper).

Steenis, C. G. G. J. van. 1981 and 1987. Rheophytes of the World: An Account of the Flood-resistant Flowering Plants and Ferns and the theory of Autonomous Evolution. 1981—Sithoff and Noordhoff, Alphen aan den Rijn. p. 1-408. 1987—Allertonia (Supplement) 4: 267-330.

Steward, A. N., L. R. J. Dennis and H. M. Gilkey. 1963. Aquatic Plants of the Pacific Northwest with Vegetative Keys. Second edition. Oregon State University Press, Corvallis, Oregon.

Stodola, J. 1967. Encyclopedia of Water Plants. T. F. H. Publications Inc. P. O. Box 33, Jersey City. New Jersey.

Subramanyam, K. 1962. Aquatic Angiosperms. A Systematic Account of Common Indian Aquatic Angiosperms. Botanical Monograph No. 3. Council of Scientific and Industrial Research, New Delhi, India. 1974 reprint.

Tarver, D. P., J. A. Rodgers, M. J. Mahlor and R. L. Lazor. 1978. Aquatic and Wetland Plants of Florida. Bureau of Aquatic Plant Research and Control. Florida Department of Natural Resources.

Thieret, J. W. 1972. Aquatic and Marsh Plants of Louisiana: A Checklist. Louisiana Society for Horticultural Research Journal 13(1): 1-45.

Thompson, G., J. Coldrey and G. Ernard. 1984. The Pond. Oxford Scientific Films. The MIT Press, Camb., Mass.

Urbanska-Worytkiewicz, K. 1975. Cytological Variation within *Lemna I*. Aquatic Botany 1: 377-394.

Warrington, P. D. 1980. Aquatic Plants of British Columbia. Studies on Aquatic Macrophytes. Part XXXIII. Inventory and Engineering Branch, Ministry of Environment, Government of British Columbia.

Warrington, P. D. 1983. Aquatic Vegetation Survey of the Major Parks, Gardens and other Tourist Attractions of Southern Vancouver Island and the Lower Fraser Valley, 1982. Resource Quality Section, Water Management Branch, Ministry of Environment, Government of British Columbia.

Warrington, P. D. 1983. A Field Manual and Guide to the Collecting and Preserving of British Columbia Aquatic Plants. Resource Quality Section, Water Management Branch, Ministry of Environment, Government of British Columbia.

- Warrington, P. D. 1983. An Introduction to: The Life Histories of *Myriophyllum* Species in Southwestern British Columbia. Resource Quality Section, Water Management Branch, Ministry of Environment, Government of British Columbia.
- Warrington, P. D. 1984. The pH Tolerance of the Aquatic Plants of British Columbia. Part 2. Analyses of Existing British Columbia Environmental Data. Resource Quality Section, Water Management Branch, Ministry of Environment, Government of British Columbia.
- Warrington, P. D. 1985. Factors Associated with the Distribution of *Myriophyllum* in British Columbia. Proceedings of the 1 st. International Symposium on Watermilfoil (*Myriophyllum spicatum* ) and Related Haloragaceae Species. July 23-24, Vancouver British Columbia. Published by the Aquatic Plant Management Society.
- Warrington, P. D. 1986. The Distribution of Aquatic Vegetation in Lakelse Lake and the Partitioning of Nutrients Among Sediments, Water and Plant Tissue. Resource Quality Section, Water Management Branch, Ministry of Environment, Government of British Columbia.
- Warrington, P. D. 1988. The pH Tolerance of the Aquatic Plants of British Columbia. Part 1. Literature Survey of the pH Limits of Aquatic Plants of the World Resource Quality Section, Water Management Branch, Ministry of Environment, Government of British Columbia.
- Warrington, P. D. 1988. Aquatic Plants of British Columbia: Common Names, Selected References, Synonymy and Classification by Life-forms and Habitat. Resource Quality Section, Water Management Branch, Ministry of Environment, Government of British Columbia.
- Warrington, P. D. 1989. Aquatic Vegetation Survey of the Major Parks, Gardens and other Tourist Attractions of Southern Vancouver Island and the Lower Fraser Valley, 1988. Water Management Branch, Ministry of Environment, Government of British Columbia.
- Weldon, L. W., R. D. Blackburn and D. S. Harrison. 1969. Common Aquatic Weeds. Agricultural Handbook No. 352. Agricultural Research Service. United States Department of Agriculture.
- Westlake, D. F. 1973. Aquatic Macrophytes in Rivers. Pol. Arch. Hydrobiol. 20: 31-40.
- Wilson, R and P. Lee. 1982. Part II. Marshland Vegetation. Plants. In: The Marshland World. Blandford Press, Poole, Dorset.

