



VASCULAR PLANTS OF ALBERTA: PART 1: FERNS, FERN ALLIES, GYMNOSPERMS, AND MONOCOTS

John G. Packer and A. Joyce Gould

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JOHN G. PACKER and
A. JOYCE GOULD

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PLANTS *of*
ALBERTA

PART 1: Ferns, Fern Allies, Gymnosperms, and Monocots

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UNIVERSITY OF CALGARY
Press

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Preface

The vascular plants of Alberta (ferns and fern allies – Pteridophyta, conifers – Gymnospermae, and flowering plants – Angiospermae) have been previously documented in two editions of the *Flora of Alberta*. The first edition by Ezra H. Moss (Moss 1959) was a single-volume regional flora with descriptions and keys for both native and non-native species known to occur in Alberta as well as general habitat and distribution information. It contained 104 families, 499 genera and 1,605 species, and was a very important contribution to knowledge of the provincial biota.

The second edition was a revision authored by John G. Packer (Moss 1983). It contained up-to-date information on species newly found in Alberta as well as recent developments in classification and nomenclature. Also added were dot maps of the provincial distribution of native species, habitat information and, where available, chromosome numbers. The number of taxa in this edition increased to 113 families, 547 genera and 1,977 species, of which 1,457 were native species.

These two editions of the *Flora of Alberta* used the traditional classification and nomenclature found in most floras across North America at the time. This approach was based largely on morphological features (e.g., leaves, flowers, fruits) that could be seen with the naked eye or lowpower magnification. At the time of publication of the second edition, new research techniques and information were beginning to indicate that some traditional groups did not reflect evolutionary relationships well. For example, separating some species of the genus *Scirpus* (Cyperaceae) into the segregate genera *Trichophorum*

and *Schoenoplectus* was recognized in the British Isles (Clapham et al. 1952), and others recognized the generic segregates *Diphasiastrum*, *Huperzia* and *Lycopodiella* from *Lycopodium*. However, these changes generally were not incorporated into regional North American floras at that time.

More recently developed research techniques have yielded a vast array of new information useful for classifying plant species, including microscopic characters, chemical composition and molecular genetic analysis, leading to many revisions of plant classification and nomenclature worldwide. This new information is reflected in the current *Flora of North America* (FNA) project, the first modern flora to cover North America as a whole, which published its first volumes in 1993 and is about halfway through publishing its 30 volumes. Draft treatments have been prepared for most of the remaining volumes and have been available to the authors. FNA has become the standard reference for vascular plants in North America and is the primary basis for this work, the *Vascular Plants of Alberta*.

This work departs from FNA primarily in two ways. The first is in listing taxa alphabetically rather than by a classification system—species are listed alphabetically within genera, genera alphabetically within families and families alphabetically within major groups. Also, we do not use taxonomic categories, such as subgenus, tribe or section. This provides the user with a simpler, clearer approach.

The second major difference is in the treatment of Liliaceae. FNA treats this family in the traditional, broad sense. Although it has long been recognized that this classification was primarily one of convenience in which a number of evolutionary lineages were grouped according to a basic floral morphology, there has been no generally accepted alternative. Here, we use a recent classification by Judd et al. (2002), which is based on modern criteria and recognizes nine families in Alberta—a more narrowly defined Liliaceae and eight segregate families. This is further discussed in the description of the lily family (page 155). In addition, we recognize that the term “fern and

fern allies” represents a group of unrelated spore-bearing plants, but we have retained the term given its common usage.

In a few minor cases, we disagreed with taxonomic decisions made by FNA authors and instead followed treatments that we think best reflect information for Alberta. We also sometimes differed with authors as to whether an infraspecific category should be a variety or subspecies. Overall, these are inconsequential differences.

Thus, while this work does contain some additional species that have been found in the province since the second edition of the *Flora of Alberta*, most of the name changes result from revised classification and consequent nomenclatural adjustments because of advances described in FNA. These name changes are noted with the new and former species names in the text. An asterisk (*) precedes names in which the taxon is the same but a new name applies. However, most species recognized in the past are still recognized in this work.

This work also differs from previous editions of the *Flora of Alberta* by not including descriptions of all species known to occur in the province. The keys do include all species, but descriptions are included only for species or other taxa that were not described in the second edition of the *Flora of Alberta*. Descriptions of other species can be found in the *Flora of Alberta*, Second Edition (Moss 1983), in both published and web-accessible forms, as well as in other floras available on the internet. Consequently, the *Vascular Plants of Alberta* provides easier access to information on Alberta species in FNA, which comprises 30 volumes and over 21,000 species, most of which do not occur in Alberta.

Distributional information for species in this work is based primarily on FNA maps and descriptions. Distributions of infraspecific taxa are not described. The Alberta distribution of most native species is in the dot maps in the *Flora of Alberta*, Second Edition (Moss 1983). The North American distribution in the *Vascular Plants of Alberta* is generally given as west (w)-to-east (e) tiers proceeding from north (n) to south (s). Species ranges beyond North America are briefly indicated. See page 279 for a list of abbreviations of jurisdictions.

In conclusion, the *Vascular Plants of Alberta* provides

- simplified access to information in the *Flora of North America*, the current standard for vascular plant classification in North America;
- a list of all species, native and introduced, known to occur in Alberta, arranged alphabetically;
- descriptions of all taxa new to Alberta since the publication of the *Flora of Alberta*, Second Edition, including species both newly found in the province and those with new classifications;
- keys for identifying all taxa; and
- distribution and habitat information for native species.

It is a matter of great regret that ill health prevented Dr. Packer from including the Dicotyledonous families.

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John G. Packer

A. Joyce Gould

September 2016

Key to the Major Groups of Vascular Plants

The keys include all species known to occur in Alberta at the time of publication, but descriptions are provided only for species or other taxa not described in the second edition of the *Flora of Alberta*.

- 1 Plants herbaceous, reproducing by spores Pteridophyta
p. 15
- Plants herbs, shrubs or trees, reproducing
by seeds Spermatophyta
p. 53
- 2 Ovules not enclosed in an ovary; seeds
in a dry cone (rarely in a berrylike cone);
pollen sacs on scales arranged in cones;
trees or shrubs; leaves needle-like or scale-
like, mostly evergreen Gymnospermae p. 53
- Ovules enclosed in an ovary, which at
maturity becomes a fruit; pollen sacs on
stamens borne in flowers; trees, shrubs
or herbs; leaves of various forms, mostly
deciduous Angiospermae
p. 61
- 3 Leaves usually parallel-veined; vascular
bundles of stem irregularly arranged;
cambium absent; parts of flowers usually
in 3s or 6s, never in 5s; embryo with 1
cotyledon; herbs (rarely shrubs) Monocotyledoneae
p. 61
- Leaves usually net-veined; vascular bun-
dles of stem commonly in a single ring;
cambium usually present; parts of flowers
usually in 5s or 4s; embryo with 2 cotyle-
dons; herbs, shrubs or trees Dicotyledoneae

Number of Taxa

	FAMILIES	GENERA	SPECIES
Pteridophyta			
Native	12	24	80
Introduced	0	0	0
TOTAL	12	24	80
Spermatophyta			
Gymnospermae			
Native	3	9	20
Introduced	0	0	0
TOTAL	3	9	20
Angiospermae			
Monocotyledoneae			
Native	27	113	387
Introduced	2	25	37
TOTAL	29	138	424
GRAND TOTAL			524

PTERIDOPHYTA

FERNS AND FERN ALLIES

- 1 Leaves slender, 1–2 mm wide, simple, sessile, often scale-like, mostly small Fern Allies p. 16

Leaves broader, usually ≥ 5 cm long, often large, variously incised or dissected Ferns p. 28
- 2 Stems conspicuously jointed and hollow; leaves scale-like, in sheath-like whorls at nodes; sporangia on peltate scales in a terminal cone Equisetaceae p. 16

Stems not as above; leaves mostly imbricated; sporangia at base or in axils of leaf-like or scale-like sporophylls often forming a terminal cone 3
- 3 Leaves slender, grass-like, 5–15 cm, dilated, sheathing at base; stem short, corm-like, lobed; sporangia in swollen leaf bases; plants rooting in mud, commonly covered by water Isoëtaceae p. 20

Leaves small, < 1.5 cm; stems slender, elongated, branched, main ones usually horizontal, creeping; sporangia in club-like cones; plants usually in terrestrial habitats, resembling coarse mosses 4
- 4 Leafy shoots mostly 7–15 mm wide; homosporous Lycopodiaceae p. 21

Leafy shoots < 6 mm wide; heterosporous Selaginellaceae p. 25

FERN ALLIES

EQUISETACEAE / Horsetail Family

EQUISETUM L. / HORSETAIL, SCOURING RUSH

- | | | |
|---|--|----------------------|
| 1 | Leaf sheaths green below, reddish brown above, teeth cohering in broad papery lobes; branches often arcuate and branched | <i>E. sylvaticum</i> |
| | Leaf sheaths and branches not as above | 2 |
| 2 | Stems green, unbranched (occasionally a few random branches occur, but regular whorled branches at successive nodes lacking); cones mostly apiculate (except in <i>E. fluviatile</i> and sometimes in <i>E. laevigatum</i>) | 3 |
| | Stems not as above, either green and branched or unbranched, greyish white to light yellow-brown colour; cones not apiculate | 7 |
| 3 | Stems 20–100 cm high, >3 mm wide, with 10–40 ridges; sheaths generally >4 mm | 4 |
| | Stems 10–30 cm high, <3 mm wide, with 3–12 ridges; sheaths generally <4 mm | 6 |
| 4 | Teeth present on all sheaths, brownish black or with very narrow hyaline margin; stem papery, readily flattened; cones not apiculate | <i>E. fluviatile</i> |
| | Teeth missing from many or all sheaths, where present, scarious or with a broad scarious margin; stem rigid, not easily flattened; cones often apiculate | 5 |

- 5 Cones sharply apiculate; sheaths generally with 2 continuous black bands, some teeth generally persistent E. hyemale
- Cones rounded at apex or only slightly apiculate; sheaths with only 1 black band (often appearing as a row of dots), teeth invariably deciduous, except for sheaths subtending cones E. laevigatum
- 6 Stem slender, wiry, 0.5–1.0 mm thick, much bent or zigzagged; sheath teeth 3 E. scirpoides
- Stem thicker, 1.0–2.0 (–3) mm thick, straight or curved (no angular bends); sheath teeth >3 E. variegatum
- 7 Stems green, branched 8
- Stems not green, unbranched (bud-like outgrowths sometimes at base of upper sheaths) 11
- 8 Lowest internode of each branch generally much longer than corresponding stem sheath E. arvense
- Lowest internode of each branch generally equal to or shorter than corresponding stem sheath 9
- 9 Branch sheaths 3-toothed E. pratense
- Branch sheaths 4–6-toothed 10
- 10 Stem sheaths with 6–8 teeth E. palustre
- Stem sheaths with 10–30 teeth E. fluviatile

- 11 Sheaths (2–) 3.0–6.0 mm across at mouth, teeth separate with narrow brown midvein and broad hyaline margin; bud-like outgrowths sometimes at base of upper sheaths E. pratense
- Sheaths (3–) 5.0–10.0 mm across at mouth, teeth often coherent with broad dark-brown midvein and scarcely paler margin; outgrowths from upper sheaths absent E. arvense

E. arvense L. / Common or Field Horsetail

Produces a sterile hybrid with *E. fluviatile* (*E. × litorale* Kühlew. ex Rupr.).

Moist woods, meadows, banks, roadsides, railway embankments, often persisting in cultivated fields and gardens. Throughout N America except Fla, La, Miss, SC. Eurasia.

E. fluviatile L.

Produces a sterile hybrid with *E. arvense* (*E. × litorale* Kühlew. ex Rupr.).

Marshes, swamps, bogs. N America; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, s to Oreg, Idaho, Mont, Neb, Iowa, Gt Lakes, Va. Eurasia.

E. hyemale L. / Scouring Rush

Two subspecies; in Alberta subsp. *affine* (Engelm.) Calder & Roy L. Taylor. Produces a sterile hybrid with *E. laevigatum* (*E. × ferrissii* Clute).

Sandy shores, open woods, embankments. Throughout N America incl. Mex except Canadian Arctic Archipelago and Greenland.

E. laevigatum A. Braun

Produces a sterile hybrid with *E. hyemale* (*E. × ferrissii* Clute).

Meadows, banks, prairie grasslands. NAmerica incl. Mex; BC, Alta to Que, s throughout US except e and se.

E. palustre L.

Stream banks, meadows, wet woods, often in shallow water. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, nUS states, disjunct Calif. Eurasia.

E. pratense Ehrh.

Stream banks, thickets, moist woods. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Gt Lakes, NEngl. Eurasia.

E. scirpoides Michx.

Damp woods, thickets, mossy banks. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Idaho, Mont, Gt Lakes, NEngl. Eurasia.

E. sylvaticum L. / Woodland Horsetail

Open woods, thickets. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Idaho, Mont, NDak, Gt Lakes, NEngl, s to Va. Eurasia.

E. variegatum Schleich. *ex* F. Weber & D. Mohr

Two subspecies; in Alberta subsp. *variegatum*.

Wet thickets, bogs, sandy shores. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, SDak, Gt Lakes, NEngl, Utah, Colo. Eurasia.

ISOËTACEAE / Quillwort Family

ISOËTES L. / QUILLWORT

- | | | |
|---|---|------------------------|
| 1 | Megaspores spiny; spines thin, sharp or stout | 2 |
| | Megaspores tuberculate, rugulate, with crests or ridges | 3 |
| 2 | Leaves to 12 cm; megaspore spines stout, blunt; girdle of megaspores evident | <i>I. maritima</i> |
| | Leaves to 25 (–40) cm; megaspore spines thin, sharp; girdle of megaspores obscure | <i>I. echinospora</i> |
| 3 | Leaves abruptly tapered to tip; megaspores 0.3–0.5 mm | <i>I. bolanderi</i> |
| | Leaves gradually tapered to tip; megaspores 0.5–0.7 mm | <i>I. occidentalis</i> |

I. bolanderi Engelm.

I. bolanderi hybridizes with *I. echinospora* and *I. occidentalis*.

Mountain ponds, lakes. NAmerica; Alta, Wash, Oreg, Idaho, Mont, Wyo, Calif, Nev, Utah, Colo, Ariz, NMex.

I. echinospora Durieu

Ponds, lakes. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Gt Lakes, NEngl, Calif, disjunct Utah and Colo. Circumboreal.

I. maritima Underw.

I. maritima hybridizes with *I. echinospora* and *I. occidentalis* (*I. × truncata* (A.A. Eaton) Clute).

Leaves mostly 2–12 cm, gradually tapered towards tip; megaspores white, 0.4–0.6 mm diam.; microspores grey to brown, 30–40 microns diam.

Lakes, streams. NAmerica; Alas, BC, Alta, Wash.

I. occidentalis L.F. Hend.

I. occidentalis hybridizes with *I. bolanderi*, *I. echinospora* and *I. maritima* (*I. × truncata* (A.A. Eaton) Clute).

Leaves mostly 5–15 cm, dark green, paler basally; megaspores 0.5–0.7 mm diam.; microspores brown, 35–45 microns diam.

Lakes. N America; Alas, BC, Wash, Oreg, Idaho, Mont, Wyo, Calif, Utah, Colo, disjunct Alta.

LYCOPODIACEAE / Club-moss Family

- 1 Sporangia in distinct terminal cones (strobili); gemmae absent 2
 Sporangia scattered along length of stem, in leaf axils; gemmae often present among upper leaves Huperzia
- 2 Sporophylls leaf-like; sterile branches prostrate Lycopodiella
 Sporophylls different from leaves; sterile branches erect or ascending 3
- 3 Cones on long peduncles 4
 Cones sessile or nearly so 5
- 4 Leaves in 8–10 rows Lycopodium
 Leaves in 4 rows Diphasiastrum
- 5 Leaves spreading Lycopodium
 Leaves appressed Diphasiastrum

DIPHASIASTRUM HOLUB

A segregate of *Lycopodium* L.

Stems horizontal, creeping, above ground or below, upright shoots with 2–5 lateral and ± flattened branches; leaves of horizontal stems

scale-like, linear to lanceolate, on erect aerial branches, linear-lanceolate to filiform in 4 or 5 rows; cones solitary or several, sessile or on leafy peduncles, sporophylls shorter than peduncle leaves.

- | | | |
|---|---|-----------------------|
| 1 | Cones on long peduncles; free portion of some leaf blades to 2 mm | <i>D. complanatum</i> |
| | Cones \pm sessile; free portion of some leaf blades generally ≥ 2 mm | 2 |
| 2 | Leaves in 5 rows, not imbricate, all \pm same shape; stem rounded | <i>D. sitchense</i> |
| | Leaves in 4 rows, imbricate, 1 row with blades shaped like a bricklayer's trowel; stem appearing winged | <i>D. alpinum</i> |

D. alpinum (L.) Holub / Alpine Club-moss

*Formerly *Lycopodium alpinum* L.

Alpine meadows, rocky slopes. N America; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Que, Nfld/L, Wash, Idaho, Mont, disjunct Colo. Circumpolar.

D. complanatum (L.) Holub / Ground Cedar

*Formerly *Lycopodium complanatum* L.

Dry woods. N America; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Gt Lakes, Vt, NH, Me, disjunct Wyo. Circumboreal.

D. sitchense (Rupr.) Holub

*Formerly *Lycopodium sitchense* Rupr.

Open woods, barrens. N America; Alas, Yuk, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, NY, Vt, NH, Me. Japan, Kamchatka.

HUPERZIA BERNH.

A segregate of *Lycopodium* L.

Stems erect to decumbent, dichotomously branched, clustered, horizontal stems absent; leaves crowded, spiral, not imbricate, gemmae-producing branchlets occurring among leaves; gemmae deltoid, 3–6 mm; cones absent, sporangia produced basally on upper surface of unmodified or reduced leaf, scattered along stem or in fertile areas.

Stems 12–20 cm; largest leaves oblanceolate, spreading or reflexed

H. occidentalis

Stems 8–15 cm; largest leaves lanceolate, ascending

H. selago

H. occidentalis (Clute) Kartesz & Ghandi

Shoots decumbent, branched 5–20 cm; leaves spreading to reflexed, the larger 6–10 mm, oblanceolate, widest 1/2–3/4 their length, smaller leaves widest basally, margins papillate; gemmiferous branches in a whorl; gemmae 4–4.5 × 3.5–4 mm.

Terrestrial, conifer forests along streams, stable scree. NAmerica; Alas, Yuk, BC, Alta, Wash, Oreg, Idaho, Mont.

H. selago (L.) Bernh. ex Schrank & Mart.

*Formerly *Lycopodium selago* L.

Several taxonomic uncertainties exist in this species and some segregates. Until resolved, it is preferable to treat *H. selago* in the broadest sense, and *H. haleakalae* (Brack.) Holub is included in this broad treatment.

Damp mossy ledges, alpine slopes, subalpine woods. NAmerica; Alas, Yuk, Nunavut, BC, Alta to Nfld/L, Maritimes, Gt Lakes. Circumpolar.

LYCOPODIELLA HOLUB

A segregate of *Lycopodium* L.

Plants creeping, horizontal stems surficial, supine or arching, vertical stems unbranched forming leafy shoots scattered along horizontal stems; strobili solitary; leaves monomorphic, linear-lanceolate, not in distinct ranks; sporophylls generally slightly longer than leaves; sporangia globose, spores rugulate.

L. inundata (L.) Holub

*Formerly *Lycopodium inundatum* L.

Marshes, lakeshores. N America; Alas, Yuk, BC, Alta, Sask, Ont to Nfld/L, Maritimes, Wash, Idaho, Mont, Gt Lakes, N Engl, s to Va. Eurasia.

Lycopodium L.

Stems horizontal, creeping, above ground or below, upright shoots simple or with 1–4 branchlets; leaves of horizontal stems membranous, appressed, scattered on aerial shoots, linear to linear-lanceolate, not imbricate, in 6 or more rows; cones solitary or several, sessile or on leafy peduncles; sporophylls much shorter than leaves of peduncles and stems.

- | | | |
|---|--|----------------|
| 1 | Cones on long peduncles; leaves with hairy apices | L. lagopus |
| | Cones sessile; apices of leaves not hairy | 2 |
| 2 | Ascending shoots simple or branched only once or twice; cones solitary | L. annotinum |
| | Ascending shoots branched several times, plant tree-like; cones 1–7 | L. dendroideum |

L. annotinum L. / Stiff Club-moss

Moist woods. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, Utah, Colo, Ariz, NMex, Gt Lakes to NEngl, s to NC. Eurasia.

L. dendroideum Michx.

*Formerly *L. obscurum* L.

Dry to moist woods and clearings. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Wash, Idaho, Mont, Wyo, SDak, Gt Lakes, NEngl, s to Va. eAsia.

L. lagopus (Laest. ex C. Hartm.) Zinserl. ex Kuzen.

*Formerly *L. clavatum* L.

Open areas, dry woodlands. NAmerica; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, Gt Lakes, Vt, NH, Me. Eurasia.

SELAGINELLACEAE / Club-moss Family

SELAGINELLA P. BEAUV. / LITTLE CLUB-MOSS

- 1 Plants forming small mats; leaves lanceolate, spinulose, not bristletipped; strobili conspicuous, \pm subcylindric S. selaginoides

Plants tufted or trailing; leaves of sterile branches linear-lanceolate, rigid, densely crowded, overlapping, minutely ciliate on margins, bristle-tipped; strobili inconspicuous, sharply 4-angled 2
- 2 Leaves abruptly adnate to stem, which is easily seen when leaves detached S. wallacei

Leaves strongly decurrent, stem clothed with decurrent bases when leaves detached 3

- 3 Main stems radially symmetrical; leaves all of equal size S. rupestris
- Main stems with upper and lower sides differentiated; leaves of unequal size 4
- 4 Bristle of leaf apices puberulent, generally 1.25–2.0 mm; leaf margins long-ciliate, mostly to 0.15 mm; sporophyll margins long-ciliate S. densa
- Bristles or attenuate apices of leaves not puberulent or only slightly, 0.5–1.25 mm; leaf margins short-ciliate, mostly to ± 0.07 mm; sporophyll margins short-ciliate or denticulate in parts 5
- 5 Sporophylls deltate-ovate, apices truncate in profile, steeply sloped to bristle base; bristle yellowish; margins short-ciliate to denticulate on distal 3/4 S. standleyi
- Sporophylls ovate-lanceolate, apices not truncate in profile; bristle generally white; margins short-ciliate to denticulate on proximal 1/2, cilia absent towards apices S. scopulorum

S. densa Rydb.

Plant low, densely matted; stems short, sterile branches ascending, forming dense flexuous tufts; leaves linear-lanceolate, 2.5–4.5 mm, with long white bristle at tip, pale green to greyish green, with 5–12 cilia on each side; strobili 4-sided, (0.5–) 1–3 (–4) cm; sporophylls ovate-lanceolate, bristle-tipped.

Prairies, open sandhills, exposed habitats. N America; BC, Alta, Sask, Man, Ont, Idaho, Mont, NDak, SDak, Wyo, Neb, Utah, Colo, Ariz, NMex.

S. rupestris (L.) Spring

Dry, open areas. NAmerica; Greenland, Alta to Maritimes, Mont, Wyo, SDak, Neb, Gt Lakes, NEngl, s to Okla and Ga.

S. scopulorum Maxon

Formerly included in *S. densa* Rydb.

Plants similar to *S. densa*. Differing in the characters of the key and the following: leaves 2.5–4 (–4.3) mm, margins short-ciliate.

Rocky outcrops and ledges in alpine and subalpine areas on sandy or granitic substrate. NAmerica; BC, Alta, Wash, Oreg, Idaho, Mont, Wyo, Utah, Colo, Ariz, NMex.

S. selaginoides (L.) P. Beauv. ex Mart. & Schrank

Wet mossy banks, mounds and rocks. NAmerica; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, PEI, NS, Idaho, Mont, Wyo, Nev, Colo, Gt Lakes, Me. Eurasia.

S. standleyi Maxon

*Formerly included in *S. densa* Rydb.

Plants similar to *S. densa*. Differing in the characters of the key and the following: leaves longer (2.5–) 3–4.5 mm, margins short-ciliate to denticulate and shorter; strobili 0.5–1 (–2.3) cm.

Rocky, granitic soils at alpine elevations, alpine meadows. NAmerica; Alas, BC, Alta, Mont, Wyo, Colo.

S. wallacei Hieron.

Dry, rocky slopes. NAmerica; BC, Alta, Wash, Oreg, Idaho, Mont, Calif.

FERNS

- | | | |
|---|--|--------------------------|
| 1 | Leaves (fronds) long-stalked, palmately divided into 4 leaflets (like a 4-leaf clover); plant rooting in mud, leaves sometimes floating in water; spores in hard, bean-like structures | Marsileaceae
p. 39 |
| | Leaves (fronds) not divided into 4 leaflets; spores in sporangia on green leaves or on modified leaf segments | 2 |
| 2 | Sporangia large, borne in a terminal (grape-like) cluster (sorus), sterile blade appearing lateral on a common stalk with fertile blade | Ophioglossaceae
p. 39 |
| | Sporangia minute, borne in clusters (sori) on back or near margins of green blades, or on separate modified fronds | 3 |
| 3 | Fronds strongly dimorphic, sterile green, fertile turning brown | 4 |
| | Fronds not strongly dimorphic | 5 |
| 4 | Plants up to 20 cm high; fertile fronds longer than sterile | Pteridaceae p. 49 |
| | Plants >40 cm high; fertile fronds shorter than sterile | Dryopteridaceae
p. 31 |
| 5 | Sori on leaf margin, not round | 6 |
| | Sori set in from leaf margin (if marginal, sori round) | 7 |
| 6 | Sori continuous along leaf margin | 8 |
| | Sori not continuous, kidney-shaped | Pteridaceae p. 49 |

7	Fronds pinnate, pinnately lobed or entire		9
	Fronds compound pinnate, 2 or more divisions		11
8	Plants >30 cm high; fronds bipinnate	Dennstaedtiaceae	p. 30
	Plants mostly <30 cm high; fronds pinnate to bipinnate	Pteridaceae	p. 49
9	Pinnae lobed, about as long as broad, frond usually <10 cm	Aspleniaceae	p. 30
	Pinnae simple, much longer than broad, frond usually >10 cm		10
10	Pinnae rounded at end, marginal spines lacking	Polypodiaceae	p. 48
	Pinnae acute at apex, with conspicuous marginal spines	Dryopteridaceae	p. 31
11	Stipe generally 2 or 3× longer than blade; lowest pair of pinnae much larger than those above, blade almost appearing trifoliolate	Dryopteridaceae	p. 31
	Stipe generally much less than 2× as long as blade; lowest pair of pinnae not much larger than those above		12
12	Lowest pair of pinnae reflexed; conspicuous hyaline hairs on midrib and veins of lower leaf surface	Thelypteridaceae	p. 52
	Plants not as above	Dryopteridaceae	p. 31

ASPLENIACEAE

A segregate of Polypodiaceae.

Plants terrestrial on rock, rarely epiphytic; stems erect, scaly; leaves monomorphic, blades variable, simple to 4-pinnate, usually with glandular hairs and a few linear scales, veins free or anastomosing; sori borne on veins, lunate or linear, indusium present; gametophytes green, cordate.

ASPLENIUM L. / SPLEENWORT

A. trichomanes-ramosum L. / Green Spleenwort

*Formerly *A. viride* Huds. *A. ramosum* L. is a synonym.

Limestone and other basic rocks to 4,000 m. N America incl. Mex; Alas, Yuk, Greenland, BC, Alta, Ont, Que, Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, SDak, Gt Lakes, N Engl, Calif, Nev, Utah, Colo. Europe, Asia, Africa, Australia.

DENNSTAEDTIACEAE

A segregate of Polypodiaceae.

Plants terrestrial; stems short to long creeping, subterranean, jointed, hairy or with scales; leaves monomorphic, circinate in bud, blades pinnate, rachis and costae grooved adaxially in most genera, veins free or sometimes joined at margins; sori near or on blade margin, indusia present, free or fused with portion of blade margin to form a pouch, margin sometimes revolute covering sorus; gametophytes green, cordate.

PTERIDIUM GLED. EX SCOP. / BRACKEN

P. aquilinum (L.) Kuhn

Four varieties; in Alberta var. *pubescens* Underw. and var. *latiusculum* (Desv.) Underw. ex A. Heller.

Moist to dry woods, forming dense colonies. N America incl. Mex; Alas, BC, Alta, Man to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, SDak, Gt Lakes to N Engl, s to Calif and Fla. Almost worldwide.

DRYOPTERIDACEAE

A segregate of Polypodiaceae.

Plants perennial, of diverse habit, terrestrial or on rock; leaves arising from horizontal, creeping rhizomes or short and \pm erect rhizomes; leaves circinate in bud, monomorphic or dimorphic, with scales, glands or hairs especially on lower surface, blades pinnately divided with 1–5 divisions, sometimes more; sporangia on lower surface, aggregated into clusters (sori) on veins or tips of veins; sori naked or covered with an indusium; spores all alike, variously ornamented; gametophytes (prothalli) green, minute, cordate, flat, on surface of moist substrate. The family is sometimes defined more narrowly to exclude, for example, *Woodsia*, *Gymnocarpium* and *Matteuccia*.

- | | | |
|---|---|-------------|
| 1 | Leaves strongly dimorphic, fertile or sterile; plants of moist woods | Matteuccia |
| | Leaves all of 1 kind (monomorphic); plants of various habitats | 2 |
| 2 | Pinnae entire, with conspicuous marginal spines; plants of shaded rocks in mountains | Polystichum |
| | Pinnae divided or lacking marginal spines; plants of various habitats | 3 |
| 3 | Stipe 2–3 \times longer than leaf blade; lowest pair of pinnae much larger than those above | 4 |
| | Stipe much less than 2 \times as long as leaf blade; lowest pinnae not much larger than those above | 5 |

- | | | |
|---|--|--------------|
| 4 | Indusium present | Cystopteris |
| | Indusium absent | Gymnocarpium |
| 5 | Plants tufted, small, mostly <20 cm; lowest pinnae somewhat remote | 6 |
| | Plants larger, generally >20 cm, tufted or with scattered or single fronds; lowest pinnae not remote | 7 |
| 6 | Indusium evident, hood-like, attached laterally; stipe bases not persistent | Cystopteris |
| | Indusium not evident, obscured by sorus; stipe bases persistent | Woodsia |
| 7 | Indusium absent; plants of alpine habitats | Athyrium |
| | Indusium present; plants mostly of lowland habitats | 8 |
| 8 | Indusium round or reniform, attachment at sorus, margin not fimbriate | Dryopteris |
| | Indusium elongate, flap-like, attached along 1 margin to vein subtending sorus, margin often fimbriate | Athyrium |

ATHYRIUM ROTH

- | | |
|--|-----------------|
| Indusium absent; plants of alpine habitats | A. alpestre |
| Indusium present; plants of woods and thickets | A. felix-femina |

A. alpestre (Hoppe) Clairv.

*Formerly *A. distentifolium* Tausch ex Opiz.

Several varieties; in Alberta var. *americanum* Butters.

Wet alpine talus slopes. NAmerica; Alas, Yuk, Greenland, BC, Alta, Que, Nfld/L, Wash, Oreg, Idaho, Mont, Wyo, Calif, Nev, Utah, Colo.

A. filix-femina (L.) Roth ex Mert. / Lady Fern

Several varieties; in Alberta var. *cyclosorum* Rupr.

Moist woods, stream banks. NAmerica; Alas, Yuk, NWT, BC, Alta to Que, Wash, Oreg, Idaho, Mont, Wyo, SDak, Calif.

CYSTOPTERIS BERNH. / BLADDER FERN

Fronds tufted; rhizome rather thick, unbranched; blades of fronds broadly lanceolate, 2–3-pinnate; pinnae about equal at base

C. fragilis

Fronds scattered; rhizome slender, branched; blades of fronds deltoideovate, somewhat ternate and 2–3-pinnate; pinnae very unequal at base

C. montana

C. fragilis (L.) Bernh.

The subsp. *dickieana* (R. Sim) Hyl. is no longer regarded as a valid taxon.

Rocks, cliff faces. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, NMex, Kans, Gt Lakes, NEngl. Worldwide.

C. montana (Lam.) Bernh. ex Desv.

Wet woods, streams. NAmerica; Alas, Yuk, NWT, Greenland, BC, Alta, Sask, Ont, Que, Nfld/L, Maritimes, Mont, disjunct Colo. Eurasia.

DRYOPTERIS ADANS. / SHIELD FERN

- | | | |
|---|--|----------------|
| 1 | Fronds 2–20 cm, aromatic; blades glandular on margins, veins and rachis; indusia often overlapping; xerophytic | D. fragrans |
| | Fronds 10–100 cm, not especially aromatic; blades rarely glandular; indusia not overlapping; chiefly in woods | 2 |
| 2 | Blades mostly bipinnate to tripinnate, segments with spinulose teeth; indusia small, dot-like | 3 |
| | Blades mostly bipinnate, segments not spinulose or rather obscurely so; indusia ± 1 mm wide | 4 |
| 3 | Basal pinnule on lowest pinna not much larger than opposite pinnule; scales of stipe uniformly coloured | D. carthusiana |
| | Basal pinnule on lowest pinna much larger than opposite pinnule; scales of stipe darker in middle than near margin | D. expansa |
| 4 | Pinnae lanceolate or linear-lanceolate, similar, longest 8–18 cm; petioles <1/4 length of leaves; scales dimorphic, some broad, some hair-like | D. filix-mas |
| | Pinnae oblong-lanceolate and (lower) triangular-ovate, longest 6–8 cm; petioles 1/4–1/3 length of leaves; scales narrow to broad, none hair-like | D. cristata |

D. carthusiana (Vill.) H.P. Fuchs / Narrow Spinulose Shield Fern
Moist woods, stream banks. NAmerica; Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Wash, Idaho, Mont, Gt Lakes, NEngl, s to Neb, Ark and SC. Eurasia.

D. cristata (L.) A. Gray
Wet woods, swamps, wetlands. NAmerica; BC, Alta to Nfld/L, Maritimes, Mont, Gt Lakes to NEngl, Iowa, s to Tenn and NC, disjunct Neb and Ala. Europe.

D. expansa (C. Presl) Fraser-Jenk. & Jermy / Broad Spinulose Shield Fern

*Formerly *D. assimilis* S. Walker.

Moist woods and rocky slopes. NAmerica; Alas, Yuk, NWT, Greenland, BC, Alta, Ont, Que, Nfld/L, Wash, Oreg, Idaho, Mont, Minn, Wisc, Mich, Calif. Europe.

D. filix-mas (L.) Schott / Male Fern

Moist woods, igneous rock outcrops, limestone talus. NAmerica; Greenland, BC, Alta, Sask, Ont, Que, Nfld/L, NB, NS, Wash, Oreg, Idaho, Mont, SDak, s to Calif, Ariz, NMex, Tex, Okla, Gt Lakes, Vt, Me. Asia, Europe.

D. fragrans (L.) Schott / Fragrant Shield Fern

Cliff faces, talus. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Gt Lakes, NEngl. Europe, Asia.

GYMNOCARPIUM NEWMAN

- 1 Adaxial leaf blades (fronds) glabrous or somewhat glandular, abaxially somewhat or densely glandular G. jessoense

Adaxial and abaxial leaf blades essentially glabrous 2
- 2 Basal pair of pinnules of second and third pinnae markedly unequal, upper ones (towards apex of whole leaf) $<1/4$ size of those opposite (towards base of whole leaf) G. disjunctum

Basal pair of pinnules of second and third pinnae \pm same size, upper ones (towards apex of whole leaf) same size or $1/3$ – $1/2$ size of those opposite (towards base of whole leaf) G. dryopteris

G. disjunctum (Rupr.) Ching

*Formerly *G. dryopteris* (L.) Newman var. *disjunctum* (Rupr.) Ching.

Rhizome slender, forked, blackish with brown scales 2–4 mm in size; stipes 10–40 cm, scaly at base, glabrous; blades deltate, 8–24 cm, with 3 primary pinnate or bipinnate divisions, ultimate segments lobed; sori round, indusia lacking. $2n = 80$.

Moist coniferous and mixed woods, ravines, stream banks. N America; Alas, BC, Alta, Wash, Oreg, Idaho, Mont, disjunct Wyo. Asia.

G. dryopteris (L.) Newman / Oak Fern

*Formerly *G. dryopteris* (L.) Newman var. *dryopteris*.

Rhizome slender, forked, blackish with brown scales 1–4 mm in size; stipes 9–28 cm, scaly at base, glabrous; blades deltate, 5–18 \times 5–25 cm, with 3 primary pinnate or bipinnate divisions, ultimate segments lobed; sori round, indusia lacking. $2n = 160$.

Coniferous and mixed woods, talus slopes. N America; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Idaho,

Mont, Gt Lakes to NEngl, Iowa, WVa, NJ, disjunct Oreg, Wyo, SDak, Colo, Ariz, NMex. Circumpolar.

G. jessoense (Koidz.) Koidz.

Acid or neutral, cool talus slopes. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Ont, Que, NB, Minn, Iowa, Wisc, Mich, Me, disjunct Vt, Conn. Eurasia.

MATTEUCCIA TOD.

M. struthiopteris (L.) Tod. / Ostrich Fern

One variety in North America; var. *pensylvanica* (Willd.) C.V. Morton. Woods, swamps. NAmerica; BC, Alta to Nfld/L, Maritimes, NDak, Gt Lakes, NEngl, s to Mo and Va, disjunct Alas, Yuk, NWT, SDak. Eurasia.

POLYSTICHUM ROTH

P. lonchitis (L.) Roth / Northern Holly Fern

Rock crevices, talus, boulders, ravines, subalpine to alpine elevations. NAmerica; Alas, Yuk, Greenland, BC, Alta, Ont, Que, Nfld/L, NS, Wash, Oreg, Idaho, Mont, Wyo, Calif, Nev, Utah, Colo, Gt Lakes, disjunct Ariz.

WOODSIA R. BR.

- 1 Fronds glabrous except for glands; proximal pinnae fan-shaped, wider than long; stipe yellow or green

W. glabella

- Fronds with scattered scales, hairs or glands; proximal pinnae lanceolate to ovate or deltate, usually longer than wide; stipe reddish brown or dark purple

2

- 2 Stipes with a swollen articulation area above base W. *ilvensis*
- Stipes lacking a swollen articulation area above base 3
- 3 Stipes brittle, easily shattered; pinnae with flat multicellular hairs along midrib on both surfaces W. *scopulina*
- Stipes pliable, not easily shattered; pinnae lacking multicellular hairs along midrib on both surfaces W. *oregana*

W. *glabella* R. Br. / Smooth Woodsia

Cliff faces, crevices, rocks, generally calcareous. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Minn, NY, Vt, NH, Me. Eurasia.

W. *ilvensis* (L.) R. Br. / Rusty Woodsia

Cliffs, rocks of varying composition. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Gt Lakes to NEngl, s to Iowa and NC. Eurasia.

W. *oregana* D.C. Eaton / Oregon Woodsia

Two subspecies; in Alberta subsp. *oregana*.

Granitic or volcanic rocks. NAmerica; BC, Alta, Sask to Que, s to Calif, Ariz, NMex, Okla, disjunct NY.

W. *scopulina* D.C. Eaton / Mountain Woodsia

Three subspecies; two in Alberta: subsp. *laurentiana* Windham with some scales at base of stems and petioles with clusters of dark cells centrally forming a broken black median stripe; and subsp. *scopulina* with scales at base of stems and petioles of uniform colour or a few isolated dark cells.

Cliffs, rocky slopes. NAmerica; Alas, Yuk, BC, Alta to Que, Wash, Oreg, Idaho, Mont, Wyo, SDak, Minn, Calif, Nev, Utah, Colo, Ariz.

MARSILEACEAE / Water-clover Family

MARSILEA L.

The only genus.

M. vestita Hook. & Grev.

Ponds, lakeshores, river alluvium, ditches, vernal pools. N America incl. Mex; BC, Alta, Sask, wUS from Minn, Iowa, Kans, Ark, La. wSAmerica.

OPHIOGLOSSACEAE / Adder's-tongue Family

BOTRYCHIUM SW. / GRAPE FERN

Key adapted from Wagner and Wagner (1993), Williston (2001) and Farrar (2006).

- | | | |
|---|---|-----------------------|
| 1 | Plant with 2 fertile blades (sporophores) | <i>B. paradoxum</i> |
| | Plant with 1 fertile blade (sporophore)
and 1 sterile blade (trophophore) | 2 |
| 2 | Plants usually ≥ 12 cm tall; trophophore
deltate | 3 |
| | Plants usually < 12 cm tall; trophophore
deltate or oblong to linear | 5 |
| 3 | Trophophore blade thin, herbaceous;
leaf sheath open; sporophore attached to
base of trophophore, high on common
stalk; leaves deciduous | <i>B. virginianum</i> |
| | Trophophore blade herbaceous to
leathery; leaf sheath closed; sporophore
arising from ground; leaves evergreen | 4 |

4	Trophophore bluish green; pinnae undivided at tip	B. oneidense
	Trophophore shiny green; pinnae divided to tip	B. multifidum
5	Trophophore twice-pinnate or pinnate-pinnatifid	6
	Trophophore once-pinnate or entire, not pinnatifid	12
6	Trophophore blade deltate, pinnate; pinnae and pinnae lobes lanceolate to linear; sporophores several equally long branches	B. lanceolatum
	Trophophore blade ovate to oblong (deltate-oblong in <i>B. hesperium</i>), pinnate; pinnae and pinnae lobes deltate to linear; sporophores with single stalk or 1 main and 2 smaller	7
7	Trophophore with a broad apical pinna; pinnae not pinnatifid above basal pair	B. simplex
	Trophophore without a broad apical pinna; pinnae usually pinnatifid above basal pair	8
8	Peduncle of trophophore 1/4–1/2 length of blade; lowermost pinnae of trophophore occasionally with sporangia	B. pedunculosum
	Peduncle of trophophore absent or reduced in size, <1/4 length of blade; pinnae rarely with sporangia	9

- 9 Pinnae with many lobes, lowest pinnae symmetrical; pinnae \pm at right angle to main stem B. pinnatum
- Pinnae with few lobes, lowest pinnae asymmetrical with exaggerated lower lobes; pinnae at less than right angle to main stem 10
- 10 Lowest pinna pair evidently larger than rest B. michiganense
- Lowest pinna pair equal or only slightly larger than rest 11
- 11 Trophophore blade deltate; basal pinna pair elongate B. hesperium
- Trophophore blade oblong; basal pinna pair not elongate B. matricariifolium
- 12 Basal pinnae broadly fan-shaped 13
- Basal pinnae narrowly fan-shaped or cuneate to lanceolate or linear 14
- 13 Plants herbaceous; pinnae with 2–5 pairs, well separated, margins crenate to dentate; sporophores 1.3–3 \times length of trophophore B. crenulatum
- Plants fleshy; pinnae with 4–9 pairs, approximate to overlapping, margins usually entire to undulate, rarely dentate or crenulate; sporophores 0.8–2 \times length of trophophore B. lunaria

- 14 Pinnae strongly ascending, margins conspicuously dentate-lacerate, basal pair often with sporangia *B. ascendens*
- Pinnae spreading or slightly ascending, margins entire to crenate or rarely dentate 15
- 15 Pinnae elongate, \pm linear to narrowly spatulate 16
- Pinnae not elongate, broadly spatulate to oblong 17
- 16 Pinnae narrowly spatulate to wedge-shaped, often shallowly cleft into non-spreading lobes, largest pinnae usually not basal *B. campestre*
- Pinnae linear, often deeply cleft into widely spreading lobes, basal pinnae usually largest *B. lineare*
- 17 Trophophore sessile or short-stalked *B. spathulatum*
- Trophophore distinctly stalked 18
- 18 Sporophore tall, stalk equal to or longer than trophophore; branches of sporophore spreading, not overlapping; pinnae narrowly fanshaped, entire to shallowly lobed *B. minganense*
- Sporophore short, stalk $\leq 3/4$ length of trophophore; branches of sporophore ascending and overlapping; pinnae entire to deeply cleft *B. pallidum*

B. ascendens W.H. Wagner

Plants to 15 cm; sterile blade once-pinnate; pinnae in 3–5 well-separated pairs, ascending; basal pinna pair approximately equal in size to adjacent pair, margins denticulate, often incised, apex rounded, venation fan-shaped, basal proximal pinnae often with sporangia; sporophores 1.5–2× height of sterile blade.

Grassy fields, meadows, roadsides. N America; Alas, Yuk, BC, Alta, Oreg, Mont, Calif, Nev, disjunct Ont.

B. campestre W.H. Wagner & Farrar

Plants to 15 cm, often with clusters of minute gemmae at root bases; sterile blade once-pinnate with broad rachis; ≤5 pairs of well-separated pinnae; blade glaucescent, folded, fleshy; basal pinna pair ± equal in size to adjacent pair, mostly linear to linear-spatulate, undivided to tip, margins crenulate to dentate usually notched into ≥2 segments, apex rounded to acute, venation fan-shaped; sporophores once-pinnate, 1–1.5× height of sterile blade. Appears in early spring and dies back by early summer.

Grassy meadows. N America; Alta, Sask, Ont, Mont, s to Colo, Neb, Iowa, e to Gt Lakes.

B. crenulatum W.H. Wagner

Plants to 20 cm; sterile blades yellow green, blades oblong, once-pinnate; ≤5 pairs of pinnae, well separated; basal pinna pair approximately equal in size to adjacent pair, pinnae broadly fan-shaped, margins mainly crenulate to dentate, apex rounded, venation fan-like; sporophores 1–2-pinnate, 1–1.5× length of trophophore.

Wet meadows, marshes. N America; Alta, Wash, Oreg, Idaho, Mont, Wyo, Calif, Nev, Utah.

B. hesperium (Maxon & R.T. Clausen) W.H. Wagner & Lellinger

Produces a sterile hybrid with *B. paradoxum* (*B. × watertonense* W.H. Wagner) known in Alberta only from Waterton Lakes National Park.

Plants to 15 cm; blade dull, grey green, narrowly oblong to deltate, 1–2-pinnate; ≤6 pairs of approximate, ascending pinnae; basal pinna pair oblong to oblong-lanceolate with lobed margins, larger and more divided than adjacent pair; lobed to tip, other pinnae broadly spatulate, entire or shallow lobed, apex rounded, venation pinnate; sporophores 1–3-pinnate, 2–3× length of sterile blade.

Grassy mountain slopes, roadsides. NAmerica; BC, Alta, Sask, Idaho, Mont, Wyo, Utah, Colo, Ariz, disjunct Ont and Mich.

B. lanceolatum (S.G. Gmel.) Ångstr.

Two subspecies; in Alberta subsp. *lanceolatum*.

Mountain slopes. NAmerica; Alas, Yuk, Greenland, BC, Alta, Sask, Ont, Que, Nfld/L, Maritimes, s to Calif, Ariz, Colo, Gt Lakes, NEngl, s to Tenn, NC. Eurasia.

B. lineare W.H. Wagner

Plant to 20 cm, pale green; sterile blade oblong, once-pinnate; pinnae ≤6 pairs, widely separated, linear, ascending, often cleft at apex; sporophore 1–2× length of sterile blade.

Grassy meadows, open forests. NAmerica; Alas, BC, Alta, Que, NB, Idaho, Mont, SDak, Calif, Nev, Utah, Colo.

B. lunaria (L.) Sw.

Meadows, banks, slopes, open woods. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, SDak, Gt Lakes, NEngl. Eurasia, SAmerica.

B. matricariifolium (Döll) A. Braun ex W.D.J. Koch

Plants to 30 cm; sterile blade glaucescent, oblong, 1–3-pinnate; pinnae ≤ 7 pairs, approximate; basal pinnae \pm equal in size, spatulate-ovate to narrowly ovate, divided to tip, margins entire to lobed or dissected, apex round to acute, venation pinnate; sporophores 1–3-pinnate, 1.3–2.4 \times length of trophophore.

Grassy meadows. NAmerica; Alta, Ont to Nfld/L, Maritimes, SDak, Iowa, Gt Lakes, NEngl, s to Tenn, NC. Europe.

B. michiganense W.H. Wagner

Plants to 15 cm tall; sterile blade pinnate-pinnatifid to undulate; basal pinnae much larger than adjacent; trophophore sessile to short-stalked; sporophore divided into 3 axes.

Meadows. NAmerica; BC, Alta to Ont, Wash, Idaho, Mont, Wyo, NDak, SDak, Minn, Wisc, Mich.

B. minganense Vict.

Plants to 15 cm tall; sterile blade dull green, once-pinnate, oblong to linear; pinnae ≤ 10 pairs, approximate to remote; basal pinna pair approximately equal in size to adjacent pair, circular to fan-shaped, ovate, margins approximately entire, crenulate, apex rounded, fan-shaped venation; sporophores 1–2-pinnate in very large, robust plants, 1.5–2.5 \times length of trophophore.

Wet to dry meadows. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, NDak, Gt Lakes, NEngl, Calif, Nev, Utah, Colo, Ariz.

B. multifidum (S.G. Gmel.) Rupr.

Also known as *Sceptridium multifidum* (S.G. Gmel.) Nishida ex Tagawa.

Wet meadows, moist, sandy areas. NAmerica; Alas, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Idaho, Mont, Wyo, NDak, Gt Lakes, NEngl, s to Calif, Nev, Colo, Ariz, Va. Circumpolar.

B. oneidense (Gilbert) House

Plants perennial to 15 cm; stalk of sterile blade 1.5–2.5× length of blade rachis; blade dull bluish green, evergreen, 2–3-pinnate, leathery; pinnae ≤5 pairs, usually widely separated, horizontal to ascending; pinnules obliquely ovate, margins crenulate to denticulate, apex rounded to acute, venation pinnate; sporophores 2–3-pinnate.

Moist acidic woods. N America; Ont, Que, NB, Gt Lakes, N Engl, s to Tenn and NC, disjunct Alta.

B. pallidum W.H. Wagner

Plants to 15 cm, often with cluster of gemmae at root bases; blade glaucous, oblong, longitudinally folded when alive, once-pinnate; pinnae ≤5 pairs, approximate, ascending; basal pinna pair equal in size, fan-shaped, asymmetric, lobed to divided to tip, margins entire to crenate-dentate, largest pinnae often split into 2 unequal lobes, apex rounded, venation fan-shaped; sporophores 1–2-pinnate, 1.5–4× length of trophophore.

Open fields, meadows. N America; Alta, Sask to Ont, Que, Mich, Ohio, Me, Colo.

B. paradoxum W.H. Wagner

Produces a sterile hybrid with *B. hesperium* (*B. × watertonense* W.H. Wagner) known in Alberta only from Waterton Lakes National Park.

Plants to 15 cm; sterile blade a second sporophore, unequal in size; sporophores double, once-pinnate.

Moist meadows. Widely separated. N America; BC, Alta, Sask, Wash, Idaho, Mont, Wyo, Utah, disjunct Calif.

B. pedunculatum W.H. Wagner

Plants to 20 cm; stalk reddish brown; trophophore grey green, dull, leathery, pinnate-pinnatifid; ≤5 pairs of separated pinnae; basal pinna pair approximately equal in size, ovate to spatulate, lobed to tip,

margin entire to lobed, apex rounded to acute, occasionally with sporangia; sporophores 1–3-pinnate, 2–4× length of trophophore.

Meadows, shrublands, woods. NAmerica; Alas, BC, Alta, Sask, Que, Nfld/L, Oreg, Idaho, Mont, Calif.

B. pinnatum H. St. John

Plants to 12 cm; trophophore sessile or with short stalk, bright green, oblong-deltate, 1–2-pinnate; pinnae ≤ 7 pairs, slightly ascending, approximate to overlapping; basal pinna pair approximately equal in size, ovate to lanceolate to spatulate, deeply and regularly lobed or pinnulate, lobed to tip, margins entire to shallowly crenate, apex truncate to acute, venation pinnate; sporophores twice-pinnate, 1–2× length of trophophore.

Grassy slopes, stream banks, woods. NAmerica; Alas, Yuk, NWT, BC, Alta, Wash, Oreg, Idaho, Mont, Wyo, Calif, Nev, Utah, Colo.

B. simplex E. Hitchc.

Moist meadows, shores. NAmerica; w population: BC, Alta, Wash, Oreg, Idaho, Mont, Wyo, Calif, Nev, Utah, Colo; e population: Greenland, Ont, Que, Nfld/L, Maritimes, Gt Lakes, NEngl, s to NC. Europe, Japan.

B. spathulatum W.H. Wagner

Plants to 15 cm; trophophore blade shiny yellow green, narrowly deltate, once-pinnate, thick, leathery; pinnae ≤ 8 pairs, ascending, remote; basal pinna pair approximately equal in size, narrowly spatulate to linear-spatulate, rounded, lobed or unlobed to tip, margins entire or shallowly incised, apex rounded, notched, venation fan-like; sporophores 1–2-pinnate, 1.2–2× length of trophophore.

Sparsely vegetated sand dunes, grassy meadows. NAmerica; w population: Alas, Yuk, NWT, BC, Alta, Idaho, Mont; e population: Ont, Que, Maritimes, Mich.

B. virginianum (L.) Sw. / Grape Fern

Also known as *Botrypus virginianus* (L.) Holub.

Moist woods, thickets. Most of N America incl. Mex except Nunavut, Greenland, Calif. C America, S America, Eurasia.

POLYPODIACEAE / Polypody Family

Plants perennial, terrestrial, on rocks, often epiphytic; stem creeping, branched or not, scaly; leaves monomorphic (in Alberta), circinate in bud, stipe articulate at base, blade simple or pinnate (Alberta); sori abaxial, on veins, round or oval, marginal or inset, indusium absent; gametophytes green, cordate or elliptical, above ground; spores all of 1 kind. More narrowly defined than previously. One genus in Alberta.

POLYPODIUM L.

- | | | |
|---|--|-----------------------|
| 1 | Sori oval, set midway between costa and margin, paraphyses absent | <i>P. hesperium</i> |
| | Sori round, marginal, paraphyses present | 2 |
| 2 | Paraphyses with glandular hairs; stem scales uniformly light brown or conspicuously bicoloured | <i>P. virginianum</i> |
| | Paraphyses lacking glandular hairs; stem scales uniformly dark brown or obscurely bicoloured with a paler margin | <i>P. sibiricum</i> |

***P. hesperium* Maxon**

Moist, noncalcareous cliffs, ledges. N America incl. Mex; BC, Alta, Wash, Oreg, Idaho, Mont, Calif, Nev, Utah, Colo, Ariz, NMex.

***P. sibiricum* Sipliv.**

Similar to *P. virginianum*, differing in the characters of the key as well as smaller spores, usually <52 microns compared with >52 microns in

P. virginianum, and a chromosome number of $2n = 74$ compared with $2n = 148$ in *P. virginianum*.

Cliffs, ledges of varying substrates including granite and dolomite. NAmerica; Alas, Yuk, NWT, Greenland, BC, Alta, Sask, Man, Ont, Que. Asia.

***P. virginianum* L.**

Cliffs, rocks of a variety of substrates. NAmerica; NWT, Alta to Nfld/L, Maritimes, Gt Lakes, NEngl, s to Ark, Tenn, Ala, Ga.

PTERIDACEAE

A segregate of Polypodiaceae.

Plants perennial, terrestrial or rocky habitats, small, rarely large; stems with hairs and/or scales; leaves monomorphic or dimorphic, circinate in bud or not; stipes scaly, blades pinnate to multipinnate, indumentums various; sori marginal, discrete or forming continuous submarginal border, sometimes covering whole lower blade surface, indusia absent; sporangia sometimes covered by revolute or folded leaf margin; spores all of 1 kind, variously ornamented; gametophytes green above ground on substrate surface.

- | | | |
|---|--|--------------|
| 1 | Leaves strongly dimorphic, fertile large; petioles yellow or green, at least distally | Cryptogramma |
| | Leaves monomorphic, not strongly dimorphic; petioles brown to dark purple or black | 2 |
| 2 | Sporangia in discrete, marginal reniform sori, each sorus covered by reflexed margin of pinna lobe; leaves deciduous | Adiantum |
| | Sporangia in a continuous marginal or submarginal row, sometimes covered by recurved margin of pinna | 3 |

- 3 Leaf blades densely pubescent and/or scaly
on lower surface; distal pinnae <5 mm Cheilanthes
- Leaf blades glabrous, lower surface not scaly
or pubescent; distal pinnae >5 mm Pellaea

ADIANTUM L.

A. aleuticum (Rupr.) C.A. Paris / Maidenhair Fern

Rhizomes creeping, short or slightly erect with reddish-brown scales with golden margins; stipes deep reddish brown to black, stiff, 10–40 cm tall, forking above into equal branches; leaves broadly fan-shaped, 4–40 × 4–30 cm, ultimate segments oblong, fan-shaped, 2–4 (or 3.2)× longer than wide, apices with sharply denticulate, angular lobes, lobes separated by sinuses 0.6–4 mm deep; false indusia, oblong to crescent-shaped, 0.2–3.5 (–6) mm, glabrous.

Wet rock fissures at alpine elevations. NAmerica incl. Mex; Alas, BC, Alta, Que, Nfld/L, s to Calif, Ariz and Colo in w, s to Md in e, many occurrences disjunct.

CHEILANTHES SW.

Leaf blades with conspicuous scales on rachis
and costae abaxially C. gracillima

Leaf blades lacking scales (dehisced sporangia
are not scales) C. feei

C. feei T. Moore / Slender Lip Fern

Calcareous cliffs and ledges. NAmerica incl. Mex; BC, Alta, e to Wisc, s to Calif, Ariz, NMex, Tex, Ark, Tenn, disjunct Ky, WV.

C. gracillima D.C. Eaton

Cliffs, rocks, usually igneous. NAmerica; BC, Alta, Wash, Oreg, Idaho, Mont, Calif, Nev, Utah.

Cryptogramma R. Br. / Rock Brake

Rhizomes short, ascending to erect; fronds clustered, sterile ones firm, somewhat leathery *C. acrostichoides*

Rhizomes slender, creeping to decumbent; fronds scattered along stem, sterile ones delicate, ephemeral *C. stelleri*

C. acrostichoides R. Br.

Noncalcareous, often dryish cliffs, rocky outcrops. N America incl. Mex; Alas, Yuk, NWT, BC, Alta, Sask, Man, Ont, s to Calif, Ariz, NMex. Circumpolar.

C. stelleri (S.G. Gmel.) Prantl

Calcareous cliffs, ledges. N America; w population: Alas, Yuk, NWT, BC, Alta, disjunct Oreg, Wyo, Nev, Utah, Colo; e population: Ont, Que, Nfld/L, Maritimes, Iowa, Gt Lakes, N Engl, NJ, disjunct W Va. Europe, Asia.

PELLAEA LINK / CLIFF-BRAKE

Leaves monomorphic, 2–40 cm; blades linear-oblong to ovate-lanceolate, ultimate segments 5–20 mm; lower surface glabrous *P. glabella*

Leaves somewhat dimorphic, sterile leaves shorter than fertile, 8–25 cm; blades lanceolate to deltate, ultimate segments 7–30 mm; lower surface sparsely villous *P. gastonyi*

P. gastonyi Windham

Stems compact, ascending; scales linear, reddish-brown margins entire or denticulate; leaves somewhat dimorphic, sterile ones shorter, 8–25 cm, petioles reddish purple to dark brown, lustrous, blades lanceolate to deltate, 2-pinnate proximally, 3–6 cm, sparsely villous adaxially. A recently described species. Part of the *P. atropurpurea*-*P. glabella*

complex, both of which have been involved in its origin through hybridization. *Formerly *P. atropurpurea* (L.) Link in *Flora of Alberta* (Second Edition), but this species is restricted to southern and eastern North America. Collections called *P. atropurpurea* from western Canada are *P. gastonyi*.

Calcareous cliffs, ledges. N America; scattered localities in BC, Alta, Sask, Man, Wyo, SDak, Mo.

P. glabella Mett. ex Kuhn

Several subspecies; in Alberta subsp. *simplex* (Butters) Á. Löve & D. Löve and subsp. *occidentalis* (E.E. Nelson) Windham.

Calcareous cliffs, ledges. N America; NWT, BC, Alta, Sask, Man, Wash, Idaho, Mont, Wyo, NDak, SDak, Utah, Colo, Ariz, NMex.

THELYPTERIDACEAE

Formerly included in Polypodiaceae.

Plants terrestrial or on rocks; stems creeping, ascending to erect, scaly when young; fronds monomorphic (Alberta) or somewhat dimorphic, blades narrowly to broadly deltate, generally large, pinnate to pinnate-pinnatifid, lowest pair sharply deflexed in *Phegopteris*; sori marginal to submarginal, round or oblong, indusia present or absent (Alberta); gametophytes green, cordate, usually hairy or glandular.

PHEGOPTERIS (C. PRESL) FÉE

P. connectilis (Michx.) Watt

Moist, moderately to strongly acidic soils on shaded rocks. N America; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Oreg, Idaho, Mont, Gt Lakes, N Engl, s to Iowa, Tenn, NC. Eurasia.

SPERMATOPHYTA / SEED PLANTS

GYMNOSPERMAE / CONIFERS

- 1 Leaves needle-like, borne singly (and alternate) or in clusters of 2–5; ovulate cones absent or woody with many spirally arranged scales 2

Leaves scale-like, if needle-like, opposite or whorled; ovulate cones woody or fleshy, scales ≤ 12 , opposite or whorled Cupressaceae
p. 53
- 2 Plants dioecious; ovulate cones lacking, seeds solitary, surrounded by a red fleshy cup-like aril Taxaceae p. 60

Plants monoecious; ovulate cones woody, several–many-seeded Pinaceae p. 55

CUPRESSACEAE

- Seeds in a small dry cone; large trees (or may be small in Alberta) Thuja
- Seeds in a berry-like cone; small trees or shrubs Juniperus

JUNIPERUS L. / JUNIPER

Plants shrubs or small trees; leaves scale-like or awl-shaped, opposite or in whorls of 3; pollen and seed cones on same or separate plants; pollen cones very small, catkin-like; seed cones berry-like, greenish at first, becoming bluish, with 1–6 seeds.

- | | | |
|---|--|-----------------|
| 1 | Leaves of 1 kind, awl-shaped, in whorls of 3, spreading, 5–15 mm | J. communis |
| | Leaves of 2 kinds, mostly scale-like, opposite, appressed, 1–1.5 mm | 2 |
| 2 | Shrub, branches prostrate; scale leaves strongly apiculate | J. horizontalis |
| | Shrub or small tree, branches erect; scale leaves not strongly apiculate | J. scopulorum |

J. communis L. / Ground Juniper

Several varieties; in Alberta var. *depressa* Pursh.

Woods, open slopes. NAmerica; throughout Canada and continental US except Neb, Iowa, Kans, Mo, Ky, Okla, Ark, Tenn, Tex, La, Miss, Ala, Fla. Circumpolar.

J. horizontalis Moench / Creeping Juniper

Hybridizes with *J. scopulorum* Sarg.

Sandy and rocky areas. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Mont, Wyo, e to Gt Lakes and NEngl.

J. scopulorum Sarg. / Rocky Mountain Juniper

Hybrids between *J. scopulorum* and *J. horizontalis* occur and have been named *J. × fassettii* B. Boivin (*J. scopulorum* var. *patens* Fassett).

Open rocky areas. NAmerica incl. Mex; BC, Alta, Wash, Oreg, Idaho, Mont, NDak, s to Ariz, NMex, Tex, except Calif.

THUJA L.

T. plicata Donn ex D. Don / Western Red Cedar

Cool, moist mountain slopes. NAmerica; Alas, BC, Alta, Wash, Oreg, Idaho, Mont, Calif.

PINACEAE / Pine Family

- | | | |
|---|--|-------------|
| 1 | Leaves (needles) borne singly on branches | 2 |
| | Leaves (needles) in groups of 2 or more | 5 |
| 2 | Branches (from which leaves have fallen)
rough with peg-like projections | 3 |
| | Branches not rough with peg-like projections | 4 |
| 3 | Leaves 4-sided, not narrowed at base | Picea |
| | Leaves flattened, narrowed at base | Tsuga |
| 4 | Cones erect, scales falling away at maturity;
bracts shorter than scales; winter buds blunt,
rounded; leaf scars circular | Abies |
| | Cones drooping, scales persistent on axis;
bracts longer than scales and 3-lobed; winter
buds sharp-pointed; leaf scars oval | Pseudotsuga |
| 5 | Leaves evergreen, 2–5 in a cluster,
surrounded by a basal papery sheath | Pinus |
| | Leaves deciduous, 10–40 in a cluster on a
short spur shoot, cluster lacking a sheath | Larix |

ABIES MILL. / FIR

- | | |
|---|-------------|
| Seed cones 4–7 × 1.5–3 cm; leaves 1.5–3 mm
wide; adaxial leaf surfaces with 0–3 stomatal
rows at midlength | A. balsamea |
| Seed cones 5–10 × 3–3.5 cm; leaves 1.25–
1.5 mm wide; adaxial leaf surfaces with 3–6
stomatal rows at midlength | A. bifolia |

A. balsamea (L.) Mill. / Balsam Fir

Plants trees up to 23 m, trunks to 0.6 m; bark grey, smooth, in age becoming broken into irregular scales; lower branches spreading, often drooping, twigs mostly opposite; leaves 1.2–2.5 cm × 1.5–2 mm, 1-ranked to alternate, grooved adaxially, deep green adaxially with 0–3 rows of stomata (midleaf), resin canals median, away from margins and upper and lower leaf surfaces; pollen cones at pollination red, purple, bluish, greenish or orange; seed cones cylindrical, 4–7 × 1.5–3 cm, sessile, grey purple becoming brown; scales pubescent 1–1.5 × 0.7–1.7 mm (reverse in more western populations), bracts included or exerted and reflexed over scales; seeds 3–6 × 2–3 mm. Boreal and northern forests, commonly mixed with white spruce and poplar. N America; Alta to Nfld/L, Maritimes, Iowa, Gt Lakes, N Engl, s to Va.

A. bifolia A. Murray bis / Subalpine Fir

Formerly included in *A. lasiocarpa* (Hook.) Nutt., but chemical analysis of terpenes and recently disclosed anatomical features indicate that *A. bifolia* is distinct from *A. lasiocarpa*, which is a more western species extending from Alaska and Yukon through British Columbia to Washington, Oregon and California.

Plants trees up to 30 m, trunks to 0.5 m, becoming shrubby at timberline; branches stiff, twigs opposite to whorled; leaves 1.1–2.5 cm × 1.25–1.5 mm, alternate, turned upward, grooved adaxially, light green to bluish green, with 3–6 rows of stomata (midleaf); fresh leaf scars with a light brown periderm; resin canals median, away from margins, and upper and lower surfaces; pollen cones reddish purple at pollination; seed cones cylindrical, 5–10 × 3–3.5 cm, sessile, greyish purple to dark bluish purple, scales densely pubescent, 1.5–2.5 cm, bracts included; seeds 5–7 × 2–3 mm.

Subalpine coniferous forests. N America; Yuk, NWT, BC, Alta, s to Oreg, Nev, Ariz, NMex.

LARIX MILL. / LARCH

- 1 Seed cones 1–2.5 cm, bracts shorter than scales; leaves 1–2.5 cm long, 3-angled L. laricina
Seed cones 2–5 cm, bracts longer than scales; leaves 3–4 cm long, 2-angled 2
- 2 Leaves 4-angled; twigs tomentose; bracts much exceeding scales and with reflexed tips L. lyallii
Leaves 3-angled; twigs soon becoming glabrate; bracts not greatly exceeding scales in mature cones L. occidentalis

L. laricina (Du Roi) K. Koch / Tamarack

Peatlands in central and northern areas. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Gt Lakes, NEngl, s to WVa and Md.

L. lyallii Parl. / Subalpine Larch

A tree of high altitudes, usually at upper timberline. NAmerica; BC, Alta, Wash, Idaho, Mont.

L. occidentalis Nutt. / Western Larch

Moist mountain slopes. NAmerica; BC, Alta, Wash, Oreg, Idaho, Mont.

PICEA A. DIETR. / SPRUCE

- 1 Seed cones persisting for several years, usually <2.5 cm, often purplish; twigs hairy and dull brown; leaves usually blunt at apex P. mariana
Seed cones deciduous, 2.5–8 cm, brown when mature; twigs glabrous or minutely hairy; leaves more pointed 2

2 Seed scales stiff, broadly rounded at apex, entire; cones 2.5–5 cm; leaves mostly <1.5 cm and sharp-pointed; twigs glabrous P. glauca

Seed scales flexible, truncate to pointed at apex, erose; cones 3–8 cm; leaves mostly >1.5 cm, apex flattened and short-pointed; twigs minutely hairy P. engelmannii

P. engelmannii Parry *ex* Engelm. / Engelmann Spruce

Two varieties; in Alberta var. *engelmannii*.

An important species in subalpine forest on the eastern slopes of the Rocky Mountains. NAmerica incl. Mex; BC, Alta, s to Calif, Ariz, NMex.

P. glauca (Moench) Voss / White Spruce

Hybridizes with *P. engelmannii* producing intergrading forms in areas of contact, some of which have been named, for example vars. *albertiana* (S. Brown) Sarg. and *porsildii* Raup, which are generally no longer given formal taxonomic recognition.

Mountains, northern forests. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, s to Wyo, SDak, Gt Lakes, NEngl.

P. mariana (Mill.) Britton / Black Spruce

The most common tree of peatlands in Alberta, also found on drier soils northward and in the mountains. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Gt Lakes, NEngl, Pa, NJ.

PINUS L. / PINE

1 Leaves in groups of 2 2

Leaves in groups of 5 3

- | | | |
|---|--|---------------|
| 2 | Cones directed towards shoot apex, strongly incurved or divergent; scales without prickles at maturity | P. banksiana |
| | Cones commonly reflexed or spreading at right angle; scales with a persistent prickle | P. contorta |
| 3 | Cones cylindrical, long-stalked; scales thin; needles with finely serrated margins | P. monticola |
| | Cones ovoid, short-stalked or sessile; scales thick; needles with smooth margins | 4 |
| 4 | Cones 8–20 cm, opening at maturity; scales light brown, very thick at tip | P. flexilis |
| | Cones 3–7 cm, remaining closed; scales purplish, very thick in middle and towards tip | P. albicaulis |

P. albicaulis Engelm. / Whitebark Pine

At treeline in the Rocky Mountains. NAmerica; BC, Alta, s to Calif, Nev, Wyo.

P. banksiana Lamb. / Jack Pine

Common on sandy and gravelly places in central and northern regions of Alberta. NAmerica; NWT, BC, Alta to Que, Maritimes, Gt Lakes, NEngl.

P. contorta Douglas *ex* Loudon / Lodgepole Pine

Three varieties; in Alberta var. *latifolia* Engelm. Produces hybrids of intermediate morphology with *P. banksiana* where ranges of the two species overlap in central Alberta.

The most common tree species at lower and middle altitudes on the eastern slopes of the Rocky Mountains in Alberta. NAmerica; Yuk, NWT, BC, Alta, Wash, Oreg, Idaho, Mont, Wyo, SDak, Utah, Colo.

P. flexilis E. James / Limber Pine

Exposed rocky slopes, hilltops to subalpine elevations. NAmerica; BC, Alta, Oreg, Idaho, Mont, Wyo, NDak, SDak, Neb, Calif, Nev, Colo, Ariz, NMex.

P. monticola Douglas *ex* D. Don / Western White Pine

Open rocky slopes. NAmerica; BC, Alta, Wash, Oreg, Idaho, Mont, Calif, Nev.

PSEUDOTSUGA CARRIÈRE

P. menziesii (Mirb.) Franco / Douglas Fir

Two varieties; in Alberta var. *glauca* (Mayr) Franco.

Forests on mountain slopes and valleys. NAmerica incl. Mex; BC, Alta, Wash, Oreg, Idaho, Mont, Wyo, Nev, Utah, Colo, Ariz, NMex, Tex.

TSUGA (ENDL.) CARRIÈRE / HEMLOCK

T. heterophylla (Raf.) Sarg. / Western Hemlock

Moist montane forests. NAmerica; Alas, BC, Alta, Wash, Oreg, Idaho, Mont, Calif.

TAXACEAE / Yew Family

TAXUS L. / YEW

T. brevifolia Nutt. / Western Yew

Moist forests. NAmerica; Alas, BC, Alta, Wash, Oreg, Idaho, Mont, Calif.