- Winterringer, G. S. and A. C. Lopinot. 1977. Aquatic Plants of Illinois. Illinois State Museum, Popular Science Seriesi Volume VI.
- Wood, R. D. 1967. Charophytes of North America. A Guide to the Species of Charophyta of North America, Central America, and the West Indies. Stella's Printing, West Kingston, Rhode Island. Bookstore, Memorial Union University of Rhode Island, Kingston, Rhode Island. 72 page soft cover, ring bound.
- Wood, R. D. 1965. Monograph of the Characeae. In: Wood, R D. and K. Imahori. A Revision of the Characeae. Volume I, Cramer.
- Wood, R. D. and K. Irnahori. 1964. Iconograph of the Characeae. In: Wood, R. D. and K. Imahori. A Revision of the Characeae. Volume II, Cramer.
- Wright, D. M. 1973. The Fly-fishers' Plants. David and Charles, Newton Abbot, Devon, Great Britain.
- Yan, Su-Zhu. 1983. Higher Water Plants of China. Science Press. p. 1-335.
- Yoshioka, K. 1974. Aquatic and Wetland Vegetation. In: M. Numata. Editor. The Flora and Vegetation of Japan. Elsevier Scientific Pub. Co., N. Y.
- Yunker, T. G. 1959. Plants of Tonga. Bulletin No. 220. B. P. Bishop Museum. Honolulu, Hawaii.

**Figure 1**

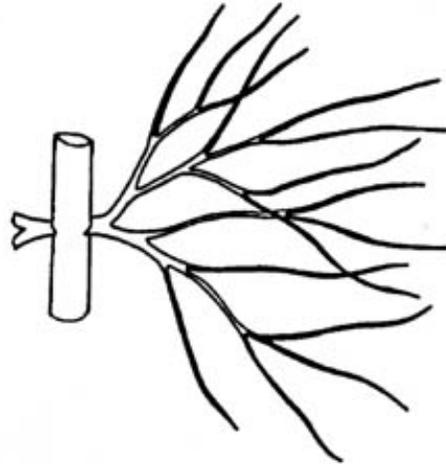
**Examples of Dissected Underwater Leaves**