ANGIOSPERMAE / FLOWERING PLANTS

MONOCOTYLEDONEAE / MONOCOTS

- | | | | |
|---|--|-------------------------|---|
| 1 | Plants submersed or free floating aquatics, only flowers sometimes elevated a little above water | | 2 |
| | Plants terrestrial or emergent aquatics with lower parts in water, but upper stem, leaves and flowers elevated much above it | | 8 |
| 2 | Plants thallus-like, not differentiated into stem and leaves | Lemnaceae p. 153 | |
| | Plants differentiated into stem and leaves | | 3 |
| 3 | Flowers in conspicuous, globose, unisexual heads | Sparganiaceae p. 266 | |
| | Flowers not as above | | 4 |
| 4 | Perianth present | | 5 |
| | Perianth absent | | 6 |
| 5 | Flowers biseriate, 3-merous, imperfect (dioecious); ovary inferior; leaves linear, 1–2 cm long | Hydrocharitaceae p. 140 | |
| | Flowers uniseriate, 4-merous, perfect; ovary superior; leaves generally longer or wider | Potamogetonaceae p. 257 | |

6	Leaves alternate; flowers perfect, in terminal spikes	Ruppiaceae p. 263	
	Leaves opposite or whorled; flowers imperfect, axillary		7
7	Leaf margins minutely spinulose; ovary solitary	Najadaceae p. 159	
	Leaf margins not spinulose; ovaries 2 or more	Zannichelliaceae p. 273	
8	Perianth with at least some coloured, showy petal-like parts		9
	Perianth entirely lacking coloured petal-like parts		24
9	Plants emergent aquatics; carpels 6–many, distinct or coherent at base		10
	Plants not emergent aquatics; carpels 3, rarely 2, fused		11
10	Outer perianth segments (sepals) green; ovaries with a single ovule; fruits (achenes) indehiscent, 1-seeded	Alismataceae p. 68	
	Outer perianth segments (tepals) pinkish; ovaries with several ovules; fruits (follicles) dehiscent, several-seeded	Butomaceae p. 72	
11	Ovary superior; stamens 2–4, 3–6		12
	Ovary inferior; stamens 1–3		23

- 12 Perianth biseriate with clearly differentiated sepals (green) and petals (blue or white with pink or bluish tinge or markings) 13
- Perianth with segments all similar (tepals), not differentiated into sepals and petals 14
- 13 Leaves broadly ovate to rhombic, 6–12 cm; plants of moist woods Trilliaceae p. 270
- Leaves linear, 5–50 cm; plants of sand dunes and sandy prairies Commelinaceae p. 73
- 14 Leaves reduced to scales, photosynthetic organs (cladodes) being axillary branches with finely divided, needle-like segments; flowers axillary Asparagaceae p. 72
- Leaves green, photosynthetic organs not reduced; cladodes absent; flowers usually terminal 15
- 15 Flowers generally pink or purple, in terminal umbels; plants with an onion/garlic odour Alliaceae p. 69
- Flowers not in terminal umbels; plants lacking an onion/garlic odour 16
- 16 Leaves linear to linear-lanceolate, usually many times longer than wide; fruit dry 17
- Leaves lanceolate or broader, usually >5× longer than wide; fruit often juicy 21
- 17 Flowers 1–3 (–5) Liliaceae p. 155
- Flowers more numerous 18

- 18 Tepals 6–12 mm Melanthiaceae p. 157
 Tepals longer 19
- 19 Inflorescence 20–100 cm; tepals 12.5–50 mm Agavaceae p. 67
 Inflorescence much shorter; tepals 10–20 mm 20
- 20 Leaves equitant and/or with flowers in fascicles of (2–) 3s and upper stem glandular Tofieldiaceae p. 268
 Leaves not equitant Melanthiaceae p. 157
- 21 Plants scapose; tepals white or bright yellow, 20–35 mm Liliaceae p. 155
 Plants not scapose, stems leafy; tepals generally much shorter, 3–18 mm, cream, white, greenish white or greenish yellow, occasionally brownish crimson with yellowish tips 22
- 22 Inflorescences in terminal racemes or panicles, usually manyflowered, tepals white, (0.1–) 1–5 mm Ruscaceae p. 264
 Inflorescences terminal or axillary, usually 1–4 (–5)-flowered, tepals cream to greenish white or greenish yellow, 8–18 mm (occasionally, *Streptopus streptopoides* tepals brownish crimson with yellow-green tips, 3–5 mm) Uvulariaceae p. 271
- 23 Flowers regular; stamens 3 Iridaceae p. 140
 Flowers irregular; stamens 1 or 2 Orchidaceae p. 160

24	Flowers in a fleshy spadix 2–10 cm, subtended by a conspicuous white spathe or a green leaf-like appendage, spadix then appearing to be lateral; emergent aquatics	25
	Flowers not in a spadix	26
25	Leaves narrowly linear, not petiolate; spadix 3–8 cm; white spathe subtending spadix absent	Acoraceae p. 67
	Leaves long-petioled, blades ovate to rounded, bases cordate; spadix 1.5–2.5 cm; white spathe subtending spadix present	Araceae p. 71
26	Ovary solitary with 1 locule and 1 ovule	27
	Ovary not as above (either ovaries ≥ 2 , \pm united at least towards base, or if ovary solitary, then with ≥ 2 locules, or if ovary solitary and 1-loculed, then with ≥ 3 ovules)	31
27	Style and stigmas 1	28
	Styles or stigmas 2 or 3	30
28	Leaves all basal, terete	Juncaginaceae p. 152
	Leaves not all basal, not terete	29
29	Flowers in dense cylindrical spikes; achenes stipitate, hairy	Typhaceae p. 271
	Flowers in dense globose heads; achenes not stipitate or hairy	Sparganiaceae p. 266

- 30 Stem usually hollow and terete, never triangular; leaves 2-ranked, sheaths usually open; flowers mostly perfect, distichous on spikelet axis, or only 1 flower in spikelet; each flower subtended by 2 bracts (lemma and palea); perianth bristles absent; stigmas 2 Poaceae p. 173
- Stem usually solid, often triangular; leaves generally 3-ranked, sheaths usually closed; flowers spirally arranged, seldom distichous; each flower subtended by a single bract; perianth bristles mostly present or flowers imperfect; stigmas 2 or 3 Cyperaceae p. 74
- 31 Flowers unisexual, in dense globose heads Sparganiaceae p. 266
- Flowers bisexual 32
- 32 Perianth dry, often scarious; fruit a capsule; flowers in chaffy heads or in clusters at branch ends or laterally on stem Juncaceae p. 141
- Perianth herbaceous; fruit not capsular; flowers in elongate spike-like racemes or flowers ± 5 in a short raceme 33
- 33 Flowers ± 5 ; carpels united only at base; fruits follicles, ovoid, 4–10 mm; seeds 1–2 (–3) Scheuchzeriaceae p. 266
- Flowers many; carpels \pm united; fruits schizocarps $\leq 8 \times 2$ mm; seeds 1 per locule Juncaginaceae p. 152

ACORACEAE / Sweet Flag Family

Formerly included in Araceae.

Plants herbs, perennial, aromatic; rhizomes branched, creeping, shallow; leaves basal, linear, not differentiated into petioles and blade; inflorescences lateral spadices subtended by a linear leaf-like green structure (often but erroneously called a spathe); flowers numerous, bisexual, hypogynous; tepals 6; stamens 6; carpels 2–3, connate; fruits berries.

ACORUS L.

A. americanus (Raf.) Raf. / Sweet Flag, Calamus

A native species, confused for many years with the introduced European *A. calamus* L.

Swamps, streams, lakes and pools. NAmerica; Alas, NWT, BC, Alta to NB, Nfld/L, Wash, Idaho, Mont, NDak, SDak, Neb, Gt Lakes, NEngl, NJ, Va.

AGAVACEAE

A segregate of Liliaceae.

Plants trees, shrubs or herbs, rhizomatous; leaves alternate, sometimes in a basal rosette, simple, entire, usually succulent, apex often sharply spined, venation parallel, stipules lacking; inflorescences terminal, racemose; flowers bisexual, hypogynous or epigynous, radial; tepals 6, petaloid, free or fused; stamens 6; carpels 3, fused, placentation axile, ovules numerous; fruits capsules, dehiscence loculicidal; seeds flat, black.

Plants herbaceous with bulbs; tepals \pm 2 cm,
blue

Camassia

Plants woody at base, with numerous spine-
tipped basal leaves, lacking bulbs; tepals
3–5 cm, greenish white or yellowish

Yucca

CAMASSIA LINDL.

C. quamash (Pursh) Greene / Blue Camas
Several subspecies; in Alberta subsp. *quamash*.

Wet meadows. N America; BC, Alta, Wash, Oreg, Idaho, Mont, Wyo.

YUCCA L. / SPANISH BAYONET

Y. glauca Nutt. / Soapweed

Dry sandy prairies. N America; Alta, Mont, NDak, s to NMex, Tex, Iowa.

ALISMATACEAE / Water-plantain Family

Leaves usually ovate or elliptic-lanceolate;
stamens usually 6; carpels in a single whorl
on a small flat receptacle

Alisma

Leaves sagittate or, when submersed, without
blades; stamens many; carpels crowded on a
large convex receptacle

Sagittaria

ALISMA L. / WATER-PLANTAIN

Sepals 1.5–3 mm, petals 2–4 mm, anthers
0.3–0.6 mm

A. gramineum

Sepals 3–6 mm, petals 3.5–6 mm, anthers
0.6–1.0 mm

A. triviale

A. gramineum Lej. / Narrow-leaved Water-plantain

Marshes, ponds, streams. N America; BC, Alta to Que, s to Calif, Ariz, Colo, Neb, Minn, NY, Vt. Eurasia.

A. triviale Pursh / Broad-leaved Water-plantain

*Formerly *A. plantago-aquatica* L. in *Flora of Alberta* (Second Edition), but *A. plantagoaquatica* is introduced in North America and not known from Alberta.

Marshes, ponds, ditches. NAmerica incl. Mex; Alas, NWT, BC, Alta to Nfld/L, s to Calif, Ariz, NMex, Okla, Gt Lakes, NEngl.

SAGITTARIA L. / ARROWHEAD

Beak of achene erect, <0.5 mm; head of achenes at maturity seldom >1.5 cm wide; monoecious

S. cuneata

Beak of achene at inner margin of top and pointing inward, 0.5–2 mm; head of achenes at maturity usually >1.5 cm wide; often dioecious

S. latifolia

S. cuneata E. Sheld. / Arrowhead, Wapato

Mud, shallow water. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Tex, Iowa, Gt Lakes, NJ, NEngl.

S. latifolia Willd. / Arrowhead, Wapato

Ponds, lakes. NAmerica incl. Mex; BC, Alta to Maritimes, Calif, Colo, NDak, s to Tex and e to NEngl and Fla.

ALLIACEAE

Formerly included in Liliaceae.

Plants herbs, with an onion odour and taste, scapose, perennial, from bulbs; leaves basal, linear, not differentiated into petiole and blade; inflorescence umbels subtended by ≥ 3 papery spathe-like bracts; flowers bisexual, hypogynous, sometimes replaced partially or completely by bulbils; tepals 6, petal-like, in 2 similar series; stamens 6, epitepalous; carpels 3, connate, trilocular, usually 2 ovules per locule; fruit a loculicidal capsule; seeds black.

ALLIUM L. / ONION

- 1 Leaves terete or nearly so, hollow at least towards base; umbel compact, pedicels much shorter than flowers; ovary crestless A. schoenoprasum

Leaves flat or channelled, not hollow; inflorescence umbellate, umbels with longer pedicels; ovary crested with 6 flattened or knob-like processes 2
- 2 Outer bulb coats without fibres, or with parallel fibres, not fibrous-reticulate; umbel nodding A. cernuum

Outer bulb coats fibrous-reticulate; umbel erect or nearly so 3
- 3 Flowers usually sterile, some or all replaced by bulbils A. geyeri

Flowers fertile, bulbils not formed on pedicels 4
- 4 Leaves ≥ 3 per scape; tips of inner perianth segments erect; alveoli of seeds pustuliferous; flowers usually pink A. geyeri

Leaves usually 2 per scape; tips of inner perianth segments spreading; alveoli of seeds not pustuliferous; flowers usually white A. textile

A. cernuum Roth / Nodding Onion

Parkland prairies, open slopes, thickets, rock slides. N America incl. Mex; BC, Alta, Sask, s to Oreg, Idaho, Ariz, NMex, Tex, Gt Lakes s to Ark, Ala, Ga.

A. geyeri S. Watson

Two varieties, both in Alberta: var. *geyeri* with normal flowers and var. *tenerum* M.E. Jones in which flowers are largely replaced with ovoid, acuminate bulbils.

Wet meadows, along streams. NAmerica; BC, Alta, Sask, Wash, Oreg, Idaho, Mont, Wyo, SDak, Nev, Utah, Colo, Ariz, NMex, Tex.

A. schoenoprasum L. / Wild Chives

*Formerly *A. sibiricum* L. Varieties formerly recognized are no longer.

Wet meadows, banks, shores. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, s to Wash, Idaho, Colo, Gt Lakes, NEngl, NJ. Circumpolar.

A. textile A. Nelson & J.F. Macbr. / Prairie Onion

Dry plains, hills. NAmerica; Alta, Sask, Man, s to Wash, Nev, Utah, NMex, Kans, Minn, Iowa.

ARACEAE / Arum Family

Plants herbs, perennial, rhizomatous, stoloniferous or cormose, in a variety of habitats; leaves usually differentiated with sheathing petioles and blades; inflorescences spadices subtended by a conspicuous spathe; flowers few to many, bisexual or unisexual, hypogynous; tepals present or absent; stamens 2–12; carpels 1–3 (–many), connate; fruits berry-like.

CALLA L.

C. palustris L. / Water Arum, Wild Calla

Marshy and peaty areas. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, NDak, Gt Lakes, NEngl, Md, NJ. Circumpolar.

ASPARAGACEAE / Asparagus Family

A segregate of Liliaceae.

Plants herbs or shrubs, perennial, rhizomatous; leaves membranous, sometimes spiny subtending cladophylls (photosynthetic modified branches); inflorescences axillary or terminal, racemose or umbellate; flowers hypogynous, bisexual or unisexual; tepals 6, distinct or connate proximally, campanulate or rotate; carpels 3, connate; fruits red or purplish black, baccate, globose; seeds 1–6.

ASPARAGUS L.

A. officinalis L. / Asparagus

Dry banks, disturbed sandy ground, an escape from cultivation. Introduced. Eurasia, nAfrica.

BUTOMACEAE / Flowering Rush Family

Plants herbs, perennial, rhizomatous; leaves basal, linear or petiolate with rounded blades, usually emergent; inflorescence scapose, umbellate; flowers bisexual, hypogynous; tepals 6 in 2 series; stamens 9; carpels 6–many, distinct or connate proximally; fruits follicles.

BUTOMUS L.

B. umbellatus L. / Flowering Rush

Plants emergent aquatic herbs, rhizomatous; stems terete, ≥ 1 m; leaves basal, distichous, linear, \pm as long as or longer than stems; inflorescence umbelliform, subtended by 3 scarious, purplish bracts, peduncles ≤ 10 cm; flowers 2.5–3 cm, numerous, bisexual, hypogynous, actinomorphic; perianth segments petaloid, distinct, outer 3, pinkish tinged green, elliptic, 6–7.5 mm, inner 3, pink, oblanceolate, 9–11.5 mm; stamens 9, purplish; gynoecium 6 distinct carpels, coherent at base, ovaries multiovulate; fruit follicles, obovoid, to 1 cm, styles persistent.

Marshes, muddy lake margins, stream banks. Introduced. Eurasia.

COMMELINACEAE / Spiderwort Family

Plants herbs, annual or perennial; leaves alternate, sessile or petiolate; inflorescences terminal or axillary, sometimes subtended by spathe-like or foliaceous bracts; flowers hypogynous, bisexual and usually unisexual (monoecious), actinomorphic or zygomorphic; sepals 3, distinct or connate, generally green; petals distinct or connate; stamens 6, all functional, rarely some staminoidal; carpels 2–3, connate; fruits loculicidal capsules, rarely indehiscent, or berries.

TRADESCANTIA L.

T. occidentalis (Britton) Smyth / Western Spiderwort

Plants perennial herbs; stems erect or ascending, occasionally rooting at nodes, 5–90 cm, glabrous; leaves sessile, linear to linear-lanceolate, 5–50 cm; inflorescences terminal or axillary, flowers in umbel-like contracted clusters subtended by a spathe-like papery bract, pedicels 1–3 cm; flowers bisexual, actinomorphic, hypogynous, perianth segments free; sepals 3, green, 4–11 mm; petals 3, blue, rose or magenta, broadly ovate, 1.2–1.6 cm; stamens 6, filaments hairy; gynoecium of 3 fused carpels, placentation axile, 2 ovules per locule, style 1; fruit a loculicidal capsule; seeds 2–4 mm. Two varieties; in Alberta var. *occidentalis*.

Sand dunes, sandy prairies. NAmerica; Alta, Sask, Man, Mont, NDak, Minn, Wisc, s to Ariz, NMex, Tex, La.

CYPERACEAE / Sedge Family

- | | | |
|---|---|--------------|
| 1 | Flowers unisexual, only staminate or pistillate | 2 |
| | Flowers staminate and pistillate | 3 |
| 2 | Perigynium fused except for opening at tip through which stigmas of a single pistillate flower protrude | Carex |
| | Perigynium open on 1 side and containing a single pistillate flower and usually 1–3 staminate flowers | Kobresia |
| 3 | Scales of spikelets 2-ranked; perianth lacking; spikelets in terminal heads or spikes | Cyperus |
| | Scales of spikelets spirally imbricate; perianth usually present as bristles | 4 |
| 4 | Achenes crowned with a tubercle | 5 |
| | Achenes without a persistent tubercle | 6 |
| 5 | Spikelets solitary; stem leafless | Eleocharis |
| | Spikelets several; stem with bristle-like leaves | Rhynchospora |
| 6 | Bristles numerous, much elongating in fruit, silky | Eriophorum |
| | Bristles 1–6, rarely lacking (elongating only in <i>Trichophorum alpinum</i>) | 7 |
| 7 | Spikelets solitary, terminal; involucre bract, when present, short, often shorter than spikelet; cauline leaves absent or <1 cm | Trichophorum |
| | Spikelets 1–many; involucre bracts ≥ 2 , leaf-like; cauline leaves usually well developed | 8 |

- | | | |
|----|--|----------------|
| 8 | Ligules absent; culms cormose at base; rhizomes with swollen nodes; achenes 2.3–5.3 × 1.9–2.9 mm | Bolboschoenus |
| | Ligules present; culms not cormose at base; rhizomes lacking swollen nodes; achenes 0.7–3.5 × 0.4–2.3 mm | 9 |
| 9 | Ligules ciliate, proximal leaf sheaths often disintegrating into fibres; achenes greenish to orange brown; plants of extreme southern Alberta | Amphiscirpus |
| | Ligules not ciliate, leaf sheaths not disintegrating into fibres; achenes whitish or pale brown to dark grey brown; plants more widely distributed | 10 |
| 10 | Culms 50–400 cm, cylindrical (if trigonous, inflorescence capitate, <i>S. pungens</i>); achenes dark greyish brown, 1.5–3.5 × 1.7–2.3 mm | Schoenoplectus |
| | Culms 20–100 cm, trigonous; achenes white or whitish, 0.7–1.6 × 0.1–1.0 mm | Scirpus |

AMPHISCIRPUS OTENG-YEBOAH

Formerly included in *Scirpus* L.

Plants perennial, cespitose or not, rhizomatous; culms mostly solid, ± terete, tough, wiry; leaves basal, sheaths often disintegrating into fibres, ligules ciliate, blades strongly C-shaped in crosssection to sub-cylindric, tough, wiry; inflorescences terminal, involucre bracts 1–3, spreading or erect, leaf-like; spikelets 1–6 (–10), 5–20 × 3–5 mm; scales 30–60, spirally arranged, each subtending a flower, smooth, glabrous, margins ciliate; flowers bisexual; perianth of 1–6 bristles, straight, equal to or shorter than achene, retrorsely spinulose; stamens 3; styles deciduous, linear, bifid; achenes planoconvex or unequally biconvex.

A. nevadensis (S. Watson) Oteng-Yeboah

*Formerly *Scirpus nevadensis* S. Watson.

Plants herbs, perennial, rhizomatous; rhizomes ≤ 6 mm thick, tough; culms 10–70 cm, slender, wiry, cylindrical, finely ridged, without air cavities; leaves mostly basal, sheaths loose, often degrading to fibres, ligules ciliate, blades 3–30 cm; involucre bract 1–15 cm, leaf-like, appearing as a continuation of culm or lateral, at an angle to it; spikelets 1–6, ovoid, 0.5–2 cm; flowers bisexual; perianth bristles 1–6, retrorsely spinulose; stamens 3; style bifid; achenes 2–3 mm, reticulate.

Wet alkaline soils. N America; BC, Alta, Sask, s to Calif, Nev, Utah, Colo, Neb. S America.

BOLBOSCHOENUS (ASCH.) PALLA

Formerly included in *Scirpus* L.

Plants herbs, perennial, rhizomatous; culms cormose, sharply trigonous; leaves basal and cauline, sheaths cylindrical, ligules absent, blades keeled below, trigonous distally; involucre bracts several, leaf-like, longer than inflorescences; inflorescences terminal, spikelets many (≤ 80), 4–10 mm; flowers bisexual; perianth bristles 3–6; stamens 3; styles 2 or 3; achenes biconvex to trigonous, 2.3–5.5 mm, smooth.

Culms mostly 30–70 cm high; styles usually
2-branched; perianth bristles caducous;
achenes biconvex, 2.3–4.0 mm, float in water *B. maritimus*

Culms mostly 100–150 cm high; styles
3-branched; perianth bristles persistent;
achenes trigonous, 3.8–5.5 mm, sink in water *B. fluviatilis*

B. fluviatilis (Torr.) Soják

*Formerly *Scirpus fluviatilis* (Torr.) A. Gray.

Margins of ponds, lakes. N America; BC, Alta, e to NB, s throughout US except Wyo, Nev, NMex, Tex, Okla, Ark, La, Miss, Ky, WV, NC, Ga, Fla. Asia.

B. maritimus (L.) Palla

*Formerly *Scirpus paludosus* A. Nelson.

Two subspecies; in Alberta subsp. *paludosus* (A. Nelson) T. Koyama.

Low wet ground, especially saline flats. Most of N America incl. Mex except Yuk, Nunavut, Greenland, Nfld/L, Wisc, Ind, Ohio, Pa, and s to Gulf and Atlantic coasts. S America.

CAREX L. / **SEDGE**

Key is based on Ball and Reznicek (2002) and Reznicek (2012).

- | | | |
|---|--|---------|
| 1 | Spikes 1 | Group 1 |
| | Spikes >1 (sometimes aggregated into a head) | 2 |
| 2 | Stigmas 2; achenes lens-shaped to planoconvex in cross-section | Group 2 |
| | Stigmas 3 (-4); achenes triangular (obovoid) in cross-section (note some flowers in <i>C. petricosa</i> can be distigmatic, but tristigmatic flowers are always present) | Group 3 |

GROUP 1

- | | | |
|---|---|----------------------|
| 1 | Spikes entirely staminate | 2 |
| | Spikes with at least some pistillate flowers | 3 |
| 2 | Bases of plants with distinct red or purple colour | <i>C. scirpoidea</i> |
| | Bases of plants yellow to brown or black, without red or purple | <i>C. gynocrates</i> |
| 3 | Stigmas 2; achenes lens-shaped in cross-section | 4 |
| | Stigmas 3; achenes triangular in cross-section | 7 |

4	Spikes pistillate or androgynous; pistillate scales cuspidate, acute or acuminate; plants with long slender rhizomes	<i>C. gynocrates</i>	
	Spikes androgynous; pistillate scales obtuse; plants cespitose or short-rhizomatous		5
5	Perigynia erect or ascending; bases of plants with conspicuous persistent fibrous basal sheaths	<i>C. nardina</i>	
	At least proximal perigynia spreading to reflexed at maturity; basal sheaths not conspicuous		6
6	Perigynia with a few veins on abaxial side, not glossy; bases of plants with some red colour	<i>C. capitata</i>	
	Perigynia veinless and somewhat glossy when mature; bases of plants without red	<i>C. micropoda</i>	
7	Perigynia pubescent at least at base of beak		8
	Perigynia glabrous, although sometimes minutely papillose		9
8	Bases of plants without red or purple; spikes all androgynous	<i>C. filifolia</i>	
	Bases of plants with distinct red or purple colour; spikes usually pistillate	<i>C. scirpoidea</i>	
9	Proximal pistillate scales ≥ 10 mm, leaf-like; staminate scales with margins united at base		10
	Proximal pistillate scales < 10 mm, not leaf-like; staminate scales with margins separate to base		12

- 10 Perigynia only loosely investing achene, gradually tapered to beak 2–3 mm (measured from apex of achene) *C. backii*
- Perigynia tightly investing achene, abruptly tapered to beak 0.5–1.5 mm (measured from apex of achene) 11
- 11 Leaves dark green to glaucous, margins white-hyaline, proximal leaf margins and midrib smooth to scabrous; perigynium body papillose on distal 1/3; achenes 2.5–3 mm *C. saximontana*
- Leaves dull green to yellowish green, not glaucous, margins green, proximal leaf margins densely papillose; perigynium beak and body smooth; achenes 2.8–3.5 mm *C. cordillerana*
- 12 Perigynia 4–6× (or more) as long as wide 13
- Perigynia 1.5–4× as long as wide 14
- 13 Perigynia 3.4–4.7 mm, not including stiff, straight bristle (rachilla) conspicuously exerted from orifice of beak and exceeding style; pistillate scales (except proximal) 2.4–3 mm *C. microglochin*
- Perigynia (5–) 5.9–7.8 mm, without bristle but with style exerted; pistillate scales 3.7–5.9 mm *C. pauciflora*
- 14 Bases of plants with red or purple colour 15
- Bases of plants yellow, brown or black, without red or purple 16

- 15 Perigynia dark brown to nearly black; fronts of sheaths on stems with red dots *C. obtusata*
- Perigynia pale yellow-brown with dark tip; fronts of sheaths on stems without red dots *C. rupestris*
- 16 Perigynia with veins on faces \pm distinct at least over achene 17
- Perigynia veinless except sometimes 2 marginal veins or with very faint veins only on the proximal part 18
- 17 Perigynia rounded at apex, beakless *C. leptalea*
- Perigynia beaked or tapering to apex *C. nardina*
- 18 Spikes with 1–3 perigynia; perigynia 5–7 mm long, ascending; pistillate scales persistent, apex cuspidate to short-awned; montane species *C. geyeri*
- Spikes with >5 perigynia; perigynia 3–4 (–5) mm long, the proximal somewhat reflexed at maturity; pistillate scales deciduous before perigynia, apex obtuse or acute; alpine species 19
- 19 Plants with short-creeping but distinct rhizomes; forming mats; leaves flat to apex, (1.5–) 2–4 mm wide; pistillate scales reddish brown to black, as long as or slightly longer than perigynia *C. nigricans*
- Plants densely cespitose; leaves involute, 0.25–1.5 (–2) mm wide; pistillate scales light to dark brown, shorter than or as long as perigynia *C. micropoda*

GROUP 2

- | | | |
|---|---|---------|
| 1 | Spikes all \pm identical, androgynous or gynecandrous, rarely all unisexual; lateral spikes sessile, usually $<2\times$ as long as wide, usually lacking a leafy bract; basal sheaths brown | 2 |
| | Spikes differentiated, terminal spike staminate or gynecandrous (rarely androgynous); lateral spikes pistillate or androgynous (rarely gynecandrous), usually at least $2\times$ as long as wide, often \pm peduncled and with a leafy bract; basal sheaths brown or reddish-tinged | 24 |
| 2 | Terminal spikes with staminate flowers at base (gynecandrous) | 3 |
| | Terminal spikes with male flowers only at apex (androgynous) or all female | 9 |
| 3 | Margins of perigynia flat, winged, at least in distal $1/2$, the flat portion (0.1–) 0.2 mm wide or wider at tip of achene and base of beak | Group 4 |
| | Margins of perigynia rounded or with narrow flat portion ≤ 0.1 mm wide | 4 |
| 4 | Margins of perigynium bodies rounded or with very narrow rounded edges; achenes nearly filling perigynium bodies | Group 5 |
| | Margins of perigynium bodies sharply edged or \pm narrowly winged; achenes distinctly smaller than perigynium bodies | 5 |
| 5 | Proximal perigynia in each spike reflexed | 6 |
| | Proximal perigynia erect to spreading-ascending | 7 |

- 6 Proximal-most perigynia (2.6–) 2.9–3.6 (–4) mm, (1.7–) 1.8–3.6× as long as wide; beak 0.95–2 mm, 0.45–0.85 length of body; perigynium body gradually tapered from widest point into beak without forming a “shoulder” C. echinata
- Proximal-most perigynia 1.9–3 (–3.3) mm, 1–2 (–2.2)× as long as wide; beak 0.4–0.95 mm, 0.2–0.95 length of body; perigynium body convexly tapered from widest point to beak forming a “shoulder” C. interior
- 7 Inflorescence erect and compact to arching and elongate, but lacking an exaggerated gap between the proximal 2 spikes, proximal spike lacking a conspicuous bristle-like bract; perigynium base not spongy internally C. illota
- Inflorescence arching, with an exaggerated gap between the proximal 2 spikes and a conspicuous bristle-like bract 15–49 mm long on the proximal spike; perigynium base strongly spongy internally 8
- 8 Ligule of distal culm leaf mostly (2.1–) 2.6–6.8 mm; achenes 1.6–2.2 mm; inflorescence with (4–) 5–6 (–7) spikes; anthers 1.3–1.8 mm C. infirminervia
- Ligule of distal culm leaf 0.9–2.2 mm; achenes (1.8–) 1.9–2.2 mm; inflorescence with (2–) 3–5 spikes; anthers 1.8–2.2 mm C. deweyana

- 9 Fronts of sheaths of at least proximal cauline leaves strongly transversely rugose 10
- Fronts of sheaths of cauline leaves smooth or at most very slightly rugose 11
- 10 Perigynia with body tapering into long beak; culms stout, sharply angled, soft and flattened in drying, often 1.5–3 mm wide at \pm 3 cm below inflorescence *C. stipata*
- Perigynia with body abruptly contracted into beak; culms slender, not sharply angled, firm and not flattened in drying, often <1.5 mm wide at \pm 3 cm below inflorescence *C. vulpinoidea*
- 11 Fronts of sheaths of at least proximal cauline leaves red-, yellow- or black-dotted or copper-tinged sometimes mainly at distal end of sheaths 12
- Sheaths of proximal cauline leaves not red-, yellow- or black-dotted or copper-tinged 13
- 12 Leaf sheaths copper-tinged at summit; inflorescence lax and open, pale brown; perigynia (2.1–) 2.3–3 (–3.3) mm, dull, with inner flat face, appressed and covered by scales *C. prairea*
- Leaf sheaths whitish or pale, but red, yellow- or black-dotted, at summit; inflorescence straight, dense or slightly open, dark brown; perigynia (2–) 2.3–2.5 (–2.9) mm, shining, with convex inner face, soon wide-spreading, not completely covered by scales *C. diandra*

- 13 Perigynia abruptly contracted into smooth beak ≤ 0.25 mm C. disperma
- Perigynia with beaks > 0.25 mm, often serrulate on margin 14
- 14 Plants densely cespitose 15
- Plants with long creeping rhizomes or stolons, stems mostly arising singly 16
- 15 Spikes closely aggregated in orbicular or ovoid-oblong head, 1–2 cm; bracts greatly reduced and awl-shaped, $< 1/4$ length of inflorescence; scales acute to short-cuspidate; perigynia 3.2–5 mm C. hoodii
- Spikes in linear head, proximal 3–6 separate, distal aggregated; bracts strongly developed, proximal at times $> 1/2$ length of inflorescence; scales strongly awned; perigynia 2.6–3.5 mm C. hookeriana
- 16 Spikes densely aggregated into globose or ovoid head appearing as 1 spike; spikes consistently androgynous 17
- Spikes not all densely aggregated, proximal ones distinct; spikes mostly androgynous, but mixture of androgynous and unisexual spikes present on individuals of some species 18
- 17 Perigynia ovate to broadly ovate, usually 1.6–2.3 mm wide; pistillate scales mostly with broad hyaline margin C. maritima
- Perigynia elliptic, usually 1–1.5 mm wide; pistillate scales mostly with very narrow hyaline margin C. incurviformis

- 18 Stems arising from stolons \pm at the surface; spikes 2–5 (–7); peatlands *C. chordorrhiza*
- Stems arising from deep-seated underground rhizomes; spikes 3–18; uplands or wetlands 19
- 19 Distal leaves of culms with fronts of sheaths green-veined essentially to apex, not differentiated from rest of sheath *C. sartwellii*
- Distal leaves of culms with fronts of sheaths with at least a narrow hyaline or whitish-hyaline band extending at least 1/2 length of sheath 20
- 20 Perigynia with flat, wing-like margins about 0.1 mm wide, beak bidentate with teeth 0.5 mm *C. siccata*
- Perigynia without flat, wing-like margins <0.1 mm, beak oblique or weakly bidentate with teeth <0.2 mm 21
- 21 Culms obtusely triangular, generally smooth above; rhizomes slender, 0.6–1.9 mm thick with shoots often arising 2–several in a cluster and many nodes without shoots; plants of dry habitats 22
- Culms sharply triangular, scabrous above; rhizomes coarse, (1.5–) 1.8–3.5 mm thick, typically with long unbranched segments from which shoots arise singly every few nodes; plants of moist habitats 23

- 22 Plants usually dioecious; pistillate scales 4.3–7.5 mm, pale brown to whitish; spikes 6–25; perigynia 3–4.8 mm, beak 1–1.9 mm *C. douglasii*
- Plants monoecious; pistillate scales 2.4–4.1 mm, reddish brown; spikes 3–8; perigynia 2.4–3.9 mm, beak 0.3–0.9 mm *C. duriuscula*
- 23 Rhizomes black, 2–3 mm thick; perigynia (2.2–) 2.6–3.74 mm, beak 0.7–1.2 mm *C. praegracilis*
- Rhizomes brown, 1–2 mm thick; perigynia 1.8–2.8 mm, beak 0.2–0.5 mm *C. simulata*
- 24 Terminal spikes gynecandrous 25
- Terminal spikes staminate 27
- 25 Perigynia green at maturity; achene filling 1/2 of perigynium body; all spikes strongly overlapping, inflorescence dense, ± head-like *C. enanderi*
- Perigynia white at maturity; achene filling >3/4 of perigynium body; at least the proximal spikes ± separate, not notably overlapping with the terminal 26
- 26 Pistillate scales black with green midvein, terminal spike usually with 1/3 florets staminate; staminate portion of terminal spike 1.1–1.8 mm wide *C. bicolor*
- Pistillate scales pale to dark brown with a paler midvein, terminal spike usually with >1/3 florets staminate; staminate portion of terminal spike 1.5–2.5 mm wide *C. garberi*

- 27 Perigynia, smooth or minutely papillose, orange, fleshy, spreading at maturity, orbicular-obovate, beakless C. aurea
- Perigynia smooth, brown to reddish brown, purplish or green, not fleshy, erect or ascending at maturity, narrowly elliptic to ovate, beak >0.1 mm 28
- 28 Perigynia smooth and lustrous, at most weakly veined, veins not running to beak, beak 0.4–0.8 mm long; style persistent on achene C. saxatilis
- Perigynia usually papillose and dull, if smooth, then conspicuously veined, veins running to beak, beak 0.1–0.4 mm; style deciduous Group 6

GROUP 3

- 1 Perigynium bodies glabrous 2
- Perigynium bodies pubescent or papillose 29
- 2 Sheaths pubescent, at least near apex of inner band 3
- Sheaths glabrous or papillose 4
- 3 Perigynia often red-dotted, 2.2–3.2 mm, beak 0.2–0.5 mm, orifice entire; leaves 1.5–3 mm wide C. torreyi
- Perigynia not red-dotted, 7–12 mm, beak 2.1–4 mm with teeth (1.2–) 1.5–3 mm; leaves 3–10 mm wide C. atherodes

4	At least proximal bracts with sheath ≥ 5 mm long, if shorter, then sheath at least 4 \times as long as wide	5
	All bracts sheathless or with vestigial sheath <5 mm (if the proximal lateral spike on a stem is dramatically more distant from the rest on most stems, avoid measuring it as it may have an abnormally long sheath); plants occasionally bractless	11
5	Proximal bracts bladeless; pistillate spikes overtopping the staminate	<i>C. eburnea</i>
	Proximal bracts with well-developed blades; pistillate spikes not overtopping the staminate	6
6	Perigynia purplish black at least above or black-mottled (even when immature)	7
	Perigynia yellow brown to dark brown when mature, not blackmottled	8
7	Terminal spike gynecandrous; lateral spikes pistillate	<i>C. fuliginosa</i>
	Terminal spike staminate or androgynous; lateral spikes androgynous or pistillate	<i>C. petricosa</i>
8	Perigynia densely papillose, \pm beakless; leaves strongly glaucous	<i>C. livida</i>
	Perigynia not papillose, beaked; leaves green, not glaucous	9
9	Perigynia with 2 veins; plants cespitose	<i>C. capillaris</i>
	Perigynia with >5 veins; plants with elongate, creeping rhizomes	10

- 10 Perigynia without minute red-brown dots, beaks 0.4–1.8 mm, proximal perigynia widely spaced in spike; proximal spike originating from distal 1/2 of culm on pendant peduncles *C. vaginata*
- Perigynia with minute red-brown dots, beaks 0.1–0.3 mm, all perigynia equally and tightly spaced in spike; proximal spike originating from proximal 1/2 of culm on erect peduncles *C. crawei*
- 11 Proximal pistillate scales ≥ 10 mm, leaf-like; lateral spikes basal; staminate scales with margins united at base 12
- Proximal pistillate scales < 10 mm, not leaf-like; at least some lateral spikes cauline; staminate scales with margins separate to base 14
- 12 Perigynia only loosely investing achene, gradually tapered to beak 2–3 mm (measured from apex of achene) *C. backii*
- Perigynia tightly investing achene, abruptly tapered to beak 0.5–1.5 mm (measured from apex of achene) 13
- 13 Leaves dark green to glaucous, margins white-hyaline, proximal leaf margins and midrib smooth to scabrous; perigynium body papillose on distal 1/3; achenes 2.5–3 mm *C. saximontana*
- Leaves dull green to yellowish green, not glaucous, margins green, proximal leaf margins densely papillose; perigynium beak and body smooth; achenes 2.8–3.5 mm *C. cordillerana*

- 14 Roots (at least younger ones) with a conspicuous golden felted covering of root hairs 15
- Roots not covered with felted root hairs or sparsely felted with white root hairs 16
- 15 At least some scales on each spike with awns 1.5–2.5 mm; pistillate scales 1.1–2 mm wide, narrower than perigynia; proximal inflorescence bract leafy, often equalling or exceeding the inflorescence *C. magellanica*
- Scales not awned; pistillate scales 2–3.4 mm wide, wider than perigynia; proximal inflorescence bract usually bristle-like, shorter than the inflorescence *C. limosa*
- 16 Widest leaf blades 1–2 mm wide; plants \pm 5–20 (–30) cm tall with few (\pm 3–8) flowered spikes; bract of proximal spike inconspicuous, scale-like, similar in morphology to the pistillate scales or reduced to a thread-like blade 17
- Widest leaf blades 2–15 mm wide (if narrower, then plants larger [20–50 cm tall] with many-flowered, cylindrical spikes); spikes normally >8-flowered; bract of proximal spike conspicuous, \pm leaf-like 18
- 17 Perigynia yellow green to brown, 2.5–3.3 mm; staminate scales 3–4.5 mm, light brown; plants long-rhizomatous *C. supina*
- Perigynia reddish black to dark brown, 1.5–2.5 mm; staminate scales 2–3 mm, reddish black to dark brown; plants caespitose to short-rhizomatous *C. glacialis*

- 18 Stem bases and rhizomes densely “furred” with persistent fibres (fibrous remains of old leaf bases); perigynia with \pm globose body tightly enveloping the achenes and long cylindrical beak C. sprengelii
- Stem bases and rhizomes lacking dense persistent fibres, leaf base remnants membranous; perigynium body various (if \pm globose, then not tightly enveloping the achenes and lacking a long cylindrical beak) 19
- 19 Style jointed with achene, finally withering and deciduous; perigynium beak orifice usually entire or with short, inconspicuous teeth 20
- Style continuous with achene, persistent in fruit and the same texture and colour as achenes; perigynium beak orifice usually with firm, sharp teeth 22
- 20 Proximal perigynia in each spike ascending or spreading-ascending at less than a right angle Group 7
- Proximal perigynia in each spike spreading at right angles or even reflexed 21
- 21 Perigynia 4–6.3 mm long, perigynium beaks 1.3–2.7 mm, deflexed on the proximal perigynia of the spikes C. flava
- Perigynia 1.8–3.9 mm long, perigynium beaks 0.3–1.3 mm, \pm straight C. viridula
- 22 Pistillate scales scabrous-awned, margins often ciliate 23
- Pistillate scales awnless, margins not ciliate 24

- 23 Perigynia thin in texture, somewhat inflated, nearly circular in cross-section, ascending or spreading at maturity, longest beak teeth 0.3–0.9 mm *C. hystericina*
- Perigynia coriaceous, rigid, not inflated, flattened-triangular in cross-section, the proximal reflexed at maturity, longest beak teeth 0.7–1.2 mm *C. pseudocyperus*
- 24 Perigynia somewhat leathery and firm, not inflated, 14–28-veined *C. lacustris*
- Perigynia membranous, at least slightly inflated, 6–15-veined 25
- 25 Proximal perigynia reflexed; proximal bract several times longer than inflorescence *C. retrorsa*
- Proximal perigynia not reflexed; proximal bract not more than a few times exceeding inflorescence 26
- 26 Leaves filiform-involute, wiry, 1–3 mm wide; culms rounded or obtusely trigonous; pistillate spikes globose to short-oblong, 5–15-flowered *C. oligosperma*
- Leaves flat, U–V-shaped or W-shaped in cross-section, widest 1.5–12 mm; culms round to trigonous; pistillate spikes oblong to cylindrical, >15-flowered 27
- 27 Leaves strongly papillose adaxially, U-shaped in cross-section, pale green, mostly 1.5–5 (–7.5) mm wide; culms smooth distally, round to obtusely triangular; plants with long creeping rhizomes *C. rostrata*

	Leaves smooth or scabrous adaxially, flat or folded, pale to dark green, mostly 2.5–12 (–15) mm wide; culms scabrous distally, acutely triangular; plants with or without long creeping rhizomes	28
28	Plants with long creeping rhizomes; leaves 4.5–12 (–15) mm wide; ligules about as long as wide; basal sheaths spongy thickened, not or only slightly pinkish-tinged; perigynia spreading	<i>C. utriculata</i>
	Plants cespitose, rhizomes short; leaves 1.8–6.5 mm wide; ligules longer than wide; basal sheaths not spongy thickened, generally reddish purple; perigynia ascending	<i>C. vesicaria</i>
29	Bract of the proximal spike essentially sheathless, if any sheath, vestigial and <3× as long as wide (excluding the sheaths of spikes from basal nodes, if any)	30
	Bract of proximal spike with well-developed sheath usually >4 mm long, if less, then at least 3× as long as wide	33
30	Small (mostly 5–35 cm) upland species; pistillate spikes <10 mm with <20 perigynia	Group 8
	Tall (mostly 25–130 cm) wetland or upland species; pistillate spikes >15 mm with >30 perigynia	31
31	Perigynia 4.5–6.5 mm, conspicuously veined, finely pubescent; dry habitats	<i>C. houghtoniana</i>
	Perigynia 2.4–4.5 (–5.2) mm, veins obscured by dense pubescence; wetland habitats	32

- 32 Leaves involute, ≤ 2 mm wide; leaves and proximal bract with the midvein low, rounded, and not forming a keel except near the apex C. lasiocarpa
- Leaves flat, 2–5 mm wide; leaves and proximal bract with the midvein forming a prominent and sharply pointed keel for much of the length C. pellita
- 33 Perigynia 3–9-veined abaxially, lanceolate, hispidulous, apex of perigynium gradually tapered into an indistinct beak up to 0.5 mm; distal leaves on stems with blade at least 2 cm; culms brown at base C. petricosa
- Perigynia veinless or at most with 2 prominent marginal veins, ellipsoid, obovate to oblanceolate, pubescent or puberulent, apex of perigynium abruptly contracted into a distinct beak 0.2–0.5 mm; distal leaves on stems bladeless or with blade usually < 1 cm; culms red purple or reddish brown at base 34
- 34 Most pistillate spikes originating from basal nodes on long peduncles to 13 cm; pistillate scales abruptly truncate and awned; leaves equalling or exceeding culm C. pedunculata
- All pistillate spikes originating from cauline nodes on shorter peduncles or sessile; pistillate scales acute or obtuse, not awned 35
- 35 Staminate spike < 7 mm; anthers < 2 mm; plants densely cespitose, short-rhizomatous C. concinna
- Staminate spike usually > 10 mm; anthers usually > 2 mm; plants loosely cespitose, long-rhizomatous 36

- 36 Stigmas 4, thick, erect or convolute;
pistillate spikes aggregated, sessile or
short-pedunculate; bracts short-sheathing *C. concinnoides*
- Stigmas 3, thin, flexuous; pistillate spikes
widely separated, proximal spikes long-
pedunculate, peduncles to 7 cm; bracts
long-sheathing *C. richardsonii*

GROUP 4

- 1 Pistillate scales uniformly about as long as
or longer than mature perigynia, usually
concealing the beaks (though not necessarily
the bodies) 2
- Pistillate scales shorter than the perigynia
at least in the middle portions of the spikes,
the apical portion narrower than the beaks
and not completely covering them 9
- 2 Larger perigynia 6–8 mm long;
inflorescences stiffly erect *C. petasata*
- Larger perigynia 2.9–6 (–6.5) mm long;
inflorescences stiffly erect or flexuous and
nodding 3
- 3 Perigynium beaks ± flattened and ciliate-
serrulate essentially to apex; usually clearly
bidentate 4
- Perigynium beak apex ± cylindrical, lacking
serrulations for 0.3 mm or more from apex;
obliquely cut or ± truncate at apex 7

- 4 Pistillate scales distinctly narrower than the perigynium bodies, reddish brown 5
- Pistillate scales about as wide as and essentially covering the perigynium bodies, whitish to reddish brown 6
- 5 Inflorescences flexuous and nodding, the proximal spikes well separated *C. foenea*
- Inflorescences stiffly erect, compact, all spikes strongly overlapping *C. tahoensis*
- 6 Scales reddish brown; achenes 1.6–2 mm wide *C. adusta*
- Scales whitish to yellowish; achenes 1.2–1.4 mm wide *C. xerantica*
- 7 Perigynia 2.8–3.1× as long as wide, usually 4.5–6.5 mm long; inflorescences elongated, ± nodding, spikes often all well separated; lowland *C. praticola*
- Perigynia 2.2–2.6× as long as wide, usually <4.5 (–5.2) mm long; inflorescences very compact to somewhat elongated and nodding, at least the middle and distal spikes overlapping; alpine or subalpine 8
- 8 Inflorescences very dense and head-like, proximal internode 1.5–4 (–4.8) mm long; pistillate scales 2.7–3.5 (–4) mm long; perigynia dark gold to coppery brown *C. macloviana*
- Inflorescences compact and erect to arching and somewhat elongated, proximal internode 4–10 mm long; pistillate scales 3.7–5.1 mm long; perigynia greenish to pale brown *C. phaeocephala*

- 9 Proximal 1–3 inflorescence bracts \pm leaf-like, equalling to much longer than inflorescence, bases spatiform and partially enclosing the subtended spikes 10
- Proximal 1–3 inflorescence bracts scale-like, often with a bristle tip shorter than or equalling inflorescence (rarely the proximal bract \pm leaf-like as an abnormality) 11
- 10 Longest bracts 1/3 length of culm to as long as culm or longer; perigynia subulate, 4.5–7 mm long *C. sychnocephala*
- Longest bracts $<1/3$ length of culm; perigynia lanceolate to narrowly ovate, 3.3–4.5 mm long *C. athrostachya*
- 11 Perigynium beaks flat and ciliate-serrulate essentially to apex 12
- Perigynium beaks cylindrical, unwinged and \pm entire for 0.2–0.6 mm from apex 16
- 12 Mature perigynia (2–) 2.3–3.2 mm broad at widest part, body \pm orbicular *C. brevior*
- Mature perigynia 0.9–2 mm broad, body subulate to ovate 13
- 13 Perigynia 2.6–4 \times longer than wide, bodies subulate to lanceolate, distance from beak tip to top of achene 2.2–5 mm 14
- Perigynia $<2.5\times$ longer than wide, bodies ovate, distance from beak tip to top of achene 0.8–2.2 mm 15

- 14 Perigynia 0.9–1.2 mm wide; achenes 0.6–0.8 mm wide; inflorescences dense, proximal inflorescence internodes 2–3 (–5) mm long *C. crawfordii*
- Perigynia 1.2–2 mm wide; achenes 0.7–1.1 mm wide; inflorescences dense to open or even flexuose, proximal inflorescence internodes 2–17 mm long *C. scoparia*
- 15 Inflorescences on tallest culms compact, \pm 1.5–3 \times as long as wide, erect, spikes overlapping; proximal inflorescence internodes 1–6 (–7.5) mm long; achenes 1–1.3 mm long *C. bebbii*
- Inflorescences on tallest culms elongate, \pm (2.5–) 3–5.1 \times as long as wide, often arching or nodding; proximal inflorescence internodes (5–) 7–19 mm long; achenes 1.3–1.6 mm long *C. tenera*
- 16 Pistillate scales 5.8–7.6 mm; larger perigynia 6–8 mm *C. petasata*
- Pistillate scales 2.2–4.8 mm; larger perigynia 2.8–6.5 mm 17
- 17 Perigynia 4–6.5 mm, 2.6–3.8 mm from beak tip to top of achene; pistillate scales 3–4.8 mm *C. haydeniana*
- Perigynia 2.8–4.8 mm, 1–2.5 mm from beak tip to top of achene; pistillate scales 2.2–3.7 mm 18

- 18 Perigynia light green to straw-coloured or finally pale golden brown when overmature, contrasting significantly with the darker pistillate scale bodies 19
- Perigynia dark gold to coppery brown or brownish black when overmature, not much different in colour from the very dark pistillate scale bodies 20
- 19 Perigynium body thin, \pm flat except where distended by achene; achenes 0.7–1.2 mm wide *C. microptera*
- Perigynium body thick, planoconvex to biconvex; achenes 1–1.5 mm wide *C. preslii*
- 20 Dorsal suture of beak clearly whitish-hyaline margined; pistillate scale margins and perigynium tips also usually conspicuously white-hyaline; perigynium wings darker than the body; alpine habitats *C. macloviana*
- Dorsal suture of beak brown to blackish; pistillate scale margins and perigynium tips not or inconspicuously white-margined; perigynium wings the same colour as the body (except sometimes the very margins of the wings may be dark); habitats variable, moist openings among trees and shrubs, sometimes alpine *C. pachystachya*

GROUP 5

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|---|---|---------------|
| 1 | Proximal bract bristle-form, much prolonged, many times exceeding 1–5-flowered spikes; spikes widely separate | C. trisperma |
| | Proximal bract much shorter, sometimes similar to scales; spikes several–many-flowered, distal spikes approximate | 2 |
| 2 | Perigynia beakless or nearly so; scales white-hyaline; plants loosely cespitose and with slender stolons | 3 |
| | Perigynia very short-beaked to strongly beaked; scales often darker-tinged; plants densely cespitose | 4 |
| 3 | Spikes closely aggregated, forming an ovoid or suborbicular head; perigynia with veins flush against their surface; pistillate scales subequal to perigynia | C. tenuiflora |
| | Spikes remote; perigynia with raised veins; pistillate scales shorter than perigynia | C. loliacea |
| 4 | Perigynia ovate, broadest near base, beak conspicuous, strongly serrulate; spikes 5–15, closely aggregated | C. arcta |
| | Perigynia broadest near middle, beak short, smooth or moderately serrulate; spikes 2–9 | 5 |
| 5 | Spikes 2–4, closely approximate; scales chestnut or reddish-tinged | 6 |
| | Spikes 3–9, proximal at least remote; scales usually hyaline, sometimes brownish-tinged | 7 |

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| 6 | Culms smooth or nearly so; leaves green; perigynia brownish yellow, beak prominent | C. lachenalii |
| | Culms very rough above; leaves grey green; perigynia grey green or brown at maturity, beak short or \pm absent | C. heleonastes |
| 7 | Leaves green to yellowish green; perigynia loosely spreading, distinctly beaked, with conspicuous abaxial suture; spikes with 3–10 perigynia | C. brunnescens |
| | Leaves usually grey green; perigynia appressed ascending, shortly beaked, abaxial suture inconspicuous; spikes usually with 10–30 perigynia | 8 |
| 8 | Leaf blades generally 2–4 mm wide; perigynia 1.8–3 mm, beak with small marginal teeth | C. canescens |
| | Leaf blades 1–2 mm wide; perigynia 1.8–2.1 mm, beak essentially smooth | C. lapponica |

GROUP 6

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|---|---|-----------|
| 1 | Perigynia veinless ventrally or with obscure impressed veins | 2 |
| | Perigynia distinctly veined ventrally, veins raised | 4 |
| 2 | Scales clearly longer than perigynia, divergent; perigynia inflated at maturity | C. aperta |
| | Scales about as long as perigynia or slightly longer, appressed; perigynia not inflated at maturity | 3 |

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| 3 | Proximal bract shorter than inflorescence | <i>C. scopulorum</i> |
| | Proximal bract longer than inflorescence | <i>C. aquatilis</i> |
| 4 | Pistillate scales acute, awned, awn to 0.5 mm; perigynia smooth, leathery, 1.6–2.5 mm wide, beak bidentate, teeth to 0.5 mm | <i>C. nebrascensis</i> |
| | Pistillate scale apex obtuse, awnless; perigynia papillose, membranous, 1–1.8 mm wide, beak entire or nearly so | <i>C. lenticularis</i> |

GROUP 7

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|---|--|-----------------------|
| 1 | Terminal spike staminate | 2 |
| | Terminal spike gynecandrous | 6 |
| 2 | Achenes filling only proximal 1/2 of perigynium body | 3 |
| | Achenes ± filling perigynium body | 5 |
| 3 | Perigynia broadly ovate or obovate to circular, smooth | <i>C. paysonis</i> |
| | Perigynia ovate to narrowly ovate, papillose | 4 |
| 4 | Midvein of pistillate scales inconspicuous, not cuspidate, same colour as body; distal lateral spikes drooping, long-pedunculate; perigynia 2–3.5 mm | <i>C. podocarpa</i> |
| | Midvein of pistillate scales conspicuous, often excurrent as a short cusp, lighter colour than body; distal lateral spikes erect or spreading, short-pedunculate; perigynia 3.5–5 mm | <i>C. spectabilis</i> |

- 5 Perigynia broadly elliptic or obovate, 3.5–4.5 mm, beak 0.3–0.5 mm; lateral spikes always present, all spikes of similar length *C. raynoldsii*
- Perigynia ellipsoid, 2–2.5 mm, beak to 0.2 mm; lateral spikes often shorter than terminal or absent *C. parryana*
- 6 Lateral spikes sessile or short-pedunculate, distal spikes forming a dense terminal cluster *C. media*
- Lateral spikes pedunculate, distal spikes not forming a dense terminal cluster 7
- 7 Proximal spikes spreading or pendant 8
- Proximal lateral spikes erect 10
- 8 Spikes 4–9; perigynia ovate, 4–5 mm, lightly 3-veined, light green; scales much shorter than perigynia *C. mertensii*
- Spikes 3–6; perigynia broadly elliptic or obovate, 2.5–4 mm, veinless, dull green, brownish or black; scales equalling length of perigynia 9
- 9 Perigynia broadly elliptic, papillose *C. atratiformis*
- Perigynia obovate, smooth *C. epapillosa*
- 10 Lateral spikes of varying lengths, usually shorter than terminal spike; perigynia 2–2.5 × 1–1.5 mm *C. parryana*
- Lateral spikes of similar lengths; perigynia 2.5–4 × 1.5–2.5 mm 11

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| 11 | Pistillate scales ovate or broadly lanceolate, apex blunt | <i>C. atosquama</i> |
| | Pistillate scales lanceolate, apex acute to conspicuously long-mucronate | 12 |
| 12 | Pistillate scales conspicuously long-mucronate; perigynium beak to 0.2 mm | <i>C. buxbaumii</i> |
| | Pistillate scales acute or short-mucronate; perigynium beak 0.3–0.4 mm | <i>C. albonigra</i> |

GROUP 8

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|---|---|------------------------|
| 1 | Stigmas 4; pistillate scales ciliate | <i>C. concinnoides</i> |
| | Stigmas 3; pistillate scales not ciliate | 2 |
| 2 | Plants with pistillate spikes from basal nodes in addition to sessile or short-peduncled pistillate spikes from cauline nodes immediately below staminate spike | 3 |
| | Plants producing spikes only at cauline nodes near the staminate spike | 5 |
| 3 | Perigynia obovoid, as long as wide; pistillate scales about as long as perigynia | <i>C. inops</i> |
| | Perigynia ellipsoid, longer than wide; pistillate scales shorter than perigynia | 4 |
| 4 | Culms robust, 21–47 cm, longer than leaves; perigynia 3.2–4.2 mm; achenes 1.9–2.4 mm | <i>C. peckii</i> |
| | Culms delicate, 5–31 cm, shorter than leaves; perigynia 2.3–3.1 mm; achenes 1.3–1.6 mm | <i>C. deflexa</i> |

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| 5 | Bracts of cauline pistillate spikes leaf-like,
equalling or exceeding inflorescences | 6 |
| | Bracts of cauline pistillate spikes scale-like,
usually shorter than inflorescences | 7 |
| 6 | Perigynia 2.3–3.1 mm, beak 0.4–0.8 mm,
apical teeth 0.1–0.2 mm | C. deflexa |
| | Perigynia 3.1–4.5 mm, beak 0.9–1.7 mm,
apical teeth 0.2–0.4 mm | C. rossii |
| 7 | Perigynia 2.2–3.2 mm, beak 0.4–1 mm | C. umbellata |
| | Perigynia 3.1–4.7 mm, beak 0.9–2 mm | C. tonsa |

C. adusta Boott

Dry soils. NAmerica; BC, Alta to Nfld/L, NS, s to Gt Lakes.

C. albonigra Mack.

Exposed alpine tundra. NAmerica; Alas, Yuk, NWT, BC, Alta, s to Ariz, NMex, Wash, Calif.

C. aperta Boott

Low, wet ground. NAmerica; BC, Alta, Wash, Oreg, Idaho, Mont.

C. aquatilis Wahlenb.

Several varieties recognized but not readily distinguished; in Alberta var. *aquatilis*.

Marshy places. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Kans, Mo, Gt Lakes, NEngl, NJ, Va. Circumpolar.

C. arcta Boott

Moist woods. NAmerica; Yuk, BC, Alta, Man to Que, NB, s to Calif, Idaho, Mont, Gt Lakes, NEngl.

C. atherodes Spreng.

Wet meadows. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Que, s to Calif, Ariz, NMex, Neb, Mo, Gt Lakes, Vt, Me. Circumpolar.

C. athrostachya Olney

Marshy ground. NAmerica incl. Mex; Alas, Yuk, BC, Alta to Man, s to Calif, Ariz, Colo, SDak, disjunct Tex.

C. atratiformis Britton

*Formerly *C. raymondii* Calder.

Open woods, stream banks, lakeshores. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, NS, Mich, NY, Vt, NH, Me.

C. atosquama Mack.

Subalpine meadows. NAmerica; Alas, Yuk, NWT, BC, Alta, s to Oreg, Utah, Colo.

C. aurea Nutt.

Moist banks, meadows. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Nev, Utah, NMex, Neb, Tex, Gt Lakes, NEngl.

C. backii Boott

Dry, shady woods. NAmerica; BC, Alta to NB, s to Colo, SDak, Gt Lakes, NEngl, NJ.

C. bebbii Olney *ex* Fernald

Marshes, wet meadows. NAmerica; Alas, NWT, BC, Alta to Nfld/L, Maritimes, s to Oreg, Utah, Colo, Neb, Iowa, Gt Lakes, NEngl, NJ.

C. bicolor All.

Plants cespitose, rhizomatous; culms ≤ 20 cm; leaf blades 2–6 cm \times 1–2.5 mm; proximal bracts scale-like or leaf-like; spikes 2–6, rachis papillose, lateral spikes pistillate, terminal spike gynecandrous, usually $< 1/3$ of flowers staminate, staminate portion of terminal spike 1.5–2.5 mm wide; pistillate scales 1.9–2.5 (–3) mm, black with a green

midvein, margins hyaline; perigynia ascending, 1.8–3 × 1–1.8 mm, white, densely papillose, ellipsoid to ovoid.

Moist alpine tundra, usually calcareous. NAmerica; Alas, NWT, Greenland, BC, Alta to Que, Nfld/L. Circumpolar.

C. brevior (Dewey) Mack.

Moist, open places. NAmerica incl. Mex; BC, Alta to Que, throughout US except Calif, Nev, Utah, La, Ala, SC, Fla.

C. brunnescens (Pers.) Poir.

Two subspecies; in Alberta subsp. *brunnescens*.

Wet woods, fens. NAmerica; Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Utah, Colo, Gt Lakes, NEngl, Tenn, Ga. Circumpolar.

C. buxbaumii Wahlenb.

Wet meadows, marshes, fens, often calcareous. NAmerica; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, s to Oreg, Utah, Colo, Kans, Ark, Gt Lakes, NEngl s to SC. More or less circumpolar.

C. canescens L.

*Formerly *C. curta* Gooden. Two subspecies; in Alberta subsp. *canescens*.

Fens, swamps. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, SDak, Gt Lakes, NEngl, NC. Circumpolar.

C. capillaris L.

A variable species in which a number of infraspecific taxa have been recognized, the merit of which remains to be established.

Springy, boggy places. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Utah, NMex, SDak, Gt Lakes, Vt, Me. Circumpolar.

***C. capitata* L.**

Peatlands, often calcareous. NAmerica incl. Mex; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, s to Calif, Nev, Mont, Colo, NH. Circumpolar.

***C. chordorrhiza* L.f.**

Fens and poor fens. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Oreg, Mont, Iowa, Gt Lakes, NEngl. Circumpolar.

***C. concinna* R. Br.**

Woods. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to NB, Nfld/L, s to Oreg, Mont, Colo, Wisc, Mich.

***C. concinoides* Mack.**

Dry woods. NAmerica; BC, Alta, s to Calif, Idaho.

***C. cordillerana* Saarela & B.A. Ford**

Plants cespitose; culms 7–40 cm, much exceeded by leaves; leaves dull green to yellow green, blades 15–43 cm × 1.5–6 mm, margins green, densely papillose; spikes androgynous, 1 terminal, 0–3 proximal, arising from base of culm; terminal spike 7–14 × 3.2–5 mm, with 3–5 pistillate flowers on a zigzag rachis, staminate flowers 2–3, inconspicuous; proximal spikes similar; pistillate scales leaf-like, 1.4–7.2 cm × 2–5 mm, acute, overtopping perigynia and partly concealing them; perigynia 3.9–5.4 × 1.6–2.5 mm, tightly investing achene, apex abruptly tapered, smooth, beak 0.5–1.5 mm, smooth; achenes 2.8–3.5 × 1.5–2.4 mm.

Naturally disturbed, rocky slopes with organic layer and leaf litter in mesic mixed forests, or disturbed, open, grassy slopes. NAmerica; BC, Alta, s to Oreg, Utah, Wyo.

***C. crawei* Dewey**

Calcareous meadows. NAmerica; BC, Alta to Nfld/L, NB, s to Wash, Utah, Wyo, Okla and most of eUS.

C. crawfordii Fernald

Wet, non-boggy areas (e.g., shores, wet meadows). NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, s to Oreg, Idaho, Mont, Mo, Gt Lakes, NEngl.

C. deflexa Hornem.

Dry woodlands. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Utah, Colo, Gt Lakes, NEngl.

C. deweyana Schwein.

Two varieties; in Alberta var. *deweyana*.

Moist shady woods. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Wash, Colo, SDak, Iowa, Gt Lakes, NEngl.

C. diandra Schrank

Fens, marshes. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Utah, Colo, NDak, Neb, Iowa, Gt Lakes, NEngl, NJ. Circumpolar.

C. disperma Dewey

Damp woods, swamps. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Utah, NMex, SDak, Gt Lakes, NEngl, NJ. Circumpolar.

C. douglasii Boott

Dry soils, often alkaline, open places. NAmerica incl. Mex; BC, Alta, Man, s to Calif, Utah, NMex, NDak, Neb, Mo.

C. duriuscula C.A. Mey.

*Formerly *C. stenophylla* Wahlenb. This species had been confused with the Eurasian *C. stenophylla* Wahlenb. Both are grassland species, but they are clearly distinct.

Plants not cespitose, rhizomes slender; culms smooth, mostly 10–35 cm; leaves with basal sheaths greyish brown to dark brown, shredding

blades narrow, 0.6–1.8 mm wide; inflorescences 0.7–2.0 cm; spikes 3–8, androgynous; pistillate scales broadly ovate, 2.4–4.1 mm, reddish brown with hyaline margin, shiny; anthers 1.6–3 mm; perigynia ovate to nearly orbicular, essentially veinless, 2.4–3.9 × 1.5–2.4 mm, shiny, beak 0.3–0.9 mm, weakly bidentate or oblique, hyaline.

Prairies, woodlands. N America; Alas, Yuk, NWT, BC, Alta to Man, s to Ariz, Colo, Kans, Mo, Ill, Mich. Asia.

C. eburnea Boott

Moist calcareous areas. N America incl. Mex; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Neb, Ark, Ala, SC.

C. echinata Murray

Two subspecies; in Alberta subsp. *echinata*.

Plants perennial, cespitose; culms mostly 10–135 cm; leaf blades plicate, 5–40 cm × 1–3.5 mm, ligules 0.6–4.5 mm; spikes 2–8, dense and distant, lateral pistillate, often with a few proximal staminate flowers, terminal spike gynecandrous; staminate scales lanceolate to ovate, 1.3–3.8 mm; perigynia spreading to reflexed, castaneous to dark brown, mostly (2.6–) 2.9–3.6 (–4) mm long, (1.7–) 1.8–3.6 × as long as wide, narrowly ovoid to obovoid, perigynium body gradually tapered from widest point into beak without forming a “shoulder,” beak generally 1–2 mm, serrulate; pistillate scales 1.4–3.1 mm.

Marshes, wet meadows, sandy shores, usually acidic. N America; Alas, BC, Alta, Sask, Ont, Que, Nfld/L, Maritimes, s to Calif, Nev, Utah, Colo, NDak, Gt Lakes, N Engl, s to Tenn, NC. Eurasia.

C. enanderi Hultén

Often regarded as a variety of *C. lenticularis* Michx. (*C. lenticularis* var. *dolia* (M.E. Jones) L.A. Standl.).

Plants cespitose, 3–35 cm tall; leaf blades 1.5–2.5 mm wide; proximal bract overtopping inflorescence; inflorescence dense, ± head-like, terminal spike gynecandrous, proximal 3–4 spikes pistillate, 0.9–1.5 cm,

all spikes overlapping, sessile or on peduncles up to 1 cm; pistillate scales apically obtuse or subacute, shorter than perigynia, purplish or blackish brown, with conspicuous green or tawny centre 2/3 as long as scale; perigynia ascending, green, 1.8–2.5 mm, ellipsoid or ovoid, somewhat flattened, 5–7-veined on each surface, beak red brown, \pm 0.2 mm; achene filling 1/2 of perigynium body.

Mountain streams, lakeshores and seeps. NAmerica; Alas, Yuk, BC, Alta to Mont.

C. epapillosa Mack.

Mountain meadows. NAmerica; BC, Alta, s to Calif, Nev, Utah, Colo.

C. filifolia Nutt.

Dry plains and ridges. NAmerica; Alas, Yuk, NWT, BC, Alta to Man, s to Calif, Ariz, NMex, Kans.

C. flava L.

Marshy places. NAmerica; Alas, BC, Alta, Man to Nfld/L, Maritimes, Idaho, Mont, Gt Lakes, NEngl, NJ. More or less circumpolar.

C. foenea Willd.

*Formerly *C. aenea* Fernald.

Disturbed areas, grasslands, open woods. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, s to Mont, SDak, Gt Lakes, NEngl.

C. fuliginosa Schkuhr

*Formerly *C. misandra* R. Br.

Dry alpine slopes. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Man, Que, s to Colo, Utah. Circumpolar.

C. garberi Fernald

Plants loosely caespitose and stoloniferous; culms slender, 10–40 cm tall; leaf blades \pm 2 mm wide; bracts erect, often overtopping inflorescence; terminal spike linear, staminate or gynecandrous usually

with $>1/3$ florets staminate, staminate portion of terminal spike 1.5–2.5 mm wide; lateral spikes 3–5, pistillate, 1–1.5 cm, lower on long capillary peduncles; pistillate scales ovate, often rounded-obtuse at apex, appressed to perigynia, pale to purplish or deep red brown with paler midvein and hyaline margins; perigynia 2–3 mm, obovoid, somewhat flattened, not fleshy or translucent, minutely granular-pulverulent, rather obscurely ribbed, beakless.

Meadows, shores, fens. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to NB, s to Calif, Utah, Wyo, NDak, Gt Lakes, NEngl. eAsia.

C. geyeri Boott

Open woods, dry mountain slopes. NAmerica; BC, Alta, s to Nev, Utah, Colo, disjunct Pa.

C. glacialis Mack.

Alpine slopes. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L. Circumpolar.

C. gynocrates Wormsk.

Sphagnum bogs, marshy places. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Oreg, Utah, Colo, NDak, Neb, Gt Lakes, Me. eAsia.

C. haydeniana Olney

Moist open places at subalpine to alpine elevations. NAmerica; BC, Alta, s to Calif, Utah, Colo.

C. heleonastes Ehrh.

Bogs, fens, marshes, often calcareous. NAmerica; Yuk, NWT, BC, Alta to Nfld/L, Mich. More or less circumpolar.

C. hoodii Boott

Dry to moist open slopes. NAmerica; BC, Alta, Sask, s to Calif, Nev, Utah, Colo, SDak.

C. hookeriana Dewey

Plains, dry banks, open woods. NAmerica; Alta, Sask, Man, NDak, SDak.

C. houghtoniana Torr.

Dry, sandy or gravelly places. NAmerica; Alta to Nfld/L, Maritimes, s to Gt Lakes, Vt, NH, Me.

C. hystericina Muhl. *ex* Willd.

Shady marshes. NAmerica; BC, Alta, Man to Nfld/L, NS, s to Utah, NMex, Tex, Kans, Ark, Tenn, Va, NEngl.

C. illota L.H. Bailey

Moist places in mountains. NAmerica; BC, Alta, s to Calif, Nev, Utah, Colo.

C. incurviformis Mack.

*Formerly *C. maritima* Gunnerus var. *incurviformis* (Mack.) B. Boivin.

Plants rhizomatous, mat forming; culms 2–12 cm, trigonous, curved; leaf sheaths brown, blades involute, \pm as long as culms; spikes 3–7, globose in dense heads, androgynous; pistillate scales brown with narrow, hyaline margin, ovate, shorter than perigynia; perigynia 2.9–3.9 \times 1–1.5 mm, elliptic, beak 0.4–0.9 mm, ill-defined.

Alpine tundra, ledges, wet gravel. NAmerica; Alas, BC, Alta, s to Colo, disjunct Calif.

C. infirmivervia Naczi

Plants densely cespitose; culms 10–83 cm, ligule of distal culm leaf mostly (2.1–) 2.6–6.8 mm; blades 1.4–3.8 mm wide; spikes (4–) 5–6 (–7), usually gynecandrous, sometimes pistillate or staminate, proximal 2 usually remote; scales whitish to castaneous, pistillate 2.9–4.4 mm, with a green midrib, staminate 3.1–4.3 mm, lacking a green midrib; anthers 1.3–1.8 mm; perigynia 3.7–5.3 mm, appressed erect, green to brown, weakly 1–4-veined abaxially, beak 1.5–2.2 mm; achenes 1.6–2.2 mm.

Dry to mesic deciduous and coniferous woodlands. N America; BC, Alta, s to Calif, Nev, Utah, Colo.

C. inops L.H. Bailey

*Formerly *C. pensylvanica* Lam. subsp. *heliophila* (Mack.) W.A. Weber and *C. pensylvanica* Lam. var. *digyna* Boeckeler.

Two subspecies; in Alberta subsp. *heliophila* (Mack.) Crins.

Dry sandy prairies. N America; BC, Alta to Ont, s to Calif, NMex, Kans, Mo, Gt Lakes.

C. interior L.H. Bailey

Fens, swamps. N America incl. Mex; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, Colo, Kans, Ark, Gt Lakes, WV, Va.

C. lachenalii Schkuhr

*Formerly *C. bipartita* All.

Moist alpine areas. N America; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Man, Que, Nfld/L, NB, s to Wash, Utah, Colo. Circumpolar.

C. lacustris Willd.

Marshes, swampy woods. N America; Alta to Nfld/L, Maritimes, s to Idaho, Mont, Neb, Mo, Gt Lakes, N Engl, s to Va.

C. lapponica O. Lang

Plants densely cespitose, short-rhizomatous; culms erect 15–40 cm; leaf sheaths pale brown abaxially, blades 10–20 cm × 1–2 mm, flat, green to grey green, ± as long as culms or shorter; inflorescences 1.5–4.0 cm, proximal bracts shorter to longer than spikes, distal bracts generally scale-like; spikes 3–7, lower sometimes remote; pistillate scales hyaline, green, 3-veined, centre generally brown in age, broadly ovate, apex sometimes acute, not concealing perigynia; perigynia 10–20, elliptic-ovate, appressed ascending, grey green, brown in age,

multi-veined, 1.8–2.1 × 1.3 mm, beak membranous, entire; achenes yellow brown, 1.25 × 1 mm.

Sphagnum bogs, fens, marshes. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Man, disjunct Que. Eurasia.

C. lasiocarpa Ehrh.

Bogs, lake shores. NAmerica; Alas, Yuk, BC, Alta to Nfld/L, Maritimes, Wash, Idaho, Mont, Calif, Gt Lakes, NEngl. Circumpolar.