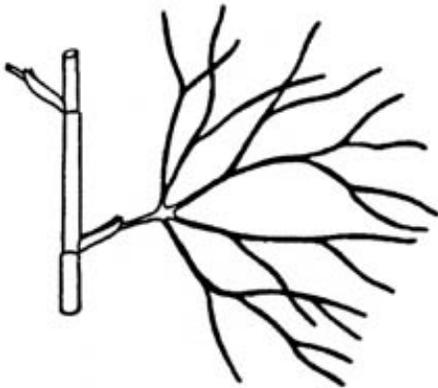
*Limnophila sessiliflora*



*Utricularia vulgaris*



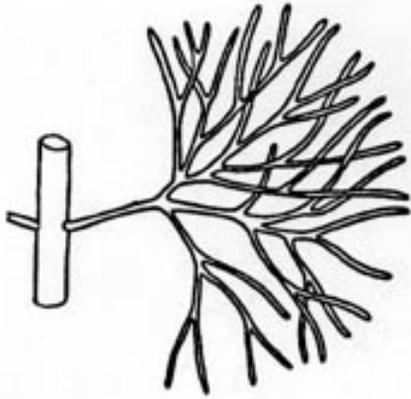
*Megalodonta beckii*



*Ranunculus aquatilis*



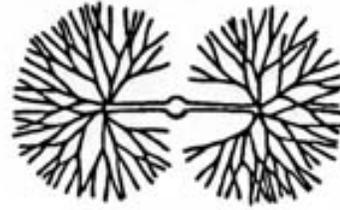
*Ceratophyllum demersum*



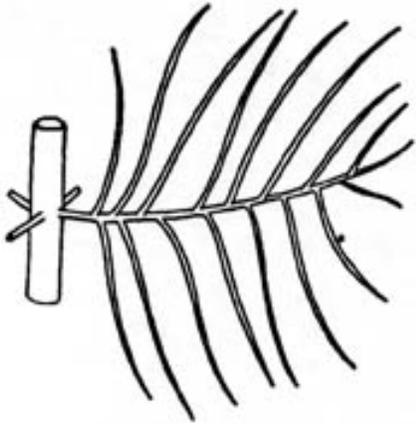
*Cabomba caroliniana*

**Figure 1**

**Examples of Dissected Underwater Leaves**



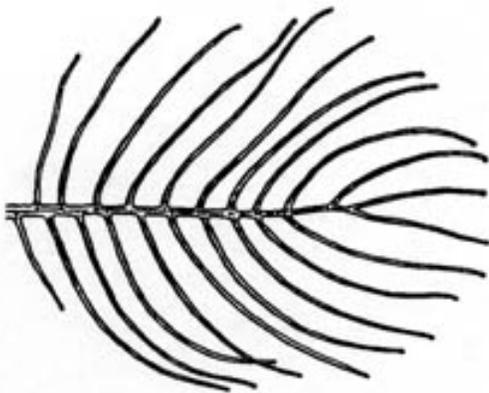
*Cabomba caroliniana*



*Myriophyllum sibiricum*



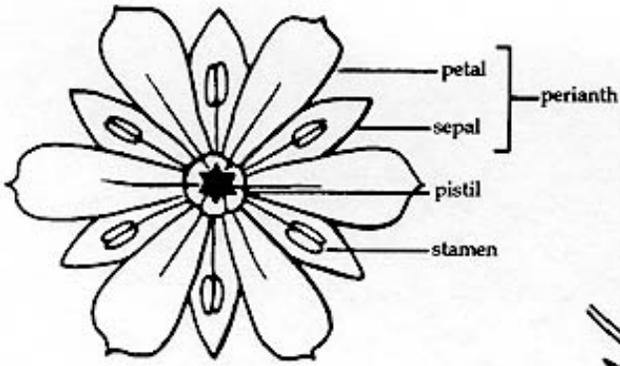
*Linnophila sessiliflora*



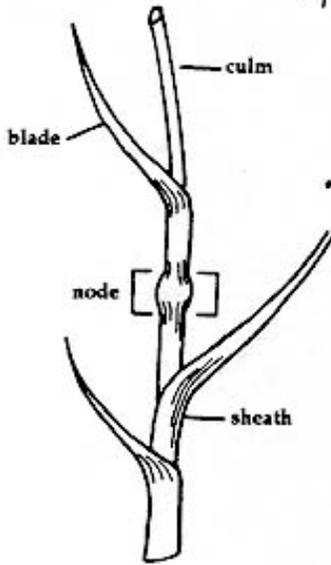
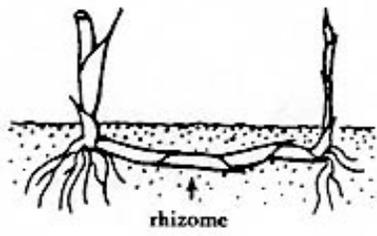
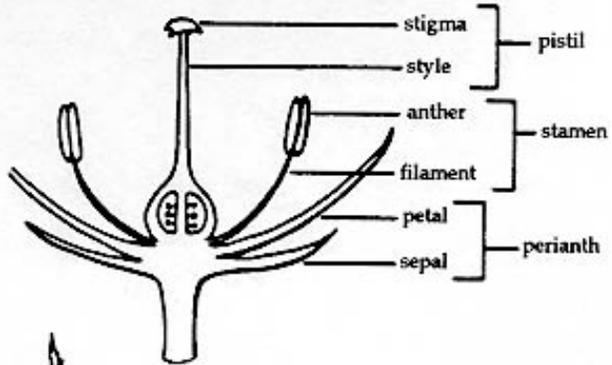
*Myriophyllum verticillatum*