C. lenticularis Michx.

Includes *C. kelloggii* W. Boott, which was formerly regarded as a distinct species. Two varieties in Alberta: var. *lenticularis* usually has brown or reddish-brown pistillate scales, green perigynium beak and stipe <0.2 mm, while var. *lipocarpa* has reddish-brown or black pistillate scales, red brown perigynium beak and stipe 0.2–0.5 mm. *C. lenticularis* var. *dolia* is recognized as a distinct species in this flora (*C. enanderi* Hultén).

Lakeshores, wet meadows. NAmerica; Alas, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, Colo, Gt Lakes, NEngl.

C. leptalea Wahlenb.

Perhaps three subspecies; in Alberta subsp. *leptalea*.

Shady bogs, fens, moist woodlands. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, s throughout US except Nev, Ariz, Neb, Kans.

C. limosa L.

Fens, marshes. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Mont, Nev, Utah, Neb, Iowa, Gt Lakes, NEngl, NJ, Del, Md. Circumpolar.

C. livida (Wahlenb.) Willd.

Calcareous fens. NAmerica; Alas, Yuk, BC, Alta to Nfld/L, Maritimes, s to Calif, Wyo, Gt Lakes, NEngl, NJ. More or less circumpolar.

C. loliacea L.

Marshes, moist banks. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Ont. More or less circumpolar.

C. macloviana d'Urv.

Moist grassy slopes. NAmerica; Alas, Yuk, NWT, Greenland, BC, Alta, Que, Nfld/L, Mont, Wyo, Colo. SAmerica, Europe.

C. magellanica Lam.

*Formerly *C. paupercula* Michx. Two subspecies; in Alberta subsp. *irrigua* (Wahlenb.) Hiitonen. The other subspecies is in southern South America, the species being one of a number of bipolar taxa.

Bogs, fens, marshes, commonly with *Sphagnum*. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Wash, Idaho, Utah, Colo, Gt Lakes, NEngl. SAmerica.

C. maritima Gunnerus

Beaches, dunes, shores of lakes and rivers. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, Alta to Nfld/L. Eurasia, SAmerica. Introduced in Alta.

C. media R. Br.

Formerly confused with *C. norvegica* Retz., which in North America only occurs in northeastern Canada and Greenland.

Moist open woods, meadows, stream banks. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, NB, s to Wash, Oreg, Mont, Iowa. Eurasia.

C. mertensii Presc.

Moist woods, stream banks. NAmerica; Alas, BC, Alta, s to Calif, Idaho, Mont. Asia.

C. microglochin Wahlenb.

Peaty marshes, often calcareous. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Man to Nfld/L, Utah, Wyo, Colo. More or less circumpolar.

C. micropoda C.A. Mey.

*Formerly *C. pyrenaica* Wahlenb., which is not a synonym but a distinct species in Europe.

Plants densely caespitose; culms 5–30 (–40) cm; leaves involute, 1.25–2 mm wide; inflorescence a solitary androgynous spike, bracts absent; pistillate scales ovate, light to dark brown, distal margins frequently hyaline; perigynia ascending to spreading or sometimes reflexed at maturity, veinless, 3–5 × 1–1.3 mm; stigmas 2 (–3).

Moist meadows, stream banks, snowbeds. NAmerica; Alas, Yuk, BC, Alta, s to Calif, Nev, Utah, Colo. Asia.

C. microptera Mack.

Moist woods. NAmerica incl. Mex; Yuk, NWT, BC, Alta to Man, s to Calif, Ariz, NMex, SDak.

C. nardina Fr.

Dry alpine slopes. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Ont to Nfld/L, s to Wash, Nev, Utah, Colo. Eurasia.

C. nebrascensis Dewey

Marshy ground. NAmerica; Alta, Sask, s to Calif, Ariz, NMex, Kans, Mo, Ill.

C. nigricans C.A. Mey.

Moist meadows, wet heaths, streams, snowbeds. NAmerica; Alas, BC, Alta, s to Calif, Utah, Colo.

C. obtusata Lilj.

Prairie grasslands, dry ridges and slopes. NAmerica; Alas, Yuk, NWT, BC, Alta to Ont, s to Utah, NMex, SDak, Minn. Eurasia.

C. oligosperma Michx.

Wet meadows, poor fens. NAmerica; Yuk, Nunavut, Alta to Nfld/L, Maritimes, Gt Lakes, NEngl, NC.

C. pachystachya Cham.

Moist woods. NAmerica; Alas, Yuk, BC, Alta, Sask, s to Calif, Nev, Utah, Colo.

C. parryana Dewey

Moist habitats. NAmerica; Alas, Yuk, BC, Alta to Ont, s to Nev, Utah, Colo.

C. pauciflora Lightf.

Sphagnum bogs, poor fens. NAmerica; Alas, Yuk, BC, Alta to Nfld/L, Maritimes, s to Wash, Gt Lakes, NEngl, WVa. Circumpolar.

C. paysonis Clokey

Mountain meadows. NAmerica; BC, Alta, s to Oreg, Utah, Wyo.

C. peckii Howe

Open woods. NAmerica; Alas, Yuk, BC, Alta to NS, s to Wyo, Neb, Iowa, Gt Lakes, NEngl.

C. pedunculata Muhl. *ex* Willd.

Plants caespitose, rhizomatous; culms 9–28 cm; leaves basal, sheaths reddish brown to purplish, blades dark green, equal to or longer than culms, to 4 mm wide; inflorescence with peduncles of basal pistillate spikes filiform, to 13 cm, peduncles of terminal staminate spikes 2–6 cm; pistillate spikes 2–5, mostly originating from basal nodes, proximal arching, distal ascending, widely separated; pistillate scales ovate to obovate, brown to reddish brown, 4.5–5 mm, apex abruptly truncate and awned; staminate spikes 7.5–10 mm, usually with 2–5 pistillate flowers at base; staminate scales ovate, reddish brown; perigynia 3.7–6 mm, tapering at base, pubescent, beak 0.2–0.4 mm; achenes 3.5–4.5 mm, ellipsoid.

Moist to dry mixed woods, calcareous and acidic. NAmerica; BC, Alta to Nfld/L, Maritimes, SDak, Gt Lakes, s to Ala, Ga. eAsia.

C. pellita Willd.

*Formerly *C. lasiocarpa* Ehrh. var. *latifolia* (Boeckeler) Gleason and *C. lanuginosa* Michx.

Marshy places. NAmerica incl. Mex; Alas, Yuk, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Tex, Ark, Ky, Va.

C. petasata Dewey

Dry grasslands, open woods. NAmerica; Alas, Yuk, NWT, BC, Alta to Sask, s to Calif, Nev, Ariz, Colo.

C. petricosa Dewey

Includes *C. franklinii* Boott. Two varieties; in Alberta var. *petricosa*.

Meadows, stream banks, scree, dry alpine slopes. NAmerica; Alas, Yuk, NWT, BC, Alta, Que, Nfld/L, s to Mont. Asia.

C. phaeocephala Piper

Dry alpine slopes. NAmerica; Alas, BC, Alta, s to Calif, Nev, Utah, Colo.

C. podocarpa R. Br.

Alpine meadows. NAmerica; Alas, Yuk, NWT, BC, Alta, Oreg, Idaho, Mont. eAsia.

C. praegracilis W. Boott

Moist open places. NAmerica incl. Mex; Yuk, BC, Alta to Que, NB, s to Calif, Ariz, NMex, Kans, Gt Lakes, Vt, Ky, s to Miss, Va.

C. prairea Dewey

Wet meadows, moist woodlands. NAmerica; Yuk, NWT, BC, Alta to NS, s to Mont, Neb, Iowa, Gt Lakes, NEngl, NJ, WV, Va.

C. praticola Rydb.

*Formerly *C. platylepis* Mack.

Wet meadows, open woods. NAmerica; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, s to Calif, Nev, Utah, Colo, SDak, Minn, Ill, Mich, Me.

C. preslii Steud.

Dry open slopes. NAmerica; Alas, Yuk, BC, Alta, s to Calif, Idaho, Mont.

C. pseudocyperus L.

Swamps, marshes. NAmerica; Alta, Man, Ont, Que, Maritimes, Gt Lakes, NEngl. Eurasia.

C. raynoldsii Dewey

Moist, open or wooded slopes. NAmerica; BC, Alta to Sask, s to Calif, Nev, Utah, Colo.

C. retrorsa Schwein.

Swampy woods, wet meadows. NAmerica; BC, Alta to NB, s to Oreg, Utah, Wyo, Iowa, Gt Lakes, NEngl.

C. richardsonii R. Br.

Dry, open prairies, meadows. NAmerica; NWT, BC, Alta to Que, s to Wyo, SDak, Iowa, Gt Lakes, Md, Vt.

C. rossii Boott

Dry soils, often in woodlands. NAmerica; Alas, Yuk, NWT, BC, Alta to Ont, s to Calif, Ariz, NMex, SDak, Neb, Minn, Mich.

C. rostrata Stokes

Plants cespitose from long creeping rhizomes; culms stout and spongy at base, terete, 8–90 cm, smooth distally; leaves 1.5–5 (–7.5) mm wide, papillose adaxially, blades pale green, involute, U-shaped in cross-section, ligules as long as wide; inflorescences 10–30 cm; bract <2.5× longer than inflorescence; pistillate spikes 2–3, erect or ascending, ±

20–150-flowered, cylindrical; terminal (1–) 2–4 spikes staminate; pistillate scales lanceolate-ovate, 2.5–4.5 (–8.8) × 0.8–1.6 mm, mostly shorter than perigynia, margins entire, apex acute to acuminate (rarely acuminate-awned); perigynia spreading, green or straw-coloured, 9–15-veined, 3.6–5.8 × 1.7–2.8 mm, beak (1–) 1.2–2 mm, bidentate; achenes brown, smooth, trigonous.

Fens, shores, often in shallow water or on floating mats. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Wash, Mont, Minn, Wisc, Mich. Eurasia.

C. rupestris All.

Dry alpine areas. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Man to Nfld/L, Mont, Wyo, SDak, Utah, Colo. Circumpolar.

C. sartwellii Dewey

Wet meadows, swamps. NAmerica; NWT, BC, Alta to Que, Idaho, Mont, s to Colo, Neb, Mo, Gt Lakes.

C. saxatilis L.

Wet places. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Wash, Utah, Colo, Me. Circumpolar.

C. saximontana Mack.

*Formerly *C. backii* Boott var. *montana* (Mack.) B. Boivin.

Plants cespitose; culms 2.5–34 cm, exceeded by leaves; leaves dark green to glaucous green, 3.5–40 cm × 1.9–4.9 mm, margins white-hyaline, smooth or scabrous; spikes androgynous, 1 terminal, 0–2 proximal, arising from base of culm; terminal spike 7.5–17.5 × 3.4–5 mm, with 2–6 pistillate flowers on zigzag rachis; staminate flowers 2–3, inconspicuous; proximal spikes similar; pistillate scales leaf-like, 2.2–8.6 (–11.0) cm × 2.4–4.6 mm, acute, overtopping perigynia and partly concealing them; staminate scales ovate to oblong, margins connate near base or for entire length; perigynia 3.2–4.9 × 1.6–2.5 mm,

tightly investing achene, apex abruptly tapered, papillose on distal $\frac{1}{3}$, beak 0.6–1.2 mm, scabrous; achenes 2.5–3.0 × 1.6–2.4 mm.

Moist to dry prairies, woods. NAmerica; Alta to Ont, s to Colo, Neb, Minn.

C. scirpoidea Michx.

Several subspecies; in Alberta subsp. *scirpoidea*.

Moist open areas to alpine elevations. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Nev, Utah, Colo, NDak, Gt Lakes, Vt, NH, Me. Europe (Norway).

C. scoparia Schkuhr *ex* Willd.

Moist woodlands. NAmerica; BC, Alta, Man to Nfld/L, Maritimes, s to Calif, Idaho, Mont, Colo, Okla, Miss, Tenn, Ga.

C. scopulorum Holm

Three varieties; in Alberta var. *bracteosa* (L.H. Bailey) F.J. Herm.

Moist open areas. NAmerica; Yuk, BC, Alta, s to Calif, Utah, Colo.

C. siccata Dewey

Dry open areas. NAmerica; Yuk, NWT, BC, Alta to Que, s to Wash, Utah, Ariz, NMex, SDak, Gt Lakes, NEngl.

C. simulata Mack.

Swamps, swales. NAmerica; Alta, Sask, s to Calif, Ariz, NMex.

C. spectabilis Dewey

Mountain meadows. NAmerica; Alas, Yuk, BC, Alta, s to Calif, Utah, Wyo.

C. sprengeii Dewey

Moist open woods, meadows. NAmerica; BC, Alta to Que, NB, s to Colo, Neb, Mo, Gt Lakes, NEngl, NJ, Del.

C. stipata Muhl. *ex* Willd.

Wet meadows, thickets. NAmerica; Alas, BC, Alta to Nfld/L, Maritimes, s throughout US except Ark, La, Miss. eAsia.

C. supina Willd. *ex* Wahlenb.

Two subspecies; in Alberta subsp. *spaniocarpa* (Steud.) Hultén.

Plants loosely cespitose, rhizomatous; culms red or purple at base, to 30 cm; leaves basal, blades 3–15 cm × 1–1.5 mm; spikes 2–5 in a loose head, lateral pistillate, terminal spike staminate; pistillate scales ovate, 2–3.5 mm, red brown, margins hyaline; staminate scales 3–4.5 mm, light brown; perigynia 2.5–3.3 mm, yellow green to brown, beak 0.4–0.9 mm; achenes 1.7–2 mm.

Dry sandy areas, alluvial plains, rocky outcrops. NAmerica; Alas, Yuk, NWT, Greenland, BC, Alta to Ont, Minn. Circumpolar.

C. sychnocephala Carey

Wet meadows, shores. NAmerica; Alas, Yuk, NWT, BC, Alta to Que, s to Wash, Mont, Colo, SDak, Mo, Gt Lakes.

C. tahoensis Smiley

Plants densely cespitose; culms 15–45 cm; leaf sheaths adaxially white-hyaline, distal ligules 0.8–1.5 mm; inflorescence stiffly erect, compact, all spikes strongly overlapping; spikes 4–6, lanceolate to ovoid, 10–15 mm; pistillate scales red brown with straw to tan mid-stripe, ovate, 4–5 mm, covering at least perigynium bodies; perigynia 3.7–6 mm, conspicuously veined abaxially and adaxially; achenes 1.9–2.4 mm, lanceolate to ovate or obovate.

Grasslands, open slopes. NAmerica; Yuk, BC, Alta, s to Calif, Colo, Utah.

C. tenera Dewey

Moist meadows, woodlands. NAmerica; BC, Alta to NS, s to Oreg, Wyo, Kans, Mo, Ky, NC.

C. tenuiflora Wahlenb.

Sphagnum bogs, poor fens. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, s to Mont, Colo, Gt Lakes, Vt, Me, Md. Circumpolar.

C. tonsa (Fernald) E.P. Bicknell

Plants densely or loosely cespitose, rhizomatous; culms 4–16 cm; leaf bases shredding, blades equal to or longer than culms, 0.5–4.3 mm wide; inflorescence with terminal staminate spike, often pistillate adjacent and 1–3 other pistillate spikes on peduncles below; pistillate scales \pm 2.9–4.1 mm, light brown to reddish brown with white margins, equal to or longer than perigynia; staminate scales ovate, 4.2–5.2 mm; perigynia green, reddish brown distally, sometimes veinless, ellipsoid, 3.1–4.7 mm, beak 0.9–2 mm; achenes 1.6–2 mm, brown, ellipsoid or obovate.

Two varieties; in Alberta var. *tonsa*.

Dry, open sandy areas. NAmerica; BC, Alta to Nfld/L, Gt Lakes, NEngl, s to Ga.

C. torreyi Tuck.

Moist meadows, thickets. NAmerica; Alta to Man, s to Colo, SDak, Minn, Wisc.

C. trisperma Dewey

Fens, wet woods. NAmerica; NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Gt Lakes, NEngl, WVa, NJ, Del, Md.

C. umbellata Schkuhr *ex* Willd.

Woods. NAmerica; Greenland, BC, Alta to Sask, Ont to Nfld/L, Maritimes, Gt Lakes, NEngl, Neb, s to Tex, Miss, Ala, Ga.

C. utriculata Boott

Often confused with *C. rostrata* Stokes. Most Alberta material of *C. utriculata* was previously misidentified as *C. rostrata*.

Plants rhizomatous, long, creeping; culms 2.5–10 cm, triangular, scabrous distally, sometimes smooth, spongy at base; leaves pale to dark green, flat or folded, 4.5–12 (–15) mm wide, glabrous, ligules about as long as wide; involucre bract <2.5× length of inflorescence; staminate spikes 2–5, well elevated above pistillate spikes; pistillate spikes 2–5, erect or ascending, cylindrical, 20–150-flowered; pistillate scales lanceolate-ovate, 2.6–7.6 mm, mostly shorter than perigynia; perigynia spreading, green or straw-coloured, 9–15-veined, ovoid, 3.2–8.6 mm; stigmas 3; achenes brown, smooth, trigonous.

Wetlands, swamps, marshes, fens, lakesides, ponds. N America; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, SDak, Gt Lakes, N Engl, s to Tenn, WV, Md. Eurasia.

C. vaginata Tausch

Fens, wet woods. N America; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Mont, Gt Lakes, N Engl. Circumpolar.

C. vesicaria L.

Swamps, marshes. N America; BC, Alta, Man to Nfld/L, Maritimes, s to Calif, Wyo, Utah, Gt Lakes, N Engl, s to Mo, Ky, Va. Circumpolar.

C. viridula Michx.

Shores, calcareous bogs, springy places. N America; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Nev, Utah, NMex, NDak, Gt Lakes, N Engl, NJ. Circumpolar.

C. vulpinoidea Michx.

Swampy ground. N America; BC, Alta to Nfld/L, Maritimes, s throughout US except Mont, Nev and Utah.

C. xerantica L.H. Bailey

Prairies. N America; BC, Alta to Ont, s to Wyo, Neb, Minn.

CYPERUS L.

Low annual with fibrous roots; scales with an outwardly curved awn; stamens 1 C. squarrosus

Tall perennial with corm-like thickenings at base; scales with a short erect awn or mucronate; stamens 3 C. schweinitzii

C. schweinitzii Torr.

Dry sandy soils. NAmerica; Alta to Que, Wash, Mont, Wyo, SDak, Gt Lakes, Iowa, Mo, Ky, NJ, Mass, Utah, Colo, NMex, Tex, Okla.

C. squarrosus L.

Moist soils, usually sandy alluvium. NAmerica incl. Mex; BC, Alta to NB, s throughout US.

ELEOCHARIS R. BR. / SPIKE RUSH

1 Achenes with 8–12 longitudinal ridges, 30–60 fine transverse lines between ridges; rhizomes 0.25–0.5 mm thick; forming dense mats E. acicularis

Achenes lacking longitudinal ridges and transverse lines; rhizomes thicker 2

2 Rhizomes present, often with terminal bulb; achenes usually narrowing apically into thick beak-like area; tubercles generally similar to achene apex and merging with it 3

Rhizomes absent, if present, lacking terminal bulb; tubercles clearly distinct from achene apex, not merging with it 4

3	Lowest floral scale with floret; bristles 0–6, rudimentary to equalling tubercle; culm tufts with bulbs	<i>E. quinqueflora</i>
	Lowest floral scale lacking floret; bristles 6, longest equal to or longer than tubercle; culm tufts not bulbous	<i>E. suksdorfiana</i>
4	Styles bifid; plants not stoloniferous or proliferating from spikelets	5
	Styles trifid; plants may be stoloniferous or proliferating from spikelets	13
5	Plants annual, creeping rhizomes absent; anthers 0–1 mm; apex of distal leaf sheath acute to acuminate	6
	Plants perennial, creeping rhizomes present; anthers 1–2.5 mm; apex of distal leaf sheath truncate to obtuse	7
6	Tubercles $\leq 1/4$ as long as achenes; perianth bristles, if present, shorter than achenes to \pm as long as tubercles	<i>E. engelmannii</i>
	Tubercles $> 1/4$ as long as achenes; perianth bristles longer than tubercles	<i>E. ovata</i>
7	Culms, all or some, with apex of distal sheath with a distinct tooth	8
	Culms with apex of distal sheath lacking a distinct tooth	9

- 8 Culms usually distinctly compressed; proximal scale of spikelet clasping entire culm; subproximal scale of spikelet lacking floret; tubercles as high as wide or higher *E. macrostachya*
- Culms terete; proximal scale of spikelet usually clasping only $2/3$ – $3/4$ of culm; subproximal scale of spikelet with floret; tubercles sometimes wider than high *E. erythropoda*
- 9 Spikelets with subproximal scale lacking floret; proximal (lowest) scale clasping $2/3$ – $3/4$ of culm 10
- Spikelets with subproximal scale with floret; proximal scale clasping $>3/4$ of culm 11
- 10 Perianth bristles 4–8, longer than tubercles; achenes lacking distinct neck; tubercles sessile on achenes *E. mamillata*
- Perianth bristles 0–5, seldom longer than tubercles; achenes sometimes with distinct neck; tubercles often not sessile on achenes *E. palustris*
- 11 Subproximal scale of some spikelets lacking floret; proximal scale of spikelets, some or all, clasping less than entire length of culm *E. macrostachya*
- Subproximal scale of all spikelets with floret; proximal scale of spikelets clasping entire length of culm 12
- 12 Scales in middle of spikelet ≤ 1.8 mm wide, 4–5 per mm of axis *E. erythropoda*
- Scales in middle of spikelet 1.8–2.5 mm wide, 2–4 per mm of axis *E. uniglumis*

- 13 Plants annual, tufted; achenes predominantly biconvex (some may be flattened trigonous); tubercles strongly compressed, much thinner than achenes in cross-section *E. engelmannii*

Plants annual or perennial of various habit; achenes trigonous; tubercles not strongly compressed, similar to achenes in cross-section *E. elliptica*

E. acicularis (L.) Roem. & Schult.

Wet places. N America incl. Mex; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s throughout US except Ala and Fla. S America, C America, Eurasia.

E. elliptica Kunth

Plants perennial, rhizomatous, mat-forming; culms 5–90 cm, 2–3× wider than thick; leaf sheaths persistent, tooth usually present on some sheaths, ≤0.5 mm; spikelets ovoid, 3–8 mm; scales ovate, 1.7–3 × 1–1.5 mm, entire or emarginate, apically translucent; bristles usually absent, occasionally 1–3, to ± 1/2 achene length; proximal scale surrounding culm; subproximal scale with floret or achene; style trifid or some bifid, some anthers 0.8–1.7 mm; achenes 0.7–1.2 × 0.6–0.9 mm, ovoid, rugulose; tubercles short, 0.1–0.25 mm.

Marshes, fens, lakes, prairie pool margins. N America; NWT, BC, Alta to Nfld/L, NS, Idaho, Mont, NDak, Iowa, Gt Lakes, N Engl, Tenn, WV, NJ.

E. engelmannii Steud.

Plants annual, densely tufted, rhizomes absent; culms 2–40 cm; distal leaf sheaths persistent, tooth usually present on all or some culms, to 0.3 mm; spikelets ovoid to cylindrical, 5–10 (–20) mm; scales ovate, 2–2.5 × 1–1.3 mm; apices obtuse to subacute, not translucent; subproximal scale usually lacking floret or achene; proximal scale not entirely clasping culm; bristles 5–8, often lacking,

slightly longer than tubercle; styles bifid or trifid; anthers 0.3–0.7 (–1) mm; achenes 0.9–1.5 × 0.7–1.1 mm, biconvex usually, some trigonous, smooth; tubercles deltoid, much thinner than achenes in cross-section.

Shores, marshes. N America; BC, Alta, Man, Ont, s throughout US except Wyo, SDak, Nev, Utah, La, NC, SC, Ga, Fla.

***E. erythropoda* Steud.**

Plants perennial, rhizomatous, mat-forming; culms terete, often ridged when dry, 8–80 cm; leaf sheaths persistent, reddish basally, usually inflated, tooth ≤0.1 mm sometimes present; spikelets ovoid to cylindrical, 3–18 mm; scales ovate to lanceolate, 2–3.5 × 1.5–1.7 mm, entire, apices acute; bristles 4 or absent, light brown to stramineous, equal, as long as or slightly longer than achene; style bifid; achenes obovoid, biconvex, 0.9–1.6 × 0.7–1.2 mm, apex rounded, smooth to rugulose; tubercles pyramidal, much higher than wide to much lower than wide.

Marshes, wet meadows, fens. N America; Alas, NWT, Alta to NB, s throughout US except Calif, Nev, La, Miss, Ga, SC, Fla.

***E. macrostachya* Britton**

Plants perennial, rhizomatous, mat-forming; culms terete to clearly compressed, ≤3× wider than thick, often ridged when dry, 10–100 cm; leaf sheaths persistent, apex truncate to obtuse, tooth 0.1–1 mm, usually present on all or some sheaths; spikelets lanceolate to ovoid, 5–40 mm long; scales 2.5–5.5 mm, entire; bristles usually absent, shorter than achene or longer; styles bifid; achenes ellipsoid, obovoid, biconvex or planoconvex, 1–2 × 0.8–1.5 mm; tubercles as high as wide, sometimes much higher than wide.

Marshy places, pools, lakeshores. N America incl. Mex; Alas, Yuk, BC, Alta, Man to Que, s to Calif, Ariz, NMex, Tex, La, Miss. S America.

E. mamillata (H. Lindb.) H. Lindb.

Plants perennial, rhizomatous, mat-forming; culms terete, ridged when dry, 10–50 cm, ≤ 3 mm thick; leaf sheaths persistent, teeth absent; spikelets ovoid, 5–20 \times 3–5 mm; proximal scale clasping $\frac{2}{3}$ of culm; subproximal scale lacking floret or achene; scales 2.5–4 mm, entire; bristles 4–8, brown, usually much longer than tubercle; achenes obovoid, biconvex, 1–1.4 mm, smooth; tubercles papillate to pyramidal, as high as wide or less.

Lakeshores, ponds, bogs, fens. NAmerica; Alas, Yuk, NWT, BC, Alta, Sask, Ont, Que, Wash, Minn, Wisc. Eurasia.

E. ovata (Roth) Roem. & Schult.

Wet places. NAmerica; BC, Alta, Ont, Nfld/L, Maritimes, Wash, Oreg, Gt Lakes, NJ, NEngl, Iowa, Mo, Ky, WV, Va, disjunct Ariz, Okla. Eurasia.

E. palustris (L.) Roem. & Schult.

Plants perennial, rhizomatous, mat-forming; culms terete or compressed slightly, ridged when dry, 30–115 cm, 0.5–5 mm thick; leaf sheaths persistent, teeth absent; spikelets ovoid to lanceoloid, 5–25 \times 3–7 mm; scales 3–5 mm, entire; proximal scale clasping culm $\frac{2}{3}$ – $\frac{3}{4}$; subproximal scale lacking floret or achene; bristles 4–5, sometimes absent, usually shorter than achene to equalling tubercle, rarely longer; achenes biconvex, obovoid, 1–2 mm, smooth or finely rugulose; tubercles papillate to pyramidal, as high as wide to 2 \times as high. A widespread circumboreal complex treated in a broad sense as a single species.

Marshes, ponds, lakeshores. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s through US except Idaho, Okla, La, Miss, Ga, SC, Fla. Eurasia.

E. quinqueflora (Hartmann) O. Schwarz

Calcareous fens. NAmerica incl. Mex; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, SDak, Gt Lakes, NJ, NEngl, Calif, Nev, Utah, Colo, Neb, Iowa, Ariz, NMex. Circumpolar.

E. suksdorfiana Beauverd

Plants perennial, rhizomatous; culms erect, 5–40 cm × 0.5–1.2 mm, subterete to slightly compressed, ridged when dry; leaf sheaths membranous or papery, subtruncate to obtuse; spikelets 5–10 × 2–4 mm; proximal scales usually lacking flowers; fertile scales 8–12 per spikelet, 3.5–5 × 2–2.5 mm, lanceolate to ovate; perianth bristles 6, equal, equalling achene to exceeding tubercle; anthers 1.5–3.5 mm; achenes trigonous, occasionally some biconvex, 2–2.7 × 0.7–1.3 mm, apex tapered to distinct beak; tubercles 0.4–0.5 × 0.3–0.5 mm.

Fens, bogs, wet meadows, moist gravelly areas. NAmerica; BC, Alta, Wash, Oreg, Idaho, Mont, Calif, Nev, Utah, Colo.

E. uniglumis (Link) Schult.

Perennial, rhizomatous, mat-forming; culms terete, often ridged when dry, 50–60 cm; leaf sheaths persistent, reddish basally, tooth absent; spikelets 5–10 mm, ovoid to lanceolate; scales broadly ovate, 3–4 × 1.8–2.5 mm, entire, apices acute to obtuse; bristles 0–5, light brown to stramineous, unequal to as long as achene, style bifid; achenes ellipsoid to obovoid, biconvex, 1.3–1.8 × 1–1.4 mm, apex rounded, smooth to finely rugulose; tubercles pyramidal, 0.4–0.8 mm.

Marshes. NAmerica; NWT, BC, Alta to Nfld/L, Maritimes, NDak, SDak, Nev, Utah, Colo, Neb, NMex, NEngl, s along coast to NC. Eurasia.

ERIOPHORUM L. / COTTON GRASS

- | | | | |
|---|---|---|-------------------|
| 1 | Spikelet solitary; leafy bracts none, lowest scale somewhat enlarged; culm leaves reduced, usually to bladeless sheaths | 2 | |
| | Spikelets ≥ 2 , clustered or spreading on drooping peduncles; leafy bracts present | 6 | |
| 2 | Stoloniferous; culms solitary or few together; empty lower scales ≤ 7 | 3 | |
| | Not stoloniferous; culms tufted; empty lower scales mostly 10–15 | 4 | |
| 3 | Scales lead colour to black with narrow pale margins; anthers 0.5–1 mm; bristles white; achene beak 0.1–0.2 mm | | E. scheuchzeri |
| | Scales brownish to black with wide hyaline margins; anthers 1.5–3 mm; bristles pale cinnamon brown to white; achene beak 0.3–0.5 mm | | E. chamissonis |
| 4 | Lower scales white-margined, spreading or reflexed | | E. vaginatum |
| | Lower scales not white-margined, ascending | 5 | |
| 5 | Plants 6–25 cm high; uppermost sheath conspicuously inflated, inserted below middle of culm | | E. callitrix |
| | Plants 30–60 cm high; uppermost sheath not conspicuously inflated, inserted above middle of culm | | E. brachyantherum |

- 6 Leaf-like bract only one, other bracts reduced to bladeless sheaths; leaf blades 1–2 mm wide, channelled E. gracile
- Leaf-like bracts 2 or 3; leaf blades 3–6 mm wide, flat below middle 7
- 7 Midrib of scales prominent to tip; upper sheaths not darkgirdled at summit; anthers 1–1.5 mm E. viridicarinatum
- Midrib of scales not extending into scarious tip; upper sheaths dark-girdled at summit; anthers mostly 3–4 mm E. angustifolium

E. angustifolium Honck.

*Formerly *E. polystachion* L.

Fens, bogs, marshes. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Oreg, Utah, NMex, Neb, Iowa, Gt Lakes, NEngl. Circumpolar.

E. brachyantherum Trautv.

Boggy areas. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L. Circumpolar.

E. callitrix Cham.

Alpine fens. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Mont, Wyo. Eurasia.

E. chamissonis C.A. Mey.

Bogs, fens, marshes. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, NDak, Minn, Wisc, Utah, Colo, Neb. Circumpolar.

E. gracile W.D.J. Koch

Bogs, fens, peaty marshes. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, Gt Lakes, NEngl, NJ, Del, Calif, Nev, Utah, Colo. Eurasia.

E. scheuchzeri Hoppe

Marshy ground. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Sask, Ont to Nfld/L, Wash, Mont, Utah, Colo. Circumpolar.

E. vaginatum L.

Dry bogs, usually in sphagnum peat. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, NS, Gt Lakes, NJ, NEngl. Circumpolar.

E. viridicarinatum (Engelm.) Fernald

Boggy woods, meadows. NAmerica; Alas, NWT, BC, Alta to Nfld/L, Maritimes, Idaho, Wyo, Colo, NDak, Iowa, Gt Lakes, NEngl.

KOBRESIA WILLD.

Spike seemingly simple, undivided, linear;
leaves of previous year mostly reduced to
bladeless sheaths at flowering time

K. myosuroides

Spike compound, ovoid; leaves of previous
year with conspicuous dried blades at
flowering time

K. simpliciuscula

K. myosuroides (Vill.) Fiori & Paol.

Turfy, often exposed, alpine areas. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Oreg, Idaho, Wyo, Calif, Utah, Colo, NMex. Circumpolar.

K. simpliciuscula (Wahlenb.) Mack.

Boggy areas at montane elevations. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Oreg, Idaho, Wyo, Utah, Colo. Circumpolar.

RHYNCHOSPORA VAHL

R. capillacea Torr.

Calcareous fens. N America; Alta to Nfld/L, NB, NDak, SDak, Gt Lakes, NJ, NEngl, Iowa, Mo, Tex, Okla, Ark, Tenn, Va, Ala.

SCHOENOPLECTUS (RCHB.) PALLA

A segregate of *Scirpus* L.

Plants herbaceous, perennial, rhizomatous; culms terete or trigonous, spongy, with internal air cavities, glabrous; leaves basal, sheaths loose, ligules present, blades generally well developed; inflorescences terminal, capitate to open paniculate; involucre bracts 1–5, leaf-like; spikelets 1–many; scales bifid, generally awned or mucronate; flowers bisexual; perianth bristles 4–8, spinulose; stamens 3; styles 2–3, branched; achenes biconvex or trigonous, smooth, beaked.

- | | | |
|---|--|---------------------------|
| 1 | Culms trigonous; inflorescences capitate; spikelets sessile | <i>S. pungens</i> |
| | Culms cylindrical; inflorescences branched; spikelets not sessile | 2 |
| 2 | Perianth bristles 4 (–5), unequal length (2 usually much shorter); achenes trigonous | <i>S. heterochaetus</i> |
| | Perianth bristles usually 6 (4–8), ± equal length; achenes not trigonous | 3 |
| 3 | Some spikelets in clusters; scale awns 0.5–2 mm, generally twisted; perianth bristles 4–8 | <i>S. acutus</i> |
| | Spikelets often all solitary; scale awns 0.2–0.8 mm, straight or bent; perianth bristles 6 | <i>S. tabernaemontani</i> |

S. acutus (Muhl. ex J.M. Bigelow) Á. Löve & D. Löve

*Formerly *Scirpus acutus* Muhl. ex J.M. Bigelow. Two varieties; in Alberta var. *acutus*.

Marshes, lakeshores. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta to Que, Maritimes, s to Oreg, Idaho, Colo, Tex, Ark, Ky, NC.

S. heterochaetus (Chase) Soják

Hybridizes with *S. acutus* and *S. tabernaemontani*.

Rhizome thick, 5–8 mm diam.; culms terete, 1.5–2.5 m; leaves often separating from culm, blades 1–2, to 22 cm; involucre bract 1–15 cm, erect; inflorescence open; spikelets 5–30, mainly individually pedunculate, 5–15 × 3–4 mm; scales orange to brown or buff, midvein often greenish, ovate oblong, 3–4 × 1.5 mm, margin sparsely ciliate, notched, awn 0.3–1 mm; flowers brown, bristles 4–5; achenes dark grey-brown, obovoid, compressed trigonous, 2.2–3.2 mm, beak 0.3–1 mm.

Calcareous marshes, lakes. NAmerica; Alta, Man, Ont, Que, Oreg, Idaho, Mont, Wyo, NDak, SDak, Gt Lakes, NEngl, Calif, Neb, Iowa, Kans, Mo, Okla.

S. pungens (Vahl) Palla

*Formerly *Scirpus pungens* Vahl. Three varieties; in Alberta var. *longispicatus* (Britton) S.G. Sm.

Marshes, shores. NAmerica incl. Mex; Alas, BC, Alta to Nfld/L, Maritimes, s throughout US except Tenn, WV.

S. tabernaemontani (C.C. Gmel.) Palla

*Formerly *Scirpus validus* Vahl.

Lakes, ponds, marshes. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s throughout US.

SCIRPUS L. / BULRUSH

Plants herbs, perennial, rhizomatous; culms \pm trigonous; leaves basal and cauline, 3-ranked, blades well developed; inflorescences terminal, sometimes also axillary, subumbellate to corymbose paniculate; involucre bracts usually 3, leaf-like; flowers bisexual; perianth bristles 3–6, smooth or barbate, shorter to much longer than achenes; stamens 1–3; styles 2- or 3-branched; achenes trigonous or planoconvex to biconvex.

- 1 Perianth bristles smooth, much longer than achenes (mature inflorescence appearing woolly); spikelet scales ≤ 1.8 mm; plants in dense tussocks S. atrocinctus

Perianth bristles toothed or barbed, shorter than achenes; spikelet scales ≤ 3.4 mm; plants not in dense tussocks 2
- 2 Style branches 3; achenes trigonous or planoconvex, ≤ 1.2 mm; scale awns 0.4–0.6 mm S. pallidus

Style branches generally 2; achenes never trigonous, ≤ 1.6 mm; scales mucronate, awns ≤ 0.2 mm S. microcarpus

S. atrocinctus Fernald

*Formerly *S. cyperinus* (L.) Kunth.

Marshy areas. NAmerica; NWT, BC, Alta to Nfld/L, Wash, Mont, Wyo, SDak, Gt Lakes, NJ, NEngl, Iowa, WVa.

S. microcarpus C. Presl / Small-fruited Bulrush

Marshy places. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Neb, Gt Lakes, Ky, WVa, NJ. eAsia.

S. pallidus (Britton) Fernald

Marshy areas. NAmerica; BC, Alta to Ont, s to Oreg, Ariz, NMex, Tex, Mo, Wisc, Pa.

TRICHOPHORUM PERS.

A segregate of *Scirpus* L.

Plants herbs, perennial, with or without rhizomes; culms terete or trigonous; leaves basal, sheaths bladeless or short-bladed; inflorescences terminal; spikelets solitary; involucre bracts scale-like, often awned or mucronate; flowers bisexual; perianth bristles present or absent, $\leq 20\times$ longer than achenes, smooth or scabrous; stamens 3; styles 3, branched; achenes planoconvex to trigonous.

- | | | |
|---|--|----------------------|
| 1 | Culms scabrous, trigonous | 2 |
| | Culms smooth, terete | 3 |
| 2 | Perianth bristles white, $\leq 20\times$ longer than achenes; flowers ≥ 15 per spikelet | <i>T. alpinum</i> |
| | Perianth bristles brown, equal to or shorter than achenes; flowers ≤ 10 per spikelet | <i>T. clintonii</i> |
| 3 | Plants rhizomatous; bracts to 2.5 mm; perianth bristles absent; anthers 0.8–1.5 mm | <i>T. pumilum</i> |
| | Plants not rhizomatous, tufted; bracts > 3 mm; perianth bristles 6; anthers 1.5–2.6 mm | <i>T. cespitosum</i> |

T. alpinum (L.) Pers.

*Formerly *Scirpus hudsonianus* (Michx.) Fernald.

Fens, bogs, lakeshores. N America; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Mont, Gt Lakes, NJ, N Engl. Circumboreal.

T. cespitosum (L.) Schur

*Formerly *Scirpus cespitosus* L.

Poor fens, bogs. N America; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Utah, NY, N Engl, Tenn, NC, SC. Circumpolar.

T. clintonii (A. Gray) S.G. Sm.

*Formerly *Scirpus clintonii* A. Gray.

Woodlands, turfy shores. NAmerica; Alta, Sask, Ont, Que, NB, Minn, Wisc, Mich, NY, Me.

T. pumilum (Vahl) Schinz & Thell.

*Formerly *Scirpus pumilus* Vahl.

Calcareous fens. NAmerica; Alas, Yuk, NWT, BC, Alta, Sask, Que, Mont, Calif. More or less circumpolar.

HYDROCHARITACEAE / Waterweed Family

ELODEA MICHX.

E. bifoliata H. St. John

*Formerly *E. longivaginata* H. St. John.

Ponds, lakes. NAmerica; BC, Alta to Man, Oreg, Mont, Idaho, Mont, NDak, Minn, Utah, Colo, NMex.

IRIDACEAE / Iris Family

Leaves 5–10 mm wide; flowers \pm 6 cm

Iris

Leaves 1–4 mm wide; flowers \pm 1 cm

Sisyrinchium

IRIS L. / FLAG

I. missouriensis Nutt.

Marshy ground. NAmerica incl. Mex; BC, Alta, Wash, Oreg, Idaho, Mont, Wyo, SDak, Neb, Calif, Nev, Utah, Colo, Ariz, NMex.

SISYRINCHIUM L. / BLUE-EYED GRASS

Leaves 1–4 mm wide; flowers blue; pedicels mostly longer than inner bract; perianth segments emarginate or abruptly narrowed to aristulate apex

S. montanum

Leaves 1–2 mm wide; flowers often white; pedicels mostly shorter than inner bract; perianth segments rounded at apex, aristulate

S. septentrionale

S. montanum Greene

Two varieties; in Alberta var. *montanum*.

Moist open areas. N America; Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Idaho, Mont, Wyo, NDak, SDak, Neb, Gt Lakes, NJ, N Engl, Colo, Kans, NMex.

S. septentrionale E.P. Bicknell

Moist grassy areas. N America; NWT, BC, Alta, Sask, Wash.

JUNCACEAE / Rush Family

Leaves glabrous, often terete, seldom flat and grass-like; capsule many-seeded

Juncus

Leaves \pm hairy, at least when young, flat or channelled and grass-like; capsule 3-seeded

Luzula

JUNCUS L. / RUSH

- 1 Inflorescence appearing to be on side of stem, stem extending beyond as a cylindrical bract; leaves all basal or mostly so, or reduced to sheaths 2
 - Inflorescence appearing terminal or lateral, if lateral, bract flat or channelled on upper side 5
- 2 Flowers few, usually 2 or 3; seeds appendaged; mountain plants 3
 - Flowers several or numerous; seeds lacking appendages; plants usually at lower elevations 4
- 3 Upper leaf sheaths with distinct blades; capsule acute J. parryi
 - Upper leaf sheaths merely bristle-pointed; capsule retuse J. drummondii
- 4 Bract nearly as long as stem or longer; flowers usually green J. filiformis
 - Bract usually much shorter than stem; flowers usually brown J. arcticus
- 5 Annual, 5–20 (–30) cm high; inflorescence diffuse, generally >2/3 plant height J. bufonius
 - Perennial; inflorescence not as above 6

- 6 Leaves all basal; flowering stems 3–15 cm tall; heads solitary (rarely 2) with 1–3 (–5) flowers; capsule 3.0–5.5 mm; mostly alpine 7
- Leaves basal and cauline; flowering stems mostly >15 cm tall; heads >1 and/or >5-flowered (occasionally heads single and 2–4-flowered in *J. stygius*, but capsule 6.0–8.5 mm); mostly non-alpine 8
- 7 Plants 3–10 cm high; lower involucral bract much longer than head; capsule retuse *J. biglumis*
- Plants 10–15 cm high; lower involucral bract ± as long as head; capsule acute *J. albescens*
- 8 Capsule 6–9 mm, much longer than perianth; seeds 2.5–4.0 mm, conspicuously appendaged 9
- Capsule shorter, at most not much longer than perianth; seeds with or without appendages, seeds with appendages <2.5 mm 10
- 9 Plants rhizomatous; leaves ± 2 mm wide *J. castaneus*
- Plants tufted, lacking rhizomes; leaves filiform, <1 mm wide *J. stygius*
- 10 Leaf blades flattened laterally, positioned edgewise to stem (equitant), 3–6 mm wide *J. ensifolius*
- Leaf blades not laterally flattened, nor equitant, either terete or flattened dorsiventrally, mostly <3 mm wide 11

11	Leaves septate, terete		12
	Leaves not septate, either dorsiventrally flattened or channelled		17
12	Heads 1 (very rarely 2); tepals dark brown to black; cauline leaves 0–1; plants of montane to alpine habitats	<i>J. mertensianus</i>	
	Plants not as above		13
13	Capsules tapering \pm from base to a long slender beak; rhizomes with swollen nodes		14
	Capsule somewhat abruptly narrowed apically to a beak; rhizomes (if present) lacking swollen nodes		15
14	Tepals 2–4 mm; heads 6–10 (–12) mm diam.; cauline leaves 0.5–1.5 mm wide; auricles 0.5–1.7 mm	<i>J. nodosus</i>	
	Tepals 3–6 mm; heads 10–15 mm diam.; cauline leaves 1–5 mm wide; auricles 1–4 mm	<i>J. torreyi</i>	
15	Seeds 0.7–1.2 mm, appendaged, covered by a whitish translucent mantle	<i>J. brevicaudatus</i>	
	Seeds 0.4–0.7 mm, not appendaged, lacking mantle		16
16	Inflorescence with 2–11 heads; tepals 2.4–6 mm, dark brown to white; anthers much longer than filaments	<i>J. nevadensis</i>	
	Inflorescence with 5–25 heads; tepals 1.6–3 mm, pale green to stramineous; anthers much shorter than filaments	<i>J. alpinoarticulatus</i>	

- 17 Flowers in heads; tepals 4–6 mm, brown with green midstripe; anthers 1–1.5 mm; auricles absent 18
- Flowers in congested cymes; tepals 3.3–4.4 mm, greenish to tan; anthers 0.4–0.8 mm; auricles present, 0.2–0.6 mm 19
- 18 Leaf blades auriculate at base; heads each with 3–12 flowers; seeds 0.4–0.6 mm, lacking appendages *J. longistylis*
- Leaf blades lacking auricles; heads each with 10–30 flowers; seeds 1–1.6 mm including conspicuous appendages *J. regelii*
- 19 Auricles of leaf sheaths 3–6 mm, membranous, transparent *J. tenuis*
- Auricles of leaf sheaths <2 mm, scarious 20
- 20 Leaf blades ± terete *J. vaseyi*
- Leaf blades flat 21
- 21 Culms 30–50 cm; auricles 0.3–0.7 mm; tepals dark green to blackish, usually with brown midstripe; anthers 0.3–0.5 mm *J. confusus*
- Culms 20–100 cm; auricles 0.2–0.4 mm; tepals greenish, lacking brown midstripe; anthers 0.6–1 mm *J. dudleyi*

J. albescens (Lange) Fernald

*Formerly *J. triglumis* L. var. *albescens* Lange.

Fens, bogs. N America; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Oreg, Mont, Wyo, Utah, Colo, NMex.

J. alpinoarticulatus Chaix

Wet meadows, shores. NAmerica; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Idaho, Mont, NDak, SDak, Gt Lakes, NEngl, Utah, Colo, Neb, Iowa, Mo. Circumpolar.

J. arcticus Willd.

*Formerly *J. balticus* Willd. A number of varieties; in Alberta var. *balticus* (Willd.) Trautv.

Lake and stream shores, wet meadows, fens. NAmerica incl. Mex; throughout NAmerica except seUS. Eurasia, SAmerica.

J. biglumis L.

Moist alpine areas. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Man, Ont, Que, Nfld/L, disjunct Mont, Wyo, Colo. Circumpolar.

J. brevicaudatus (Engelm.) Fernald

Shores, marshes. NAmerica; BC, Alta, Sask to Nfld/L, Maritimes, Wash, Oreg, Wyo, Utah, Colo, Ariz, Gt Lakes, NEngl, s to Tenn, NC.

J. bufonius L. / Toad Rush

Moist areas. NAmerica incl. Mex; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s throughout US. Circumpolar.

J. castaneus J.E. Smith

Marshes, fens. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Mont, Wyo, Nev, Utah, Colo, NMex. Circumpolar.

J. confusus Coville

Wet grasslands, thickets, open woods. NAmerica; BC, Alta, Sask, Wash, Oreg, Idaho, Mont, Wyo, SDak, Calif, Nev, Utah, Colo, Ariz.

J. drummondii E. Mey.

Moist montane slopes. NAmerica; Alas, Yuk, NWT, BC, Alta, Wash, Oreg, Idaho, Mont, Wyo, Calif, Nev, Utah, Colo, NMex.

J. dudleyi Wiegand

*Formerly *J. tenuis* Willd. var. *dudleyi* (Wiegand) F.J. Herm. but now recognized as a distinct species.

Plants perennial; stems 20–100 cm, arising singly or in tufts; rhizome densely branched; leaves 2–3, auricles obscure 0.2–0.4 mm, blades generally flat, 5–30 cm; inflorescence 1.5–5 (–9) cm, compact or open; tepals lanceolate, greenish, 4–5 mm; stamens 6; capsules 1–3, locules ellipsoid, light brown, 3–3.6 × 1.5–1.9 mm; seeds tan to amber, 0.4–0.7 mm, not appendaged.

Moist areas, stream banks, ditches. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s throughout US except Nev, La, Miss, Ala, NC, SC, Ga, Fla.

J. ensifolius Wikstr.

Two varieties, both in Alberta: var. *ensifolius* and var. *montanus* (Engelm.) C.L. Hitchc., with stamens 3 and 6, respectively. The var. *montanus* (Engelm.) C.L. Hitchc. was formerly included in *J. tracyi* Rydb.

Marshy areas. NAmerica incl. Mex; Alas, BC, Alta, Sask, Ont, Que, Wash, Oreg, Idaho, Mont, Wyo, NDak, SDak, Wisc, NY, Calif, Nev, Utah, Colo, Ariz, NMex, Tex. eAsia.

J. filiformis L.

Bogs, marshes. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, Neb, Gt Lakes, NJ, NEngl, WVa. Circumpolar.

J. longistylis Torr.

Moist meadows, shores. NAmerica; BC, Alta to Nfld/L, Wash, Oreg, Idaho, Mont, Wyo, NDak, SDak, Neb, Minn, Calif, Nev, Utah, Colo, Ariz, NMex.

J. mertensianus Bong.

Wet ground, banks, slopes. NAmerica; Alas, Yuk, NWT, BC, Alta, Sask, Wash, Oreg, Idaho, Mont, Wyo, Calif, Nev, Utah, Colo, Ariz, NMex.

J. nevadensis S. Watson

Wet areas. NAmerica; BC, Alta, Sask, Wash, Oreg, Idaho, Mont, Wyo, Calif, Nev, Utah, Colo, Ariz, NMex.

J. nodosus L.

Moist ground. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Wash, Idaho, Mont, NDak, Gt Lakes, NEngl, s to Nev, Ariz, NMex, Tex, Mo, Va.

J. parryi Engelm.

Mountain slopes, meadows. NAmerica; BC, Alta, Wash, Idaho, Mont, s to Calif, Nev, Utah, Colo.

J. regelii Buchenau

Plants perennial from creeping rhizome; stems erect, 20–60 cm; leaves not septate, basal several, cauline 1–3, flat, lacking auricles, 1.5–4 mm wide; inflorescence of 1–5 heads each with 10–30 flowers; bracts conspicuous; perianth segments lanceolate, margins scarious, dark brown with broad green central stripe, 4–6 mm; style elongate; capsule obovoid, 3–5 mm; seeds ellipsoid, appendaged, 1–1.6 mm including appendages.

Moist meadows to subalpine elevations. NAmerica; BC, Alta, Wash, Idaho, Mont, s to Calif, Nev, Utah.

J. stygius L.

Two subspecies; in Alberta subsp. *americanus* Buchenau.

Fen pools. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Minn, Mich, NY, Me. Circumpolar.

J. tenuis Willd.

Wet ground. NAmerica; Alas, Yuk, BC, Alta to Nfld/L, Maritimes, s throughout US. Europe, eAsia.

J. torreyi Coville

Wet ground. NAmerica incl. Mex; BC, Alta to NB, s throughout US except Fla.

J. vaseyi Engelm.

Moist shores, meadows. NAmerica; NWT, BC, Alta to Nfld/L, Idaho, Mont, Wyo, SDak, Colo, Iowa, Gt Lakes, NEngl.

LUZULA DC. / WOOD RUSH

- 1 Flowers crowded in few to many dense clusters in heads, spikes or small clusters 2
Flowers solitary (or 2–3 together) at ends of branches, not forming heads 5
- 2 Inflorescence dense with 1 spike-like head L. spicata
Inflorescence of several heads, stiff or open 3
- 3 Bracts of inflorescence short and inconspicuous L. arcuata
Bracts equal to or exceeding the inflorescence 4
- 4 Perianth segments 1.9–2.5 mm, outer series ± equal to or longer than inner; capsules ovoid; seeds 0.9–1.1 mm, appendage obsolete L. groenlandica
Perianth segments 2–4 mm, inner and outer series ± equal in length; capsules globose; seeds 1.1–1.7 mm, appendage evident L. multiflora

- 5 Flowers solitary; inflorescence corymbose rarely branched; seeds with conspicuous caruncle L. rufescens
- Flowers mostly in pairs (occasionally 1 or 2–3); inflorescences paniculate or cymose, branched; caruncle absent or obscure 6
- 6 Perianth segments 2.5–3.0 mm; anthers 1.2–1.5 mm; capsule ovate, 2.8–3.8 mm, with conspicuous beak ≤ 1 mm L. hitchcockii
- Perianth segments usually < 2.5 mm; anthers < 1.0 mm; capsule elliptic or rounded, < 2.5 mm, beak short, inconspicuous 7
- 7 Plants usually < 30 cm tall; cauline leaves 2–3; bracts and bractlets strongly ciliate L. piperi
- Plants usually > 30 cm tall; cauline leaves (3–) ≥ 4 ; bracts entire or slightly ciliate-lacerate, bractlets entire to lacerate but never ciliate L. parviflora

L. arcuata (Wahlenb.) Sw.

Two subspecies; in Alberta subsp. *unalaschkensis* (Buchenau) Hultén. Gravelly alpine slopes, ledges. N America; Alas, Yuk, NWT, BC, Alta, Wash, Mont. eAsia.

L. groenlandica Böcher

Plants caespitose; culms 10–30 cm; basal leaves ≤ 9 cm, generally some persistent, cauline to 5 cm; inflorescences spike-like, glomerules 1–3, peduncles ≤ 5 mm, bract leaf-like, much longer than inflorescence; flowers with tepals 1.9–2.5 mm, uniform, outer equal to or longer than inner; capsules ovoid, reddish, shiny, usually shorter than tepals; seeds 0.9–1.0 mm, appendages inconspicuous.

Sandy shores, turfey tundra, snowbeds, alpine flats. N America; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Man, Que, Nfld/L.

L. hitchcockii Hämet-Ahti

Montane to subalpine coniferous woodlands. NAmerica; BC, Alta, Wash, Oreg, Idaho, Mont.

L. multiflora (Ehrh.) Lej.

Three subspecies recognized; in Alberta subsp. *multiflora*.

Wet meadows, damp open woods. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, SDak, Gt Lakes, NEngl, s to Mo, Tenn, Ga.

L. parviflora (Ehrh.) Desv.

Moist forests, marshy areas. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, SDak, Gt Lakes, NEngl, Calif, Nev, Utah, Colo, Ariz, NMex. Circumpolar.

L. piperi (Coville) M.E. Jones

Alpine heaths, meadows. NAmerica; Alas, Yuk, BC, Alta, Wash, Oreg, Idaho, Mont.

L. rufescens Fisch. ex E. Mey.

Alberta material called *L. acuminata* is referable to *L. rufescens*.

Plants stoloniferous, loosely cespitose; culms 10–30 cm; basal leaf sheaths reddish, blades 6–10 cm, cauline leaves 2–3, blades 4–6 cm; inflorescence simple, rarely branched, bract to $\pm 1/2$ length of inflorescence; flowers solitary on spreading pedicels 1–4 cm, tepals brown, 1.6–2.5 mm; capsules stramineous, sometimes reddish, equal to or longer than tepals; seeds 1.4 mm, dark brown to black.

Dry to moist montane forests, marsh margins, gravel bars. NAmerica; Alas, Yuk, NWT, BC, Alta. Asia.

L. spicata (L.) DC.

Alpine slopes and among rocks. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Man, Que, Nfld/L, s to Calif, Utah, NMex, NY, NEngl. Circumpolar.

JUNCAGINACEAE

The Juncaginaceae here includes *Lilaea* Humb. & Bonpl. formerly classified as a distinct monotypic family. Despite numerous morphological differences, there are cytological, embryological, palynological and molecular characters that indicate the close relationship of *Lilaea* with genera of Juncaginaceae.

Plants herbs, annual or perennial, rhizomatous; leaves basal, sheaths persistent, ligulate and auriculate, blades linear; inflorescences scapose, terminal spike, also solitary, basal flowers enclosed by the leaf sheath; flowers bisexual, pistillate or staminate, hypogynous; tepals 1 or 6 in 2 series; stamens 1, 4 or 6; carpels 1, 3 (-4) or 6; ovules solitary, basal; fruits nutlets or schizocarps.

Plants annual; tepals absent; flowers mostly
staminate or pistillate, carpels solitary Lilaea

Plants perennial; tepals present; flowers
bisexual, each with 3 or 6 carpels Triglochin

LILAEA HUMB. & BONPL.

L. scilloides (Poir.) Hauman / Flowering-quillwort
Sloughs, mudflats. N America incl. Mex; BC, Alta, Sask, Wash, Oreg,
Mont, Calif, Nev.

TRIGLOCHIN L. / ARROW-GRASS

Carpels usually 6; stigmas 6, spreading;
fruit ovoid-oblong, rounded at base, with a
wingless axis T. maritima

Carpels 3; stigmas 3, very short; fruit linear-
clavate, tapering at base, with a winged axis T. palustris

T. maritima L. / Arrow-grass

Brackish marshes, meadows. N America incl. Mex; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Kans, Iowa, Gt Lakes, N Engl. Circumpolar, S America.

T. palustris L. / Slender Arrow-grass

Brackish marshes, shores, meadows. N America incl. Mex; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, s to Calif, NMex, Neb, Gt Lakes, N Engl. Circumpolar, S America.

LEMNACEAE / Duckweed Family

- | | | |
|---|---|-----------|
| 1 | Thallus lacking roots | Wolffia |
| | Thallus with 1 or more roots | 2 |
| 2 | Plant with 1 root; thallus oval or elongated, usually green beneath, 1–5-nerved | Lemna |
| | Plant with several roots; thallus nearly circular, 3–8 mm broad, reddish beneath, 4–15-nerved | Spirodela |

LEMNA L.

Thalli 6–10 mm, stalked, remaining together to appear 3-lobed; mostly submersed, forming large colonies

L. trisulca

Thalli 2–5 mm, stalkless, forming small rosettes or freely separating, rather thick; forming dense floating masses on shallow water

L. turionifera

L. trisulca L. / Ivy Duckweed

Quiet, calcium-rich waters. N America; Alas, Yuk, NWT, BC, Alta to Maritimes, s to Calif, Ariz, NMex, Kans, Ark, Tenn, Va. More or less worldwide except polar regions and S America.

L. turionifera Landolt / Common Duckweed

*Formerly *L. minor* L. Practically indistinguishable vegetatively from *L. minor* L., which does not occur in Alberta. The two species rarely flower, but *L. turionifera* produces small, olive to brown rootless turions.

In quiet waters, forming a floating green carpet. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta to Maritimes, s throughout US except Ark, La to Va. More or less circumpolar.

SPIRODELA SCHLEID.

S. polyrhiza (L.) Schleid. / Large Duckweed

Floating on quiet waters. NAmerica incl. Mex; BC, Alta to Maritimes, s throughout US. Circumpolar s of 60°N.

WOLFFIA HORKEL EX SCHLEID. / WATERMEAL

Thallus floating or submersed, globular, ovoid or boat-shaped, <1.6 mm, veins absent; roots absent; flowers 1 per thallus.

Thalli boat-shaped, tip of thallus clearly pointed, 0.3–1× deep as wide; pigment cells present (seen as brown dots in dead thalli) W. borealis

Thalli globular, tip of thallus rounded, 1–1.5× deep as wide; pigment cells absent W. columbiana

W. borealis (Engelm.) Landolt

Thalli boat-shaped, 0.7–1.5 mm long, upper surface intensely green; stomata 50–100.

Quiet waters, mesotrophic to eutrophic. NAmerica incl. Mex; BC, Alta, Ont, Que, Wash, Idaho, Mont, SDak, Neb, Kans, Okla to Gt Lakes, NEngl, Calif, Utah, Colo.

W. columbiana H. Karst.

Thalli globose, 0.5–1.4 × 0.4–1.2 mm, upper surface transparently green; stomata 1–10 (–30).

Quiet waters, mesotrophic to eutrophic. NAmerica incl. Mex; Alta, Sask to Que, Oreg, Mont, Calif, NDak s to Tex and e to NEngl, Fla. CAmerica, SAmerica.

LILIACEAE / Lily Family

In the *Flora of North America*, the family Liliaceae (Utech 2002) is delimited using the angiosperm classification of Cronquist (1981) that includes plants characterized by hypogynous flowers, 6 perianth segments, usually 6 stamens, and 3 fused carpels with axile placentation. While this has long been recognized to be an assemblage of convenience, comprising morphologically similar but evolutionarily unrelated genera, no agreement exists on how the family should be reclassified, and no fewer than 30 segregate families have been proposed (Utech 2002). More recently, new biological techniques and information have clarified many of these relationships, and here we adopt the treatment of Judd et al. (2002), which is based on work of the Angiosperm Phylogeny Group (Stevens 2001 onwards). In Alberta, this approach currently results in a more narrowly delimited Liliaceae plus Asparagaceae, Alliaceae, Agavaceae, Melanthiaceae, Ruscaceae, Tofieldiaceae, Trilliaceae and Uvulariaceae.

Plants herbs, frequently with bulbs; leaves alternate or whorled, sometimes in a basal rosette, simple, entire, with parallel venation, stipules absent; inflorescences determinate, often a solitary, large flower; flowers bisexual, hypogynous, radial; tepals 6, free, petal-like; stamens 6; carpels 3, fused, placentation axile, ovules numerous; fruit a capsule, dehiscence loculicidal, sometimes a berry; seed not winged or black.

- | | | |
|---|--|---|
| 1 | Tepals creamy to yellowish white | 2 |
| | Tepals yellow, red, red orange, brick red or brown | 3 |

- | | | |
|---|---|-------------|
| 2 | Leaves linear; fruit a capsule | Calochortus |
| | Leaves obovate to oblanceolate; fruit a dark blue berry | Clintonia |
| 3 | Tepals 4.2–8.2 cm, capsules 2.2–7.7 cm | Lilium |
| | Tepals and capsules shorter | 4 |
| 4 | Leaves lanceolate, 5–30 cm; tepals recurved, bright yellow, 2–3.5 cm; capsules 2–5 cm | Erythronium |
| | Leaves linear to lanceolate, 3–20 cm; flowers nodding, tepals yellow to orange, some lined brown, aging to brick red, 0.8–2.2 cm; capsules 1.5–3 cm | Fritillaria |

CALOCHORTUS PURSH

C. apiculatus Baker / Mariposa Lily

Dry slopes. NAmerica; BC, Alta, Wash, Idaho, Mont.

CLINTONIA RAF.

C. uniflora (Menzies ex Schult.) Kunth

Moist woods in the Rocky Mountains. NAmerica; Alas, BC, Alta, Wash, Oreg, Idaho, Mont, Calif.

ERYTHRONIUM L.

E. grandiflorum Pursh / Glacier Lily, Dog-tooth Violet

Comes into flower very promptly as winter snow melts.

Rich soils, grassy slopes, open forests from foothills to timberline. NAmerica; BC, Alta, s to Calif, Utah, NMex.

FRITILLARIA L.

F. pudica (Pursh) Spreng. / Yellow-bell

Grasslands, dry open forest areas. N America; BC, Alta, s to Calif, Nev, Utah, Wyo.

LILIUM L.

L. philadelphicum L. / Western Wood Lily

Woodlands, grasslands. N America; BC, Alta to Que, Mont, Wyo, Colo, NMex, NDak, SDak, Neb, Iowa, Gt Lakes, N Engl, s to Ga.

MELANTHIACEAE

Formerly included in Liliaceae.

Plants herbs, usually with bulb-like or tuberous rhizomes; leaves alternate, sometimes in a basal rosette, simple, entire, venation parallel, stipules absent; inflorescences indeterminate; flowers bisexual, hypogynous, usually radial; tepals 6; stamens 6, anthers bilocular, opening by a single slit; carpels 3, united, placentation axile, ovules 2–many; fruit usually a capsule; seeds often winged or appendaged, not black.

- 1 Leaves lanceolate, elliptic or ovate, $\leq 5\times$ longer than wide Veratrum
- Leaves linear to linear-lanceolate, many times longer than wide 2
- 2 Plants 50–120 cm, from a stout, woody, tuberous rhizome; leaves 20–40 cm, tough, fibrous, margins rough, forming a dense basal clump Xerophyllum
- Plants much smaller, from bulbs; leaves not as above 3

3 Flowers 1–6; corollas cup-shaped, tubular,
10–20 mm; tepals green to bronze Stenanthium

Flowers 10–50; corollas tubular; tepals
greenish white to whitish yellow or cream Zigadenus

STENANTHIUM (A. GRAY) KUNTH

S. occidentale A. Gray / Bronze-bells

Moist woods, banks. N America; BC, Alta, Wash, Oreg, Idaho, Mont,
Calif.

VERATRUM L. / FALSE HELLEBORE

V. viride Aiton

*Formerly *V. eschscholtzii* (Roem. & Schult.) A. Gray. Two varieties; in
Alberta var. *eschscholtzianum* (Roem. & Schult.) Breitung.

Moist woods, open slopes. N America; Alas, Yuk, NWT, BC, Alta,
Wash, Oreg, Idaho, Mont, Calif.

XEROPHYLLUM MICHX.

X. tenax (Pursh) Nutt. / Bear Grass

Dry mountain slopes, open woods. N America; BC, Alta, Wash, Oreg,
Idaho, Mont, Wyo, Calif.

ZIGADENUS MICHX. / DEATH CAMAS

Ovary partly inferior; glands of perianth
obcordate Z. elegans

Ovary superior; glands of perianth obovate or
semicircular Z. venenosus

Z. elegans Pursh / White Camas

Slightly poisonous to livestock.

Moist meadows, open woods. NAmerica; Alas, Yuk, NWT, BC, Alta to Que, Wash, Oreg, Idaho, Mont, Wyo, NDak, SDak, Iowa, Gt Lakes, NY, Vt, Nev, Utah, Colo, Ariz, NMex, Tex, Mo, Tenn, NC, WV, Va, Md.

Z. venenosus S. Watson / Death Camas

Two varieties; in Alberta var. *gramineus* (Rydb.) Walsh ex C.L. Hitchc. Very poisonous to livestock.

Plains, hillsides. NAmerica; BC, Alta, Sask, Wash, Oreg, Idaho, Mont, Wyo, NDak, SDak, Neb, Colo.

NAJADACEAE / Water-nymph Family

NAJAS L. / NAJAS

Recent molecular data support the view that Najadaceae is closely related to Hydrocharitaceae and would best be included in that family.

Plants submerged aquatic herbs in fresh or brackish water; stems branched, rooting at proximal nodes; leaves opposite or whorled, sheathed, blades linear, 1-veined; flowers axillary, unisexual; plants dioecious (*N. marina* L.) or monoecious (other North American species); staminate flowers usually subtended by involucre or spathe, perianth 2-lipped, stamens 1, anther sessile; pistillate flowers sessile, lacking involucre, perianth absent or vestigial; ovary solitary, ovules 1, basal; fruit 1-loculed, indehiscent.

Seeds narrowly to broadly obovoid, testa smooth, glossy; anthers 1-loculed

N. flexilis

Seeds fusiform, testa pitted, not glossy; anthers 1- or 4-loculed

N. guadalupensis

N. flexilis (Willd.) Rostk. & W.L.E. Schmidt

Ponds, streams. NAmerica; BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, NDak, SDak, Gt Lakes, NJ, NEngl, Calif, Utah, Mo to Va. Eurasia.

N. guadalupensis (Spreng.) Magnus

Plants with stems 10–90 cm, profusely branched distally; leaves 0.3–3.3 mm, sheath 1–3.4 mm wide, blade 0.2–2.4 mm wide with unicellular teeth on margin; flowers 1–3 in axils, monoecious; staminate flowers in distal axils, pistillate flowers in proximal axils; seeds 1.2–3.8 mm, fusiform, dull, yellowish white with a purple tinge. Four subspecies; in Alberta subsp. *guadalupensis*.

Lakes, rivers. NAmerica incl. Mex; Alta, Ont, s throughout US except Oreg, Idaho, Wyo, NDak, NMex. CAmerica, SAmerica.

ORCHIDACEAE / Orchid Family

- | | | |
|---|--|--------------|
| 1 | Lip a large inflated sac or pouch | 2 |
| | Lip inconspicuous or showy but not an inflated sac or pouch | 3 |
| 2 | Plants with 1 (basal) leaf | Calypso |
| | Plants with ≥ 2 leaves | Cypripedium |
| 3 | Plants saprophytic, with reduced non-green leaves; rhizome coralloid | Corallorhiza |
| | Plants not saprophytic; leaves green with well-developed blades | 4 |
| 4 | Spur on flowers present and conspicuous | 5 |
| | Spur on flowers lacking | 8 |

5	Petals and lip usually spotted with pink or purple; leaves 1, basal	Amerorchis
	Petals and lip white, yellowish or green, not spotted; leaves >1	6
6	Floral bracts much longer than flowers; lips 3-lobed apically	Coeloglossum
	Floral bracts not usually longer than flowers; lips not 3-lobed apically	7
7	Basal leaves withering at flowering; sepals 1-veined	Piperia
	Basal leaves green at flowering; sepals 3-veined	Platanthera
8	Flowers solitary	Arethusa
	Flowers ≥ 2	9
9	Leaves 2, opposite or nearly so, at \pm middle of stem	Listera
	Leaves basal, if cauline, alternate	10
10	Leaves cauline, alternate	Spiranthes
	Leaves basal	11
11	Leaves fleshy, evergreen, reticulate or blotched with white	Goodyera
	Leaves green, not reticulate or blotched with white	12
12	Mature capsules and flowers 9–13 mm	Liparis
	Mature capsules and flowers much smaller	13
13	Flowers in racemes 0.5–12 cm	Malaxis
	Flowers spirally twisted in terminal spikes	Spiranthes

AMERORCHIS HULTÉN

A. rotundifolia (Banks ex Pursh) Hultén / Round-leaved Orchid

*Formerly *Orchis rotundifolia* Banks ex Pursh.

Moist woods. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, NB, Mont, Wyo, Gt Lakes, NEngl.

ARETHUSA L.

A. bulbosa L. / Arethusa

Plants herbaceous, with small corm, 2–40 cm high; 1–2 grass-like leaves, 5–23 cm × 3–12 mm, often visible only after flowering; 1 (–2) pink to magenta, rarely white, flowers borne at end of stalk; floral bracts inconspicuous; sepals erect, 20–55 × 4–9 mm, forming an erect hood; petals arcuate, 23–49 × 4–10 mm; lip obovate to oblong, arcuate to reflexed near the middle, 19–35 × 10–19 mm, white to whitish pink in centre with yellow lamellae and fleshy processes; capsules erect, ovoid to ellipsoid, 15–25 mm.

Sphagnum bogs and fens. NAmerica; Alta to Nfld/L, Maritimes, Gt Lakes, NEngl, Ind, NC, Pa, SC, Tenn, WV, Wisc.

CALYPSO OAKES

C. bulbosa (L.) Salisb. / Venus'-slipper

Three varieties; in Alberta var. *americana* (R. Br.) Luer.

Coniferous forests. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, SDak, Gt Lakes, NEngl, Calif, Utah, Colo, Ariz, NMex. Circumpolar.

COELOGLOSSUM HARTM.

Formerly included in *Habenaria* Willd.

Plants herbs, somewhat succulent, perennial; stems leafy; leaves alternate, sessile, bases sheathing; inflorescences terminal, spike-like racemes; floral bracts foliaceous, conspicuously exserted; flowers resupinate, lip notched to 3-lobed, middle lobe reduced, base prolonged backwards into a short saccate spur; fruits ellipsoid capsules.

C. viride (L.) Hartm. / Bracted Orchid

*Formerly *Habenaria viridis* (L.) R. Br.

Moist meadows and woods. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Wash, Idaho, Mont, Wyo, NDak, SDak, Neb, Iowa, Gt Lakes, NJ, NEngl, Utah, Colo, Ariz, NMex, Va, Tenn, NC. Eurasia.

CORALLORHIZA GAGNEBIN / CORAL-ROOT

- | | | |
|---|--|-----------------------|
| 1 | Sepals and petals 1-nerved; lip 4–5 mm;
stems yellowish, usually <3 mm wide | <i>C. trifida</i> |
| | Sepals and petals 3-nerved; lip >5 mm; stems
usually purplish, often >3 mm wide | 2 |
| 2 | Lip with upturned margins; petals purple
striate | <i>C. striata</i> |
| | Lip without upturned margins; petals with
indistinct veins, flowers not appearing striped | 3 |
| 3 | Petals with rounded lateral lobes | <i>C. maculata</i> |
| | Petals with acute lateral teeth | <i>C. mertensiana</i> |

C. maculata (Raf.) Raf. / Spotted Coral-root

Three varieties; two in Alberta: var. *maculata* with floral bracts 0.5–1 mm, middle lobe of lip not or only slightly expanded; and var. *occidentalis* (Lindl.) Ames with floral bracts 1–2.8 mm, middle lobe of lip distinctly expanded.

Woods. N America incl. Mex; BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, NDak, Neb, Gt Lakes, NJ, N Engl, s to Ga, Calif, Nev, Utah, Colo, Ariz, NMex.