*Myriophyllum aquaticum*



**Flower Parts**



**Stems**

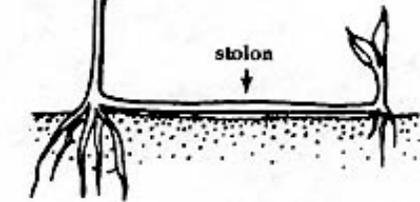
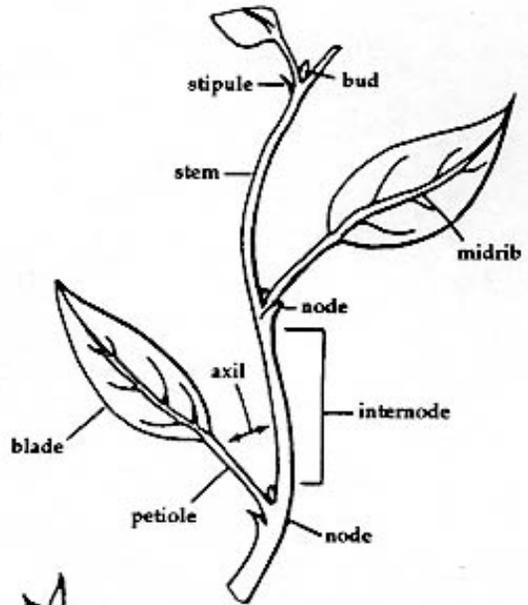
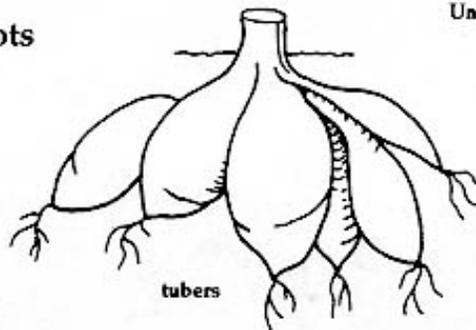


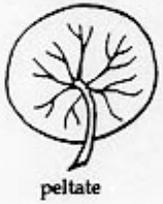
illustration provided by:  
IFAS, Center for Aquatic Plants  
University of Florida, Gainesville, 1990

**Roots**



# Illustrated Glossary

## Leaf Bases



peltate



squared



cordate



sagittate



rounded

## Leaf Shapes



linear



ovate



reniform



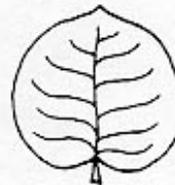
obovate



lanceolate



spatulate



orbicular



oblanceolate

## Leaf Margins



undulate



entire



serrate



crenate



lacerate



elliptic



oblong



whorled

## Leaf Arrangements



alternate



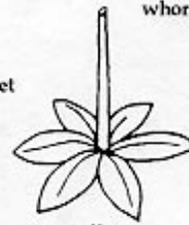
opposite



bipinnately compound



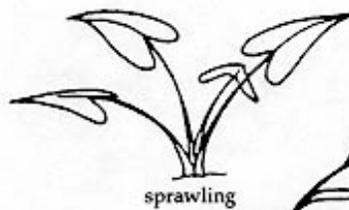
palmately compound



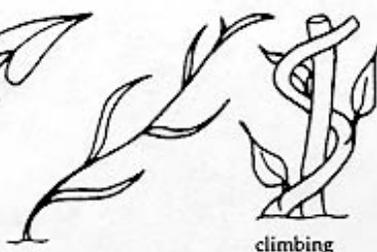
rosette



creeping



sprawling



ascending



climbing



erect

## Habit

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