C. mertensiana Bong.

Plants perennial; stems thickened, not bulbous at base; inflorescence dense raceme, 35–65 × 1.5–4 cm; flowers 8–35; sepals reddish purple, sometimes yellowish near base or completely yellow, lanceolate, 3-veined, 6–12 mm, dorsal sepal arching over column, lateral sepals strongly spreading; petals arching over column, connivent with dorsal sepal, often yellowish basally and streaked with purple or completely yellow, suffused with purple towards apex; lip red purple, white or white with purple streaks or spots, narrowly obovate, 4.8–9.5 × 2.5–5 mm, usually with small tooth on each side; column curved to lip, yellow, often with purple or white at base and streaked or spotted with purple; capsules ellipsoid, 10–25 × 6–9 mm.

Moist to dry coniferous and mixed woods. N America; Alas, BC, Alta, Wash, Oreg, Idaho, Mont, Wyo, Calif.

C. striata Lindl. / Striped Coral-root

Two varieties; in Alberta var. *striata*.

Woods. N America incl. Mex; BC, Alta to Nfld/L, Wash, Oreg, Idaho, Mont, Wyo, NDak, SDak, Gt Lakes, Calif, Nev, Utah, Colo, NMex, Tex.

C. trifida Châtel. / Pale Coral-root

Thickets, woods, bogs. N America; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, NDak, SDak, Gt Lakes, NJ, N Engl, Calif, Utah, Colo, NMex, Del, Md, WVa. Circumpolar.

CYPRIPEDIUM L. /
LADY'S-SLIPPER, MOCCASIN-FLOWER

- | | | |
|---|---|-----------------------|
| 1 | Flowering stem a naked scape, 2 leaves at base; lip pink with red veins, cleft down front, drooping | C. <i>acaule</i> |
| | Flowering stem with alternate leaves nearly to top; lip yellow or white, with a rounded opening | 2 |
| 2 | Sepals obovate or oval, not longer than lip, lip 1–2 cm; staminode elliptic-cordate | C. <i>passerinum</i> |
| | Sepals lanceolate, attenuate, often longer than lip, lip 2–4 cm | 3 |
| 3 | Flowers yellow, generally 1; staminode triangular | C. <i>parviflorum</i> |
| | Flowers white, generally 2; staminode ovate or obovate | C. <i>montanum</i> |

C. *acaule* Aiton / Stemless Lady's-slipper
 Bogs, woods, sand dunes. NAmerica; NWT, Alta to Nfld/L, Maritimes, Gt Lakes, NEngl, s to Ala, Ga.

C. *montanum* Douglas *ex* Lindl. / Mountain Lady's-slipper
 Moist woods. NAmerica; Alas, BC, Alta, Wash, Oreg, Idaho, Mont, Wyo, Calif.

C. *parviflorum* Salisb. / Yellow Lady's-slipper
 *Formerly *C. calceolus* L.

Three varieties have been recognized, two occurring in Alberta, but they intergrade and are difficult to distinguish. No purpose would be served by their inclusion.

Moist woods, banks. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Ark, Ga.

C. passerinum Richardson

Woods. N America; Alas, Yuk, NWT, Nunavut, BC, Alta to Que, Mont.

GOODYERA R. BR. / RATTLESNAKE PLANTAIN

Raceme 6–10 cm; lip scarcely saccate, with incurved margins; leaves 3–6 cm

G. oblongifolia

Raceme 3–6 cm; lip deeply saccate, with recurved or flaring margins; leaves 1–3 cm

G. repens

G. oblongifolia Raf.

Woods. N America incl. Mex; Alas, BC, Alta, Sask, Ont, Que, Nfld/L, Wash, Oreg, Idaho, Mont, Wyo, SDak, Neb, Gt Lakes, N Engl, Calif, Utah, Colo, Ariz, NMex.

G. repens (L.) R. Br.

Mossy woods. N America; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Mont, SDak, Gt Lakes, N Engl, Colo, Ariz, NMex, WV, Va, Tenn. Eurasia.

LIPARIS RICH.

Plants perennial, roots slender; pseudobulbs green, soft; stems slender, glabrous with 2 (–3) cauline bracts around base; leaves 2–7, sheathing base of pseudobulb and stem; inflorescence a raceme; flowers 3–40, yellowish green or green; sepals oblong-lanceolate to lanceolate; petals filiform; fruit an erect capsule.

L. loeselii (L.) Rich.

Plants perennial, roots fibrous; pseudobulbs enveloped in old leaf bases; stems slender, somewhat angled, 6–26 cm; leaves 2, bases sheathing, blades oblong-elliptic to elliptic or lanceolate, succulent, glossy, 3.7–18 × 1–4 cm; inflorescence a terminal raceme, 2–15-flowered, 2–10 cm; flowers pedicellate, green or yellowish green to whitish

green; dorsal sepal oblong-lanceolate to narrowly lanceolate, 4.5–6 × 1–2 mm, lateral sepals similar, to 5 mm; petals pendent, slightly curved, tubular, filiform, 4.5–5.5 × 0.5–1 mm, margins revolute; lip obovate to oblong or roundish, 4–5.5 × 2–3.5 mm, base cuneate; column stout, 2–3 × 0.5–3 mm; capsule obovoid to ellipsoid, 9–13 mm, pedicel 3–7 mm.

Bogs, fens, lake shores. N America; NWT, BC, Alta to Maritimes, Wash, Mont, Gt Lakes, N Engl, s to Neb, Kans, Mo, Ark, Ala, NC. Europe.

LISTERA R. BR. / TWAYBLADE

- | | | |
|---|---|--------------------|
| 1 | Lip linear-oblong, cleft ± halfway to base into slender lobes; leaves cordate to deltoid, mucronate | L. cordata |
| | Lip broader, notched at apex, short lobes rounded; leaves rarely cordate | 2 |
| 2 | Lip nearly oblong, somewhat narrowed in middle, with 2 earshaped appendages at base | L. borealis |
| | Lip broadest at tip, cuneate to obovate, without basal appendages | 3 |
| 3 | Lip 8–10 mm, with short basal claw and minute tooth on each side at base, margin ciliolate | L. convallarioides |
| | Lip ± 5 mm, sessile, with prominent tooth on each side at base, margin glabrous | L. caurina |

L. borealis Morong / Northern Twayblade

Mossy woods, moist meadows, mountain slopes. N America; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Wash, Oreg, Idaho, Mont, Wyo, Utah, Colo.

L. caurina Piper

Moist woods. N America; Alas, BC, Alta, Wash, Oreg, Idaho, Mont, Calif.

L. convallarioides (Sw.) Elliott

Wet woods, meadows. N America; Alas, BC, Alta, Ont to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, SDak, Gt Lakes, N Engl, Calif, Nev, Utah, Colo, Ariz.

L. cordata (L.) R. Br. / Heart-leaved Twayblade

Two varieties, both in Alberta: var. *cordata* with leaf blades 0.7–2.0 cm, lips 3–4 mm; and var. *nephrophylla* (Rydb.) Hultén with leaf blades 1.8–3.8 cm, lips 5–6 mm.

Mossy woods, thickets, fens. N America; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, Gt Lakes and N Engl, s to NC, Calif, Colo, NMex. Eurasia.

MALAXIS SOL. EX SW. / ADDER'S-MOUTH

Leaves 1, rarely 2, oblong-elliptic, 2–10 cm;
flowers 5–80, petals 1.4–2.5 mm M. monophyllos

Leaves 2–3, elliptic or narrowly elliptic,
0.3–3.5 cm; flowers 2–55, petals 1.4–1.9 mm M. paludosa

M. monophyllos (L.) Sw.

*Formerly *M. brachypoda* (A. Gray) Fernald. Two varieties; in Alberta var. *brachypoda* (A. Gray) F. Morris & E.A. Eames.

Damp woods, banks, bogs. N America; Alas, Yuk, BC, Alta to Nfld/L, Maritimes, Gt Lakes, N Engl, disjunct Calif and Colo. Eurasia.

M. paludosa (L.) Sw.

Wet bogs, in sphagnum moss. N America; Alas, Yuk, NWT, BC, Alta to Ont, Minn. Eurasia, Circumboreal.

PIPERIA RYDB.

Formerly included in *Habenaria* Willd.

Plants herbs, fleshy, glabrous; stems simple; leaves 2–6, sessile; inflorescence bracteate raceme, spike-like, many-flowered; flowers resupinate, yellowish to green; sepals 1–3, lateral sepals similar, adnate to lip, slightly longer than free dorsal sepal; lips simple, adnate to column, spur tubular to clavate; auricles absent; anthers 1, pollinia 2; fruit erect capsule, ellipsoid to fusiform.

P. unalascensis (Spreng.) Rydb. / Alaska Bog Orchid

*Formerly *Habenaria unalascensis* (Spreng.) S. Watson.

Moist woods, meadows. N America; Alas, BC, Alta, Ont, Que, Nfld/L, s to Calif, Utah, NMex, SDak, Mich.

PLATANThERA RICH. / BOG ORCHID

Formerly included in *Habenaria* Willd.

Plants with 1 or more leaves and usually fleshy roots; flowers small, greenish or white, in terminal bracted spike or raceme; sepals and lateral petals similar in form and colour or petals smaller and spreading or petals erect and connivent with upper sepal; lip entire or 3-lobed, linear to ovate or obovate, prolonged backward into saccate or elongate spur; stigmatic discs exposed, often widely separated.

- | | | |
|---|---|----------------------|
| 1 | Foliage leaves basal, usually 1 or 2; stem naked above or with a few bracts only | 2 |
| | Foliage leaves cauline, spread along stem or clustered near base | 3 |
| 2 | Leaves 1 (–2), obovate to oblanceolate; plants 10–30 cm tall; spur 5–8 mm | <i>P. obtusata</i> |
| | Leaves 2 (–3), orbicular to broadly elliptic oblong, spreading on ground; plants 20–50 cm tall; spur 15–25 mm | <i>P. orbiculata</i> |

- 3 Flowers white, strongly fragrant; lips
conspicuously dilated at base P. dilatata
- Flowers greenish, not fragrant; lips linear or
lanceolate 4
- 4 Spurs shorter than lips, saccate;
inflorescences open P. stricta
- Spurs \pm equalling lips, cylindrical or
narrowly clavate; inflorescences congested 5
- 5 Lips rhombic-lanceolate to lanceolate, 2.5–
6 \times 1–1.5 mm; spurs 2–5 mm, apices broadly
obtuse P. aquilonis
- Lips lanceolate to nearly linear, 5–12 \times
2–4 mm; spurs 4–12 mm, apices usually
slenderly tapered P. huronensis

P. aquilonis Sheviak

*Formerly *Habenaria hyperborea* (L.) R. Br. (in part). See note under *P. huronensis* (Nutt.) Lindl.

Plants 5–60 cm; leaves cauline, blades 2.5–10 (–20) cm, linear-lanceolate to oblong; flowers yellowish green to whitish green; sepals spreading to reflexed; petals rhombic-ovate to falcate, margins entire; lips 2.5–6 mm, descending, projecting or adhering to tips of sepals and petals, rhombic-lanceolate to lanceolate, margins entire; spurs 2–5 mm, clavate, sometimes cylindric, apices obtuse.

Wet meadows and woods, stream banks, marshes. N America; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, NDak, SDak, Neb, Iowa, Gt Lakes, NJ, N Engl, Utah, Colo.

P. dilatata (Pursh) Lindl. *ex* L.C. Beck / Tall White Orchid

*Formerly *Habenaria dilatata* (Pursh) Hook. Three varieties; two in Alberta: var. *dilatata* with spur shorter than lip and var. *albiflora* (Cham.) Ledeb. with spur \pm equalling lip.

Wet woods, thickets, fens. NAmerica; Alas, Yuk, BC, Alta, Man to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, Gt Lakes, NEngl, Calif, Nev, Utah.

P. huronensis (Nutt.) Lindl. / Northern Green Orchid

*Formerly *Habenaria hyperborea* (L.) R. Br. (in part). This species was first described in 1818 but, almost from the outset, was thought to be the same as the largely European *P. hyperborea* (L.) Lindl. or a minor variant. It has now been shown to be distinct and, in fact, a third species has been recognized, *P. aquilonis* Sheviak.

Plants 10–100 cm; leaves cauline, 5–30 cm, reduced to bracts distally, linear-lanceolate to oblong; flowers whitish green, usually intensely fragrant; sepals spreading to slightly reflexed; petals often whiter than calyx, ovate to falcate, margin entire; lip 5–12 mm, linear to lanceolate, margin entire; spur 4–12 mm, slender cylindrical to clavate, apex tapered.

Wet meadows, marshes, stream banks. NAmerica; Alas, Yuk, BC, Alta, Sask to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, SDak, Gt Lakes, NJ, NEngl, Utah, Colo, NMex.

P. obtusata (Banks *ex* Pursh) Lindl. / Blunt-leaved Orchid

*Formerly *Habenaria obtusata* (Pursh) Richardson.

Moist woods. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, Gt Lakes, NEngl, Utah, Colo. More or less circumpolar.

P. orbiculata (Pursh) Lindl. / Round-leaved Orchid

*Formerly *Habenaria orbiculata* (Pursh) Torr.

Woods. NAmerica; Alas, NWT, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Gt Lakes, NJ, NEngl, s to Tenn, NC.

P. stricta Lindl. / Slender Bog Orchid

*Formerly *Habenaria saccata* Greene.

Wet meadows, fens, forests. NAmerica; Alas, Yuk, BC, Alta, Wash, Oreg, Idaho, Mont, Wyo, Calif.

SPIRANTHES RICH.

Leaves basal, obovate, 2–5 cm; flowers white with greenish centre, loosely spiralled or secund, often appearing to be in a single row, lower remote; sepals 4–5 mm; ovary 0.5–2 mm

S. lacera

Leaves basal and often cauline proximally, linear-lanceolate, elliptic or oblanceolate to 6 cm; flowers white in dense spike, appearing to be in 3 rows; sepals 5.3–12.5 mm; ovary 2–7 mm

S. romanzoffiana

S. lacera (Raf.) Raf.

Two varieties recognized; in Alberta var. *lacera*.

Plants to 50 cm; leaves 3–5 in a basal rosette, petiolate, blades obovate, 2–5 × 1–2 cm; inflorescence ≤40-flowered, lower often remote, secund or loosely spiralled, 2–16 cm; sepals elliptic, 4–5 × 1 mm; petals linear, 4–5 × 1 mm, lip oblong, erose or truncate, white with greenish centre, 5 × 2.5 mm; ovary 0.5 × 2 mm; capsule ellipsoid, 5 × 2 mm.

Moist woods, marshes, dune hollows. NAmerica; Sask to Maritimes, Gt Lakes to NEngl, s to Ark, Tenn, NC, disjunct Alta.

S. romanzoffiana Cham. & Schltldl. / Ladies'-tresses

Bogs, wet meadows. N America; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, NDak, SDak, Neb, Iowa, Gt Lakes, NEngl, Calif, Nev, Utah, Colo, Ariz, NMex. Europe.

POACEAE / Grass Family

*Formerly Gramineae, an alternative name for the family. The group of genera (in Triticeae) *Agropyron*, *Elymus*, *Hordeum*, *Leymus* and some of their segregate genera are closely related and their species hybridize. Some hybrids have been named and described, and a few occur in Alberta. They are very difficult taxonomically, and FNA should be consulted for further information. The one exception is \times *Elyhordeum macounii*, a hybrid between *Elymus trachycaulus* and *Hordeum jubatum*, which is common in Alberta and North America, and is included under *Elymus*.

- 1 Spikelets 2-flowered, with 1 perfect terminal floret and a sterile or staminate floret below; articulation usually below glumes (these falling with florets at maturity); spikelets, or at least fruits, \pm dorsally compressed; few species, mostly introduced 2

Spikelets not as above, usually 1-many-flowered, sterile florets, if any, above perfect florets; articulation usually above glumes (these persisting following disarticulation of spikelet), exceptions are *Alopecurus*, *Beckmannia*, *Cinna*, *Polypogon*, *Spartina* and *Sphenopholis*; spikelets usually laterally compressed or spikelets 3-flowered, upper floret perfect, lower (lateral) 2 florets staminate or sterile; most Alberta species 3

2	Spikelets in pairs, 1 sessile and perfect, other pedicellate and sterile; glumes coriaceous; palea membranous	Schizachyrium
	Spikelets not in pairs; glumes membranous; palea thick, indurate	Group 1
3	Spikelets with 2 staminate or 2 sterile rudimentary florets below single perfect floret; no sterile or rudimentary floret above	4
	Spikelets with no sterile florets below perfect floret	5
4	Plants 30–150 cm; lower florets staminate, equal to or longer than upper perfect floret; florets brown; marshy ground, shorelines, roadsides and disturbed areas	Phalaris
	Plants 10–60 cm; lower florets reduced to sterile lemmas, $\leq 2/3$ length of upper perfect floret; florets green or pale; moist to dry open areas to alpine elevations	Anthoxanthum
5	Aquatic annuals; culms 100–300 cm tall; spikelets unisexual, 1-flowered; stamens 6	Zizania
	Plants and spikelets not as above (most Alberta species)	6
6	Spikelets sessile or subsessile in spikes or spike-like racemes	Group 2
	Spikelets pedicellate in open or contracted panicles, sometimes spike-like, but then spikelets arising all around rachis, not obviously from 1 side or in 2 opposite rows	7
7	Spikelets 1-flowered	Group 3
	Spikelets 2–many-flowered	8

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|---|--|---------|
| 8 | Glumes as long as lowest floret, usually as long as spikelet | Group 4 |
| | Glumes shorter than first floret | Group 5 |

GROUP 1

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|---|---|---------------|
| 1 | Spikelet subtended by 1–many distinct or ± connate bristles, these forming an involucre | Setaria |
| | Spikelet not subtended by bristles | 2 |
| 2 | Glumes and sterile lemma awned or awn-pointed | Echinochloa |
| | Glumes and sterile lemma awnless | 3 |
| 3 | Spikelets in slender spike-like racemes; ligule membranous | Digitaria |
| | Spikelets in an open panicle, each on a long pedicel; ligule a ring of hairs | 4 |
| 4 | Basal leaves different from culm leaves, forming a winter rosette; second glume and sterile lemma pilose | Dichanthelium |
| | Basal leaves similar to culm leaves, not forming a winter rosette; second glume and sterile lemma scaberulous | Panicum |

GROUP 2

- | | | |
|---|---|---|
| 1 | Spikelets secund on rachis; spikes usually >1 | 2 |
| | Spikelets or clusters of spikelets on opposite sides of rachis; spikes terminal, solitary | 5 |

2	Culms 8–55 cm, usually curving distally; leaf blades 1–12 cm, often spirally twisted; inflorescences paniculate, 5–50 cm, branches widely spaced, divergent with distant to slightly imbricate closely appressed spikelets, 3–5.5 mm, 1 floret; dry prairies of southeastern Alberta	Schedonnardus
	Plants not as above	3
3	Plants of dry prairie grasslands	Bouteloua
	Plants of marshes, bogs, wet ground, ponds and lakes	4
4	Annual; ligules 5–11 mm; lemmas 2.4–3.5 mm; anthers 0.5–1.5 mm	Beckmannia
	Perennial, strongly rhizomatous; ligules 0.5–3 mm; lemmas 7–9 mm; anthers 2.5–6 mm	Spartina
5	Spikelets solitary at each node of rachis (sometimes 2 in generic hybrids of this group, but never throughout the spike)	6
	Spikelets >1 (2–7) at each node of rachis (sometimes solitary in part of spike in generic hybrids)	14
6	Spikelets edgewise to rachis; first glume wanting except in terminal spikelet	Lolium
	Spikelets flatwise to rachis	7
7	Plants annual; introduced species weedy or escaped from cultivation, includes wheat and rye	8
	Plants perennial	10

8	Spikes short, 1–2 cm	Eremopyrum	
	Spikes 3–17 cm		9
9	Glumes ovate, 3-nerved	Triticum	
	Glumes awl-shaped, 1-nerved	Secale	
10	Spikelets markedly divergent from axis, often approaching horizontal, strongly overlapping; internodes usually <3 mm	Agropyron	
	Spikelets not markedly divergent, usually \pm erect or somewhat angled from axis, not strongly overlapping; internodes 4–15 mm or more		11
11	Glumes lanceolate, apices acuminate, tapering from about or below midlength, 1–3-veined at midlength, slightly curved to side distally; rhizomatous	Pascopyrum	
	Glumes various, narrowing distally beyond midlength, not curved to side, 1–9-veined at midlength; cespitose or rhizomatous		12
12	Glumes lanceolate to rectangular, stiff, indurate to coriaceous, glume keels smooth proximally, usually scabrous distally, not awned	Thinopyrum	
	Glumes acute to acuminate, flexible, glume keels usually smooth or scabrous their whole length, sometimes awned		13
13	Spikelets distant; anthers <1–8 mm	Pseudoroegneria	
	Spikelets usually closer, overlapping; anthers 0.7–7 mm	Elymus	

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| 14 | Spikelets 3 at each node, each with 1 floret,
2 lateral spikelets usually reduced to awns | Hordeum |
| | Spikelets not usually 3 at each node,
spikelets with >1 floret | 15 |
| 15 | Glumes flat or with ≥ 3 veins at midlength,
if subulate and 1-veined, then <4 mm or
>18 mm; anthers 1–9 mm | Elymus |
| | Glumes subulate to narrowly lanceolate,
veinless or 1-veined at midlength, 4–18 mm;
anthers 2.5–10 mm | 16 |
| 16 | Ligules 0.2–0.3 mm; spikelets 2 or 3 per
node, 0.2–0.3 mm; plants cespitose | Psathyrostachys |
| | Ligules 0.3–8 mm; spikelets 1–7 per node;
plants cespitose or rhizomatous | Leymus |

GROUP 3

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|---|--|-----------|
| 1 | Lemma indurate, tightly enfolding palea and
caryopsis | 2 |
| | Lemma not indurate and closely enfolding
palea and caryopsis | 7 |
| 2 | Awn trifold | Aristida |
| | Awn simple | 3 |
| 3 | Cauline leaf blades 8–12 mm; callus 0.8–
2 mm, blunt distally with collar of soft hairs;
lemmas pubescent, at least basally; awns
7–15 mm, deciduous; glumes 5–7.5 mm,
6–10-veined | Oryzopsis |
| | Plants not as above | 4 |

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|---|---|--------------|
| 4 | Panicles mostly 3–7.5 cm; calluses 0.7–1.4 mm; lemmas strongly convolute; apices not lobed; paleas veinless, glabrous | Nassella |
| | Panicles 6–32 cm; calluses 2–6 mm; lemmas indurate, margins flat; apices 1–2-lobed; paleas 2-veined, pubescent | 5 |
| 5 | Calluses 2–6 mm, sharp-pointed; awns 5–22.5 cm; glumes 15–45 mm; florets 7–25 mm | Hesperostipa |
| | Calluses 0.1–2 mm, sharp-pointed or blunt; awns <5 cm | 6 |
| 6 | Florets 1.5–2.5 mm; glumes 2.5–6 mm; awns 1–15 mm, geniculate; caryopsis 1.2–2.5 mm | Piptatherum |
| | Florets 3–7 mm; glumes 5–12 mm; awns 9–30 mm (if awns shorter, 3–6 mm, straight, deciduous; panicle branches dichotomous, strongly divergent – <i>A. hymenoides</i>); caryopsis 2–4 mm | Achnatherum |
| 7 | Panicle open; florets stipitate; stamens 1 | Cinna |
| | Plants not as above | 8 |
| 8 | Disarticulation below glumes; panicle dense, spike-like | 9 |
| | Disarticulation above glumes; panicle various, including spikelike | 10 |
| 9 | Glumes long-awned | Polypogon |
| | Glumes awnless | Alopecurus |

10	Ligule a ring of hairs	11
	Ligule membranous	12
11	Spikelets <3 mm	Sporobolus
	Spikelets >3 mm	Calamovilfa
12	Lemmas awn-tipped, short-pointed or mucronate, <4 mm	Muhlenbergia
	Lemmas not as above, awnless or with a dorsal awn	13
13	Glumes shorter than lemmas	14
	Glumes, at least 1 longer than lemmas	16
14	Lower glumes longer than lemmas, upper glumes longer or shorter than lemmas; anthers 1.3–4 mm	Arctagrostis
	Glumes \pm equal to or longer than lemmas	15
15	Paleas absent or <1/2 as long as lemmas	Agrostis
	Paleas >1/2 as long as lemmas	16
16	Inflorescence cylindrical, spike-like; glumes strongly keeled	Phleum
	Inflorescence panicle, open or contracted, not spike-like or cylindrical; glumes not strongly keeled	17
17	Lemmas awned from lower back; calluses conspicuously hairy, hairs 0.2–4.5 mm	Calamagrostis
	Lemmas usually not awned (awns to 1.3 mm); calluses glabrous or sparsely hairy, hairs to 0.5 mm	18

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| 18 | Glumes 1.6–2.3 mm; anthers 0.4–0.8 mm;
plants of alpine habitats | Podagrostis |
| | Glumes 1.6–3.2 mm; anthers 0.9–1.4 mm;
lowland plants of disturbed areas | Agrostis |

GROUP 4

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|---|---|--------------|
| 1 | Spikelets 2-flowered, disarticulating below
glumes; glumes markedly dissimilar, lower
<1/3 as wide as upper; lemmas generally
scabrous | Sphenopholis |
| | Spikelets not as above | 2 |
| 2 | Lemmas bifid at apex, with a conspicuous
geniculate awn arising between lobes; ligule
a ring of hairs | Danthonia |
| | Lemmas and ligules not as above | 3 |
| 3 | Spikelets pendulous; lemmas 14–22 mm;
glumes 18–32 mm | Avena |
| | Spikelets on erect or ascending branches;
lemmas and glumes much shorter | 4 |
| 4 | Spikelets 3–6-flowered; glumes 9–14 mm;
lemmas 10–12 mm | Avenula |
| | Spikelets mostly 2-flowered; glumes and
lemmas much shorter | 5 |
| 5 | Lemmas convex, awned from below middle,
truncate, erose-dentate at apex | 6 |
| | Lemmas keeled, awn when present, arising
from above middle | 7 |

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|---|---|-------------|
| 6 | Leaf blades flat, 3–6 mm wide; spikelets purple; awn \pm 3 mm | Vahlodea |
| | Leaf blades involute or folded, <3 mm wide; spikelets light brown to green; awn >3 mm | Deschampsia |
| 7 | Lemmas with dorsal geniculate awn | Trisetum |
| | Lemmas awnless or short-awned | 8 |
| 8 | Glumes equal to or longer than spikelet | Trisetum |
| | Glumes \pm as long as first floret | Koeleria |

GROUP 5

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|---|--|--------------|
| 1 | Tall reed-like grass with plume-like panicle; rachilla with silky hairs as long as lemmas | Phragmites |
| | Smaller grasses, rarely >120 cm tall | 2 |
| 2 | Plants dioecious; culms erect from creeping rhizomes; lemmas coriaceous; in saline or alkaline soils | Distichlis |
| | Plants not dioecious (except in a few species of <i>Poa</i> with villose lemmas) | 3 |
| 3 | Plants low, matted annuals, mostly 3–15 cm, leaves and spikelets congested at ends of naked culms; ligule a ring of hairs; blades white-margined, spiny-tipped | Munroa |
| | Plants not as above | 4 |
| 4 | Spikelets 2-flowered, disarticulating below glumes; glumes markedly dissimilar, lower <1/3 as wide as upper; lemmas generally scabrous | Sphenopholis |

	Spikelets not as above	5
5	Lemmas 3-nerved, nerves prominent	6
	Lemmas 5–many-nerved, nerves sometimes obscure	7
6	Spikelets many-flowered; glumes and lemmas obtuse to acute, wart-like projections covering these and other parts	Eragrostis
	Spikelets 2-flowered; glumes and lemmas erose-truncate, wart-like projections lacking; plants growing in water or very wet soil	Catabrosa
7	Callus of florets bearded	8
	Callus not bearded (lemmas cobwebby at base in some species of <i>Poa</i>)	10
8	Lemmas erose at summit, awnless; tall grasses, 70–200 cm; plants of wet places	Scolochloa
	Lemmas bifid at summit, awned	9
9	Lemmas \pm 10 mm, excluding awn; sheaths closed	Schizachne
	Lemmas 5–7 mm, excluding awn; sheaths open	Trisetum
10	Lemmas awned, awn \geq 1 mm	11
	Lemmas awnless or awn-pointed, point $<$ 1 mm	15
11	Spikelets $>$ 12 mm; lemma awned from a bifid apex; sheaths closed for most of length	12
	Spikelets $<$ 12 mm; lemmas with terminal awn; sheaths open	13

12	First glume 1-nerved; second glume 3-nerved	Bromus
	First glume obscurely 3-nerved; second glume 5-nerved	Melica
13	Plants annual	Vulpia
	Plants perennial	14
14	Lower leaves with auricles; leaves generally flat; large plants, culms 20–40 cm or more	Schedonorus
	Lower leaves lacking auricles; leaves generally involute; generally smaller plants (lemmas awned); introduced species	Festuca
15	Panicle congested; spikelets in dense clusters towards end of panicle branches, forming solitary spike or several spike-like clusters	16
	Panicle open; spikelets not in dense clusters	17
16	Panicle of 1-sided spikelet clusters; primary panicle branches 1–10 cm; leaf blades flat, mostly 3–10 mm wide; ligules mostly 3–9 mm	Dactylis
	Panicle a solitary spike, branches short; leaf blades generally folded or involute, mostly 1–2 mm wide; ligules 1–2 mm	Koeleria
17	Glumes papery; lemmas of ≥ 2 upper florets often folded together as unit; culms commonly bulbous at base; sheaths closed	Melica
	Glumes not papery; lemmas not as above; culms not bulbous at base; sheaths open or closed	18

18	Lemmas ≥ 8 mm	19
	Lemmas < 8 mm	20
19	Leaf sheaths closed; lemma nerves prominent	Bromus
	Leaf sheaths open; lemma nerves often obscure	Festuca
20	Lemmas with parallel nerves not converging towards tip, apex broadly obtuse or truncate	21
	Lemmas with nerves converging towards tip	23
21	Leaf sheaths closed; plants of ponds, streams and moist woods	Glyceria
	Leaf sheaths open; plants mostly of alkaline and saline soils	22
22	Lemma nerves prominent; plants of non-saline and non-alkaline habitats	Torreyochloa
	Lemma nerves obscure; plants generally of saline or alkaline habitats	Puccinellia
23	Lemmas compressed-keeled	Poa
	Lemmas not compressed-keeled	24
24	Lemmas ≥ 5 mm; glumes not compressed-keeled	Festuca
	Lemmas usually < 5 mm; glumes usually compressed-keeled	Poa

ACHNATHERUM P. BEAUV.

Alberta species formerly included in *Stipa* and *Oryzopsis*.

Plants perennial, cespitose; culms erect, 25–175 cm; leaf sheaths open, ciliate distally, often hairy at junction with blades, ligules various, glabrous or pubescent; inflorescences terminal panicles, branches straight or flexuous, spikelets usually appressed; florets solitary, usually fusiform, sometimes globose, calluses to 1 mm; glumes generally lanceolate, 1–5-veined, usually exceeding florets; lemmas membranous to coriaceous, glabrous or pubescent, apex often lobed with central terminal, persistent or deciduous awn; paleas $\frac{1}{3}$ as long as to slightly longer than lemmas, 2-veined, generally pubescent; anthers 3, 3–5 mm; caryopsis fusiform.

- 1 Lemmas pilose, hairs 2.5–6 mm; awns
3–6 mm, deciduous A. hymenoides

Lemmas pubescent, at least basally, hairs
<2 mm; awns 15–45 mm, persistent 2

- 2 Panicle branches flexuous, spikelets
drooping; lower glumes 2–3 mm longer
than upper; awns 15–25 mm; lemmas often
glabrous distally A. richardsonii

Panicle branches straight, ascending; lower
glumes ≤ 1 mm longer than upper; awns
19–45 mm; lemmas pubescent distally A. nelsonii

A. hymenoides (Roem. & Schult.) Barkworth /
Indian Rice Grass

*Formerly *Oryzopsis hymenoides* (Roem. & Schult.) Ricker. Produces a sterile hybrid with *Nassella viridula* (Trin.) Barkworth.

Dry, well-drained soils, sand dunes. N America incl. Mex; Yuk, BC, Alta, Sask, Man, s to Calif, Ariz, NMex, Tex, Ark.

A. nelsonii (Scribn.) Barkworth / Columbia Needle Grass

*Formerly *Stipa columbiana* Macoun. Two subspecies; in Alberta subsp. *dorei* (Barkworth & J.R. Maze) Barkworth.

Prairie grasslands, meadows, woodlands. NAmerica; Yuk, BC, Alta, Sask, Man, s to Calif, Ariz, NMex, Tex.

A. richardsonii (Link) Barkworth / Richardson's Needle Grass

*Formerly *Stipa richardsonii* Link.

Woodlands, grasslands, often sandy. NAmerica; Yuk, NWT, BC, Alta, Sask, Man, s to Wash, Idaho, Colo, SDak.

AGROPYRON GAERTN. / WHEAT GRASS

All Alberta native species formerly placed in *Agropyron* have been reclassified to other genera, primarily *Elymus*.

Plants perennial, cespitose, sometimes rhizomatous; culms geniculate or erect; leaf sheaths open, ligules membranous; inflorescences solitary, terminal spikes; spikelets 1 per node, closely imbricate, generally strongly divergent from rachis, florets 3–16; glumes lanceolate to narrowly ovate, shorter than adjacent lemmas, asymmetrically keeled, secondary keel sometimes also present on wider segment of glume, awned or awnless; lemmas asymmetrically keeled, acute, awned or awnless; anthers 3–5 mm.

A. cristatum (L.) Gaertn. / Crested Wheat Grass

*Formerly *A. pectiniforme* Roem. & Schult. and *A. sibiricum* (Willd.) P. Beauv.

Pastures, disturbed areas. Widely used in rehabilitation and recovery of disturbed areas following mining, highway construction, etc. Introduced. Eurasia.

AGROSTIS L. / BENT GRASS

- | | | |
|---|---|-----------------------|
| 1 | Palea evident, $\geq 1/2$ as long as lemma | 2 |
| | Palea lacking, or minute and nerveless, $\leq 1/3$ as long as lemma; rhizomes absent | 3 |
| 2 | Stolons present, rhizomes absent; panicle narrow, contracted, lower panicle branches 2–6 cm | <i>A. stolonifera</i> |
| | Stolons absent, rhizomes present; panicle open, lower panicle branches 4–9 cm | <i>A. gigantea</i> |
| 3 | Panicle narrow, at least some lower branches bearing spikelets to near base | 4 |
| | Panicle open, branches spreading or reflexed at maturity, naked at base | 5 |
| 4 | Culms over 20 cm tall; leaf blades >1.5 mm wide; ligules 2–6 mm | <i>A. exarata</i> |
| | Culms mostly 10–20 cm tall; leaf blades <1.5 mm wide; ligules 1–2 mm | <i>A. variabilis</i> |
| 5 | Lemmas awned | <i>A. mertensii</i> |
| | Lemmas awnless | <i>A. scabra</i> |

A. exarata Trin. / Spike Redtop

Moist to dry woodlands. N America incl. Mex; Alas, Yuk, BC, Alta, Sask, s to Calif, Ariz, NMex, Tex. eAsia.

A. gigantea Roth

Plants perennial, rhizomatous, not stoloniferous; culms 20–120 cm, erect; leaves cauline, sheaths open, smooth, ligules erose to lacerate, blades 4–10 cm \times 3–8 mm; panicles 8–25 (–30) cm, open, lower branches 4–9; spikelets ovate to lanceolate; glumes subequal 1.7–3.2 mm; lemmas 1.5–2.2 mm, 3–5 veins, usually awnless.

Fields, roadsides, disturbed areas. Introduced. Eurasia.

A. mertensii Trin.

Moist alpine tundra slopes. NAmerica incl. Mex; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Sask to Nfld/L, Maritimes, s to Wash, Idaho, Mont, Wyo, Colo, NEngl, Tenn, WV, NC. Circumpolar, S America.

A. scabra Willd. / Hair Grass, Tickle Grass

Disturbed areas, woodlands to subalpine elevations. NAmerica incl. Mex; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Tex, Gt Lakes, NEngl, Ga, Fla. eAsia.

A. stolonifera L.

Lawns, damp fields, marshes, disturbed areas. Introduced. Eurasia.

A. variabilis Rydb. / Alpine Redtop

Alpine and subalpine ridges. NAmerica; BC, Alta, s to Calif, Ariz, NMex.

ALOPECURUS L. / **FOXTAIL**

- | | | |
|---|--|------------------------|
| 1 | Plants annual; awns geniculate, exceeding lemmas by 1.6–4 mm; anthers 0.3–0.9 mm | <i>A. carolinianus</i> |
| | Plants perennial; not as above | 2 |
| 2 | Spikelets densely woolly; panicle oblong or ovoid, ± 1 cm thick | <i>A. magellanicus</i> |
| | Spikelets not woolly; panicle linear or oblong-linear, <1 cm thick | 3 |
| 3 | Awns straight, longer than lemmas by ≤1 mm; anthers 0.5–0.9 mm | <i>A. aequalis</i> |
| | Awns geniculate, longer than lemmas by 1.2–4 mm; anthers 1–2.4 mm | 4 |

4 Glumes 4–6 mm, apices acute; anthers
2–4 mm *A. pratensis*

Glumes 1.9–3.5 mm, apices obtuse; anthers
(0.9–) 1.4–2.2 mm *A. geniculatus*

A. aequalis Sobol. / Short-awn Foxtail

Two subspecies; in Alberta subsp. *aequalis*. Produces a sterile hybrid *A.* × *haussknechtianus* Asch. & Graebn. with *A. geniculatus* L.

Shallow water, muddy shores. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Tex, Kans, Mo, Gt Lakes, Tenn, NC. Circumboreal.

A. carolinianus Walter / Tufted Foxtail

Plants annual; culms solitary or tufted, 5–50 cm, erect or decumbent; leaf blades 3–15 cm × 1–3 mm; panicle slender, spike-like, 1–7 cm × 3–6 mm; glumes 2–3 mm, sparsely pubescent, apices obtuse, awns geniculate, 3–6.5 mm, exceeding lemma body by 1.6–4 mm; anthers 0.3–0.9 mm.

Wet meadows, ditches, vernal pools, lakesides. NAmerica; BC, Alta, Sask, s to Calif, Ariz, NMex, Tex, La, Ala, Fla. Introduced in Alta, native to cUS and sUS.

A. geniculatus L. / Water Foxtail

Hybridizes with *A. aequalis* Sobol. (see above).

Plants with tufted culms, 5–60 cm, erect or decumbent, often rooting at nodes; leaf blades 2–13 cm × 1–4 (–7) mm; panicles 1.5–7 cm × 4–8 mm; glumes 1.9–3.5 mm, connate at base, membranous, apices obtuse, pubescent; lemmas 2.5–3 mm, glabrous or pubescent distally, awns geniculate, 3–6 mm, 1.2–4 mm longer than lemmas; anthers 1–2.2 mm.

Shallow water, ditches, shores, wet meadows. NAmerica; Alas, Yuk, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Okla, Gt Lakes, NEngl. Eurasia.

A. magellanicus Lam. / Alpine Foxtail

*Formerly *A. occidentalis* Scribn. & Tweedy.

Wet tundra, streams, gravel bars. N America; Alas, Yuk, NWT, Greenland, BC, Alta to Que, Nfld/L, s to Idaho, Mont, Wyo, Colo. Circumpolar.

A. pratensis L. / Meadow Foxtail

Plants 30–110 cm, erect, shortly rhizomatous; leaf blades 6–40 cm × 1.9–8 mm, ligules 1.5–3 mm, obtuse to truncate; panicles 3.5–9 cm × 6–10 mm; glumes 4–6 mm, pubescent on margins; lemmas 4–6 mm, connate in lower 1/3, glabrous or ciliate at tip of keel, apices acute, awns 5–10.5 mm, geniculate, longer than lemmas by (1–) 2.2–5.5 mm; anthers 2–4 mm, yellowish, orange, reddish or purplish; caryopses ± 1–1.2 mm.

Poorly drained meadows, ditches, roadsides. Introduced. Eurasia, n Africa.

ANTHOXANTHUM L.

*Formerly *Hierochloë* R. Br., previously a distinct genus.

Plants annual or perennial, cespitose, sometimes rhizomatous, fragrant; culms erect; leaf sheaths closed, auricles present or absent, blades flat, folded or involute; inflorescences paniculate, sometimes spike-like, spikelets laterally compressed with 3 florets, distal floret bisexual, lower (distal) 2 staminate or reduced to awned lemmas; glumes keeled, equal or not; lower floret lemmas compressed, 3-veined, strigose, apices bilobed, awned or not, distal floret lemmas indurate, shiny, 3–7-veined, awnless; paleas 1-veined; anthers 2 or 3.

Plants loosely to densely cespitose; lemmas
with awn >4 mm

A. monticola

Plants solitary to loosely cespitose; lemmas
with awn <1.1 mm

A. hirtum

A. hirtum (Schrank) Y. Schouten & Veldkamp

*Formerly *Hierochloë odorata* (L.) P. Beauv. Several subspecies; in Alberta subsp. *hirtum*.

Plants perennial, loosely caespitose or culms solitary, 40–85 (–110) cm; leaf sheaths brownish or reddish, ligules 2.5–5.5 mm, blades 2.5–5.5 mm wide; panicles (5–) 7.5–15 × 2–10 cm, open, pyramidal, with 20–100+ spikelets; spikelets 4–6.3 mm; lowest 2 florets staminate; glumes subequal, exceeding florets, glabrous, often somewhat purplish; lowest 2 lemmas 3–5 mm, with hairs towards tips, tips acute, emarginate or bifid, awns 0.1–1.1 mm; anthers of staminate florets 1.6–2.1 mm, those of bisexual florets 1.2–1.3 mm.

Moist meadows, woodlands, montane meadows. N America; Alas, Yuk, NWT, Nunavut, BC, Alta to Que, Nfld/L, Maritimes, s to Calif, Ariz, NMex, SDak, Iowa, Gt Lakes, N Engl, Va. Circumpolar.

A. monticola (Bigelow) Veldkamp

*Formerly *Hierochloë alpina* (Sw.) Roem. & Schult.

Two subspecies; in Alberta subsp. *alpinum* (Sw. ex Willd.) Soreng.

Dry alpine slopes. N America; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Ont to Nfld/L, Maritimes, N Engl. Circumpolar.

ARCTAGROSTIS GRISEB.

A. latifolia (R. Br.) Griseb.

*Formerly *A. latifolia* (R. Br.) Griseb. subsp. *arundinacea* (Trin.) Griseb. or *A. arundinacea* (Trin.) Beal. Two subspecies; in Alberta subsp. *arundinacea* (Trin.) Tzvelev.

Marshy ground at high elevations. N America; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Man to Que. Circumpolar.

ARISTIDA L.

A. purpurea Nutt. / Red Three-awn

*Formerly *A. longiseta* Steud. Several varieties; in Alberta var. *longiseta* (Steud.) Vasey.

Dry plains. N America incl. Mex; BC, Alta to Man, s to Calif, Ariz, NMex, Tex.

AVENA L. / OATS

Lemma usually hairy on back, base much enlarged, with tuft of stiff hairs; awn 2–5 cm, geniculate

A. fatua

Lemma glabrous, base not enlarged or hairy; awnless or with short straight awn only on first floret

A. sativa

A. fatua L. / Wild Oats

Fields, disturbed areas. An aggressive weed of arable land. Introduced. Eurasia.

A. sativa L. / Cultivated Oats

Fields, disturbed areas. An escape from cultivation. Introduced. Eurasia.

AVENULA (DUMORT.) DUMORT.

Formerly included in *Helictotrichon* Besser ex Schult. & Schult. f.

Plants perennial, caespitose, sometimes stoloniferous; leaf sheaths usually open, auricles absent, ligules acute, membranous, blades flat or folded, ribless, adaxial surfaces with furrow on each side of midrib; inflorescence panicles; spikelets with 2–7 florets; glumes 1–3-veined, awnless, equal to or longer than adjacent lemmas; lemmas 5–7-veined, awned from ± middle, awns geniculate; paleas bifid; anthers 3; caryopsis shorter than lemmas.

A. hookeri (Scribn.) Holub / Hooker's Oat Grass

*Formerly *Helictotrichon hookeri* (Scribn.) Henrard.

Dry prairies and foothills parklands. NAmerica; Yuk, NWT, BC, Alta to Man, Mont, NDak, Minn, Wyo, Colo, NMex.

BECKMANNIA HOST

B. syzigachne (Steud.) Fernald / Slough Grass

Wet areas. NAmerica; Alas, Yuk, NWT, BC, Alta to Que, Maritimes, s to Calif, Ariz, NMex, Kans, Iowa, Gt Lakes, NEngl. Eurasia.

Bouteloua Lag. / Grama Grass

Spikes many, racemose, on axis 13–30 cm,
reflexed; spikelets usually 2–7

B. curtipendula

Spikes (1–) 2 (–3); spikelets ≥ 20 , pectinate

B. gracilis

B. curtipendula (Michx.) Torr. / Side-oats Grama

Two varieties; in Alberta var. *curtipendula*.

Plants perennial, rhizomatous; culms solitary or tufted, 8–80 cm; leaf sheaths glabrous, blades 2–30 cm, mostly 2.5–7 mm wide; inflorescence 13–30 cm, racemose, spikes secund, reflexed; spikelets usually 2–7 (–15); glumes unequal, glabrous or scabrous, lower 2.5–6 mm, upper 5.5–8 mm; lowest floret lemmas 3–6.5 mm, glabrous or scabrous, 3-veined, veins extending into short mucrose tips or awns to 6 mm, apices 3-lobed; paleas awnless; anthers 1.5–3 mm, distal florets sterile.

Moist grasslands, wetlands. NAmerica incl. Mex; BC, Alta to Ont, s throughout US except Wash, Oreg, NEngl, NC, SC and Ga.

B. gracilis (Kunth) Lag. ex Griffiths / Blue Grama

Prairie grasslands. NAmerica incl. Mex; BC, Alta to Man, s to Calif, Nev, Ariz, NMex, Tex.

BROMUS L. / BROME GRASS

- | | | |
|---|---|---------------|
| 1 | Weedy annuals; mostly small, slender plants with pubescent sheaths and blades | 2 |
| | Perennials; large plants with pubescent or glabrous sheaths and blades | 7 |
| 2 | Glumes slender, hairy, first 1-nerved; lemmas slender, acuminate, teeth 2–5 mm | B. tectorum |
| | Glumes broad, glabrous, first 3–5-nerved; lemmas broad, rounded at apex, teeth very short | 3 |
| 3 | Pedicels all or mostly shorter than spikelets; panicle congested; lemmas prominently nerved | B. hordeaceus |
| | Pedicels mostly longer than spikelets; panicle open; lemmas less prominently nerved | 4 |
| 4 | Lemma margins inrolled at maturity; palea almost equalling lemma; rachilla visible | B. secalinus |
| | Lemma margins not inrolled; palea much shorter than lemma; rachilla concealed | 5 |
| 5 | Awns straight, ± equal length; anthers 0.7–1.7 mm | B. commutatus |
| | Awns divergent, upper longer; anthers ± 1 mm | 6 |
| 6 | Panicle somewhat secund; spikelets 5–8 mm wide, inflated; awns strongly divergent; first glume 5-nerved, second obscurely 7–9-nerved | B. squarrosus |
| | Panicle not secund; spikelets <5 mm wide, not much inflated; awns flexuous, often somewhat divergent; first glume 3-nerved, second 5-nerved | B. japonicus |

- 7 Spikelets strongly flattened or compressed; lemmas compressed-keeled; first glume 3–5-nerved, second 5–9-nerved 8
- Spikelets rounded or somewhat flattened; lemmas not compressed-keeled; first glume 1-nerved, second 3-nerved (except in *B. porteri*) 9
- 8 Upper glumes 9–13 mm, awn 4–17 mm; anthers 1–6 mm *B. carinatus*
- Upper glumes 10–15 mm, awns 3–10 mm; anthers 2.2–4.2 mm *B. aleutensis*
- 9 Plants rhizomatous; lemmas awnless or short-awned 10
- Plants not rhizomatous; lemma awns >3 mm 11
- 10 Lemma backs usually densely hairy, or basally and on margins, or on marginal nerves and keel; cauline nodes and leaf blades usually pubescent; awns when present to 7.5 mm *B. pumpellianus*
- Lemma backs usually glabrous, sometimes sparsely puberulent basally and on margins; cauline nodes and leaf blades usually glabrous, rarely hairy; awns when present to 3 mm *B. inermis*
- 11 Lemmas hairy rather unevenly on back, usually more densely so along lower margin 12
- Lemmas hairy rather evenly on back, upper part glabrous 14

- 12 Lower lemmas \pm 2 mm wide, awn usually
>5 mm; ligule 3–5 mm B. vulgaris
- Lower lemmas \pm 3 mm wide, awn 3–5 mm;
ligule \pm 1 mm 13
- 13 Anthers 1–1.4 mm; upper glumes
7–8.5 mm; lemma backs glabrous B. ciliatus
- Anthers 1.6–2.7 mm; upper glumes
9–11.3 mm; upper lemma backs with ap-
pressed hairs B. richardsonii
- 14 Panicle up to 20 cm; leaf blades mostly
2–4 mm wide, auricles absent; first glume
3-nerved B. porteri
- Panicle up to 10 cm; leaf blades mostly
>5 mm wide, auricles present; first glume
1-nerved B. latiglumis

B. aleutensis Trin. *ex* Griseb.

Plants perennial, loosely caespitose; culms 40–130 cm, 3–7 mm thick; leaf sheaths coarsely striate, often pilose, ligules 3.5–5 mm; panicles 8–28 cm, erect; spikelets 25–40 mm, elliptic to lanceolate, strongly compressed laterally; glumes glabrous or pubescent, lower 9–15 mm, 3–5-veined, upper 10–15 mm, 7–9-veined; lemmas 12–17 mm, laterally compressed, strongly keeled distally, 9–11-veined, usually softly pubescent, entire or toothed spirally; awns 3–10 mm; anthers 2.2–4.2 mm.

Sandy, gravelly and disturbed habitats. NAmerica; Alas, BC, Alta, Wash, Idaho.

B. carinatus Hook. & Arn.

Two varieties; in Alberta var. *marginatus* (Nees) Barkworth & Anderton.

Open woods, meadows, montane areas. NAmerica incl. Mex; BC, Alta, Sask, s to Calif, Ariz, NMex, Tex, introduced Yuk.

B. ciliatus L. / Fringed Brome

Meadows, moist woodlands, shores, streamsides. N America incl. Mex; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Tex, Neb, Iowa, Gt Lakes, N Engl, Tenn, Ala. e Asia.

B. commutatus Schrad.

Fields, disturbed areas. Introduced. Europe.

B. hordeaceus L.

*Formerly *B. mollis* L. Several subspecies; in Alberta subsp. *hordeaceus*.

Disturbed areas. Introduced. Europe, n Africa.

B. inermis Leyss. / Smooth Brome

Plants perennial, rhizomatous; culms 50–130 cm, erect; leaf sheaths glabrous, blades 11–35 (–42) cm × 5–15 mm, flat; panicles 10–20 cm, open, branches spreading or ascending; spikelets 20–40 mm, florets 5–10; glumes mostly 5–10 mm, glabrous, 1–3-veined; lemmas 9–13 mm, elliptic to lanceolate, backs rounded, usually glabrous, smooth, awns absent or to 3 mm, straight; anthers 3.5–6 mm.

Open woods, grasslands, roadsides, disturbed areas to subalpine elevations. Introduced. N America incl. Mex; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, s throughout US except Miss, Ala, Fla, Ga, SC. Eurasia.

B. japonicus Thunb. / Japanese Chess

Disturbed areas. Introduced. Eurasia.

B. latiglumis (Scribn. ex Shear) Hitchc.

*Formerly *B. altissimus* Pursh.

Moist banks. N America; BC, Alta to Que, NDak, Gt Lakes, N Engl, s to Kans, Mo, Tenn, Va.

B. porteri (J.M. Coult.) Nash / Nodding Brome

*Formerly *B. anomalus* Rupr. ex E. Fourn.

Montane meadows, foothills grasslands, woodlands. NAmerica incl. Mex; BC, Alta to Man, s to Calif, Ariz, NMex, Tex.

B. pumpellianus Scribn. / Arctic Brome

*Formerly *B. inermis* Leyss. subsp. *pumpellianus* (Scribn.) Wagon. Similar to *B. inermis* Leyss. and formerly included in that species. Two subspecies; in Alberta subsp. *pumpellianus*.

Grasslands, roadsides, shores, stream banks, dunes. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Ont, Wash, Oreg, Idaho, Mont, Wyo, SDak, Nev, Utah, Colo, NMex.

B. richardsonii Link / Richardson's Brome

Plants perennial, not rhizomatous; culms 50–110 cm, generally erect; basal leaf sheaths glabrous or long-hairy, upper leaf sheaths pilose at throat, blades 10–35 cm × 3–12 mm, flat; panicles mostly 10–20 cm, open, nodding; spikelets 15–25 (–40) mm, florets 4–10 (–15); glumes 7.5–12.5 mm, 1–3-veined; lemmas 9–16 mm, elliptic, backs rounded, lower lemma backs glabrous, upper backs with appressed hairs, margins hairy proximally, awns 2–5 mm, straight; anthers 1.6–2.7 mm.

Moist meadows, open woods at montane to subalpine elevations. NAmerica incl. Mex; Alas, BC, Alta, Sask, Mont, Wyo, SDak, Calif, Nev, Utah, Colo, Ariz, NMex, Tex.

B. secalinus L.

Disturbed areas. Introduced. Europe.

B. squarrosus L.

Disturbed areas, pastures. Introduced. Eurasia.

B. tectorum L. / Downy Chess, Cheat Grass

Pastures, disturbed areas. Introduced. Europe.

B. vulgaris (Hook.) Shear

Moist woodlands. NAmerica; BC, Alta, Wash, Oreg, Idaho, Mont, Wyo, Calif, Utah.

CALAMAGROSTIS ADANS. / REED GRASS

- | | | |
|---|--|------------------------|
| 1 | Callus hairs $>1.3\times$ as long as lemmas;
lemmas ≥ 2 mm shorter than glumes | <i>C. epigejos</i> |
| | Callus hairs generally $<1.2\times$ as long as
lemmas (if longer, lemmas <2 mm shorter
than glumes) | 2 |
| 2 | Awn of lemma geniculate, \pm exserted; callus
hairs usually much shorter than lemma | 3 |
| | Awn of lemma straight or nearly so, included;
callus hairs equalling lemma or nearly so | 5 |
| 3 | Awn of lemma much exceeding glumes; plant
tufted, sometimes with short rhizomes | <i>C. purpurascens</i> |
| | Awn of lemma about equalling glumes | 4 |
| 4 | Plant rhizomatous, not tufted; culms
scabrous below panicle; glumes sharply
keeled; spikelets strongly flattened; leaves
glabrous at junction of sheath and blade | <i>C. montanensis</i> |
| | Plant tufted, often with rhizomes; culms
smooth; glumes not strongly keeled; spikelets
not strongly flattened; leaves often densely
hairy at junction of sheath and blade | <i>C. rubescens</i> |
| 5 | Panicle rather loose and open; callus hairs as
long as lemma | 6 |
| | Panicle \pm contracted; callus hairs mostly
shorter than lemma, of unequal lengths | 7 |
| 6 | Panicle ≥ 2 cm wide; glumes scabrous on
keel; callus hairs of uniform length except for
outer shorter ring | <i>C. canadensis</i> |

- Panicle <2 cm wide; glumes scarcely scabrous on keel; callus hairs of varying length C. lapponica
- 7 Culms and leaves harsh and scabrous, blades firm; ligules mostly >3 mm, often lacerate; panicle firm C. inexpansa
- Culms and leaves smooth, or culms scabrous only below panicle, at blade tip and margins, blades lax; ligules 1–3 mm, entire; panicle rather soft 8
- 8 Glumes usually <3× longer than wide, tips brown; awns generally stout, usually distinguishable from callus hairs C. stricta
- Glumes usually >3× longer than wide, tips purple; awns slender, generally similar to callus hairs C. lapponica

C. canadensis (Michx.) P. Beauv. / Bluejoint, Marsh Reed Grass
A species complex variously treated. Three subspecies; two in Alberta: subsp. *canadensis* with glumes 3–4 mm, acute, rounded on back, scarious to scabrous; and subsp. *langsdorffii* (Link) Inman with glumes 4–6 mm, acuminate, keeled, strongly scabrous.

Marshes, wet meadows, moist woods. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Kans, Mo, Gt Lakes, Va. Eurasia.

C. epigejos (L.) Roth / Feathertop

Plants perennial, rhizomatous; culms 50–150 cm, unbranched; leaf sheaths mostly smooth, ligules various, generally 0.3–13 mm, blades usually 5–50 cm, scabrous; inflorescences contracted, panicles mostly 18–25 cm; spikelets mostly 4.5–5.5 mm, florets solitary; glumes keeled, apices acuminate, callus hairs to 6.5 mm; lemmas 2–3.5 (–5) mm,

shorter than glumes, awns 1.5–4 mm, generally attached to lower 1/2 of lemma, not exerted, usually straight; anthers 1–2 mm.

Roadsides, disturbed sites. Introduced. Eurasia.

C. *inexpansa* A. Gray / Northern Reed Grass

Marshy places and low meadows. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, s to Calif, Ariz, NMex, Neb, Mo, Ill, Va, Me. eAsia.

C. *lapponica* (Wahlenb.) Hartm.

Alpine fell fields, ridges. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L. Circumpolar.

C. *montanensis* (Scribn.) Vasey / Plains Reed Grass

Grasslands, open pine woods, dry hillsides. NAmerica; BC, Alta to Man, Mont, Wyo, NDak, SDak, Minn.

C. *purpurascens* R. Br. / Purple Reed Grass

Grasslands, dry woodlands, dunes to subalpine and alpine elevations. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, s to Calif, Utah, NMex. eAsia.

C. *rubescens* Buckley / Pine Grass

Montane woodlands, parklands. NAmerica; BC, Alta, Sask, s to Calif, Nev, Utah, Colo.

C. *stricta* (Timm) Koeler / Northern Reed Grass

*Formerly *C. inexpansa* A. Gray (in part). Two subspecies; both in Alberta: subsp. *inexpansa* (A. Gray) C.W. Greene with panicle branches 1.5–9.5 cm vs. 1.4–4 cm for subsp. *stricta* and callus hairs 2–4.5 mm vs. 1–3 mm for subsp. *stricta*.

Meadows, fens, stream banks, shores. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Kans, Mo, Gt Lakes, NEngl. Circumpolar.

CALAMOVILFA (A. GRAY) HACK.

C. longifolia (Hook.) Scribn. / Sand Grass

Two varieties; in Alberta var. *longifolia*.

Sandy prairies, open woods, sand dunes. NAmerica; BC, Alta to Man, s to Wash, Idaho, NMex, Kans, Gt Lakes.

CATABROSA P. BEAUV.

C. aquatica (L.) P. Beauv. / Brook Grass

Streams, ponds, lakes. NAmerica; Alas, Greenland, BC, Alta to Nfld/L, Maritimes, s to Nev, Utah, NMex, Wisc. Circumboreal, SAmerica.

CINNA L.

C. latifolia (Trevir. ex Göpp.) Griseb. / Drooping Wood Reed

Moist open woods, thickets, marshes, stream banks. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, SDak, Gt Lakes, WVa, NEngl. Circumboreal.

DACTYLIS L.

D. glomerata L. / Orchard Grass

Disturbed sites, hay fields, pastures. Introduced. Eurasia, Africa.

DANTHONIA DC. / OAT GRASS

- | | | |
|---|---|----------------------|
| 1 | Panicle usually reduced to 1 spikelet, sometimes 2, rarely 3; ligule hairs usually 3–4 mm | <i>D. unispicata</i> |
| | Panicle of 2–several spikelets; ligule hairs usually <3 mm | 2 |

- | | | |
|---|---|-----------------------|
| 2 | Lemmas glabrous on back, hairy on margins only | 3 |
| | Lemmas hairy on back, sometimes sparsely so | 4 |
| 3 | Panicles narrow, branches appressed; spikelets mostly 4–10; leaf sheaths usually glabrous | <i>D. intermedia</i> |
| | Panicles open, branches spreading; spikelets mostly 2–5; leaf sheaths usually pilose | <i>D. californica</i> |
| 4 | Glumes mostly \pm 20 mm; lemmas >9 mm | <i>D. parryi</i> |
| | Glumes 9–12 mm; lemmas <9 mm | <i>D. spicata</i> |

D. californica Bol. / California Oat Grass

Prairies, meadows, open woods. NAmerica; BC, Alta, Sask, s to Calif, Ariz, NMex. SAmerica.

D. intermedia Vasey / Timber Oat Grass

*Formerly sometimes included in *D. californica* Bol.

Plants densely tufted; culms 10–50 cm tall; leaf blades 2–4 mm wide, usually hairy, sheaths glabrous or very hairy, with a tuft of long hairs at collar; panicle purplish, becoming straw-coloured, narrow, 2–5 cm, branches appressed, each with a single spikelet; glumes \pm 15 mm; lemmas 7–8 mm, glabrous on back, pilose on callus and along margin below, teeth aristate, awn 6–10 mm.

Meadows, plains, open woods to subalpine elevations. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, s to Calif, Ariz, NMex. eRussia.

D. parryi Scribn. / Parry Oat Grass

Foothills grasslands, woodlands. NAmerica; Alta, Sask, Mont, Wyo, Colo, NMex.

D. spicata (L.) P. Beauv. / Poverty Oat Grass

Dry to moist sandy or rocky areas, woodlands. NAmerica incl. Mex; Alas, Yuk, Greenland, BC, Alta to Nfld/L, Maritimes, s throughout US except Calif.

D. unispicata (Thurb.) Munro ex Vasey / One-spike Oat Grass

Open, rocky or sandy ground. NAmerica; BC, Alta, Sask, s to Calif, Nev, Utah, Colo.

DESCHAMPSIA P. BEAUV. / HAIR GRASS

Panicle narrow, spike-like; leaves mostly
filiform, 1–1.5 mm wide

D. elongata

Panicle open, branches spreading or
drooping; leaves wider, flat or folded

D. cespitosa

D. cespitosa (L.) P. Beauv. / Tufted Hair Grass

A number of subspecies; in Alberta subsp. *cespitosa*.

Moist open areas, meadows, shores to alpine elevations. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, SDak, Gt Lakes, NEngl, s to Ala. Circumpolar.

D. elongata (Hook.) Munro / Slender Hair Grass

Barkworth (2007) states that *D. brevifolia* R. Br. “is to be expected from high elevations in BC and Alberta.” *D. brevifolia* often has been included as a subspecies of *D. cespitosa* and may be among collections identified as the latter. *D. brevifolia* can be recognized by its strongly imbricate spikelets and lemmas 2.2–4 mm, which are dark purple for >1/2 their length, compared with *D. cespitosa*, in which the spikelets are not or only moderately imbricate and lemmas are dark purple for <1/2 their length.

Moist meadows, open slopes, streamsides, woodlands to subalpine and alpine areas. N America incl. Mex; Alas, Yuk, BC, Alta, s to Calif, Ariz. S America.

DICHANTHELIUM (HITCHC. & CHASE) GOULD

- 1 Culms <30 cm; ligules 1–5 mm; panicles 3–12 cm; spikelets 1.6–1.8 mm, upper florets 1.1–1.7 mm D. acuminatum
- Culms 15–50 cm; ligules 0.5–3 mm; panicles 3–9 cm; spikelets 2.4–3.2 mm, upper florets 1.9–2.5 mm or longer 2
- 2 Cauline leaves 3, blades 4–8 cm, ligules 0.5–1 mm; panicles 3–5 cm; upper glumes lacking an orange to purple spot at base D. wilcoxianum
- Cauline leaves 5–7, blades 5–12 cm, ligules 1–1.5 mm; panicles 5–9 cm; upper glumes with a prominent orange to purple spot at base D. oligosanthos

D. acuminatum (Sw.) Gould & C.A. Clark

Several subspecies; in Alberta subsp. *sericeum* (Schmoll) Freckmann & Lelong.

Dry to wet sandy hot springs, woodlands, swamps. N America incl. Mex; BC, Alta to Que, Maritimes, s throughout US. C America, S America.

D. oligosanthos (Schult.) Gould

Two subspecies; in Alberta subsp. *scribnerianum* (Nash) Freckmann & Lelong.

Plants caespitose; culms 25–75 cm, geniculate basally, distally erect; basal leaves forming a distinct rosette, blades 2–6 cm, cauline leaves 5–7, sheaths not overlapping, blades 5–12 cm × 4–15 mm, flat or

involute; panicles 5–9 cm, partially ensheathed to fully exerted; spikelets 6–60, 2.7–4.2 × 1.7–2.4 mm, ellipsoid to broadly obovoid; lower glumes 1–1.6 mm, acute, upper glumes often orange to purplish at base; fall phase branching from midculm nodes, branches ascending to erect, sometimes developing with and overtopping primary inflorescence, later branching again to form bushy clumps of blades and small, included secondary panicles.

Sandy prairies, clay banks. N America incl. Mex; BC, Alta, s throughout US except Nev and Me.

D. wilcoxianum (Vasey) Freckmann

*Formerly *D. oligosanthos* (Schult.) Gould.

Plants caespitose; culms 15–35 cm, stiffly erect, internodes very short except distal 2–4; basal rosette of leaves poorly differentiated, cauline leaves usually 3, blades 4–8 cm × 2–5 mm, flat; panicles 3–5 cm, shortly exerted; spikelets 12–32, 2.4–3.2 × 0.7–1.2 mm, ellipsoid to obovoid, often reddish; lower glumes 0.7–1.2 mm, deltoid, upper glumes and lower lemmas 1.9–2.5 mm, ellipsoid, ± as long as upper floret; fall phase arising from midculm nodes forming branches terminating in included panicle of 8–16 spikelets; no sterile shoots formed.

Dry sandy or gravelly prairies. N America; Alta to Man, s to NMex, Kans, Iowa, Ill.

DIGITARIA HALLER / CRAB GRASS

Second glume ± as long as spikelet; leaves
glabrous

D. ischaemum

Second glume ± 1/2 as long as spikelet;
leaves pilose

D. sanguinalis

D. ischaemum (Schreb.) Muhl.

Lawns, gardens, disturbed areas. Introduced. Eurasia.

D. sanguinalis (L.) Scop. / Crab Grass
Lawns, gardens, disturbed areas. Introduced. Eurasia.

DISTICHLIS RAF.

D. spicata (L.) Greene / Salt Grass
*Formerly *D. stricta* (Torr.) Rydb.

Saline prairies. NAmerica incl. Mex; NWT, BC, Alta to Ont, Maritimes, s to Calif, Ariz, NMex, Tex, La, along US Gulf and Atlantic coasts from Miss to Me. CAmerica, SAmerica.

ECHINOCHLOA P. BEAUV.

E. crus-galli (L.) P. Beauv. / Barnyard Grass, Cockspur Grass
Moist, disturbed sites. Introduced. Eurasia.

ELYMUS L. / WILD RYE

Includes species formerly included in *Agropyron* and *Sitanion*. Several hybrids occur in this complex. A key for their identification was included in the *Elymus* key of *Flora of Alberta* (Second Edition). They are rare generally, represented by single collections, and while described, they are not included in FNA identification keys. It was thought best not to key them for identification here because it would make a difficult key even more so.

Plants perennial, with or without rhizomes, sometimes stoloniferous; culms generally erect, occasionally prostrate; leaf sheaths open, generally auriculate, ligules membranous, often ciliate, blades glabrous to scabrous or pubescent; inflorescences terminal spikes; spikelets 1–several at each rachis node, 1–11 florets, florets reduced upwards, disarticulating above glumes, occasionally below; glumes usually 2, equal or subequal, 1–5-nerved, apices sometimes awned; lemmas obscurely 5–7-nerved, awned distally, awns straight or divergent; paleas usually \pm as long as lemmas; anthers 0.7–7 mm; caryopses with pubescent apices.

1	Spikelets 1 per node (occasionally 2 at lowest nodes); lemmas awned or not	2
	Spikelets >1 per node; lemmas awned	13
2	Anthers 0.7–3 mm; plants usually not or only weakly rhizomatous	3
	Anthers 3–7 mm; plants often strongly rhizomatous	9
3	Plants prostrate or decumbent, mostly 15–35 cm, rhizomes absent; glumes 4–7, awns divergent; spikelets disarticulating at maturity, alpine	<i>E. scribneri</i>
	Plants not as above	4
4	Lemmas awned, 7–40 mm	5
	Lemmas not awned or with awns to 7 mm	6
5	Glumes 1.8–2.3 mm wide	<i>E. trachycaulus</i>
	Glumes 0.5–1.5 (–2) mm wide	<i>E. glaucus</i>
6	Plants strongly rhizomatous	<i>E. lanceolatus</i>
	Plants not rhizomatous or only weakly so	7
7	Culms 18–75 cm; glumes 8–12 mm, with 3 (–5) veins, awns 0.5–3 mm; anthers 0.7–1.3 mm	<i>E. violaceus</i>
	Culms 30–150 cm; glumes 5–19 mm, with 3–7 veins, awns to 40 mm; anthers 1.2–3.5 mm	8

8	Glumes 1.8–2.3 mm wide; spikes 0.4–1 cm wide	<i>E. trachycaulus</i>	
	Glumes 0.4–1.5 (–2) mm wide; spikes 0.5–2 cm wide	<i>E. glaucus</i>	
9	Lemmas, some at least, with strongly divergent awns	<i>E. albicans</i>	
	Lemmas awnless or with straight or flexuous awns		10
10	Lemmas 12–14 mm	<i>E. glaucus</i>	
	Lemmas 7–12 mm		11
11	Glumes keeled, scabrous distally; lemmas glabrous	<i>E. repens</i>	
	Glumes not keeled distally or keeled entire length, smooth or scabrous their entire length; lemmas glabrous or hirsute		12
12	Plants strongly rhizomatous; spikes 0.5–1 cm wide, internodes 3.5–15 mm; glumes 1/2–3/4 length of adjacent lemmas; lemmas 5–12 mm	<i>E. lanceolatus</i>	
	Plants not strongly rhizomatous; spikes 0.5–2 cm wide, internodes 4–8 (–12) mm; glumes 1/2 length of adjacent lemmas to equalling them; lemmas 8–16 mm	<i>E. glaucus</i>	
13	Spikelets disarticulating at maturity		14
	Spikelets not disarticulating at maturity		15

- 14 Culms 50–100 cm; glumes 6–9 mm; spikes 4–13 × 0.5–2 cm including awns; lemma awns 10–20 mm × *Elyhordeum macounii*
- Culms 8–65 cm; glumes >9 mm; spikes 3–20 × 5–15 cm including awns; lemma awns 25–75 mm *E. elymoides*
- 15 Auricles usually absent, if present, brown, to 1.8 mm; spikelets 10–15 mm; lemmas 6–10 mm; paleas 5–9 mm *E. virginicus*
- Auricles usually present, 1.5–4 mm, often purplish; spikelets 8–25 mm; lemmas 8–16 mm; paleas 8–13 mm 16
- 16 Spikes 3–7 cm wide, internodes (middle) 3–5 (–7) mm; auricles 1.5–4 mm; spikelets 12–20 mm *E. canadensis*
- Spikes 0.5–2 cm wide, internodes (middle) 4–8 (–12) mm; auricles to 2.5 mm; spikelets 8–25 mm *E. glaucus*

× **ELYHORDEUM MANSF. EX TSITSIN & K.A. PETROVA**

× **ELYHORDEUM MACOUNII (VASEY) BARKWORTH & D.R. DEWEY**

Consists of hybrids between *Elymus trachycaulus* and *Hordeum jubatum*.

Plants perennial, caespitose; culms 50–100 cm; spikes terminal, 7–10 cm × 5 mm, lower nodes with 1–2 spikelets, upper with 1; spikelets imbricate with 1–3 florets; glumes 6–9 mm, awned; lemmas 6–11 mm, glabrous or scabrous distally, awns 10–20 mm; anthers sterile; caryopses generally aborted.

Moist meadows, saline flats. wNAmerica, cNAmerica.

ELYMUS L.

E. albicans (Scribn. & J.G. Sm.) Á. Löve

*Formerly *Agropyron albicans* Scribn. & J.G. Sm. Of hybrid origin, involving *Pseudoroegneria spicata* (Pursh) Á. Löve and *Elymus lanceolatus* (Scribn. & J.G. Sm.) Gould.

Plants strongly rhizomatous; culms 40–100 cm, glabrous; leaves concentrated proximally, blades involute, 1–3 mm wide, ligules 0.2–0.5 mm, ciliolate; spikes 4–14 cm, 1 spikelet per node, internodes 6–14 mm; spikelets 10–18 mm, 1.5–2× longer than internodes, appressed to ascending; glumes ± equal length, acute or short-awned, 1/2 to as long as adjacent lemmas, glabrous or hairy, 4–8 mm; lemmas 7.5–9.5 mm, glabrous or hairy, awns 4–12 mm, some strongly divergent; anthers 3–5 mm.

Dry prairie grasslands. NAmerica; BC, Alta, Sask, Wash, Idaho, Mont, Wyo, NDak, SDak, Utah, Colo.

E. canadensis L. / Canada Wild Rye

Three varieties; two in Alberta: var. *canadensis*, glaucous with lemmas villous or hispid and spikes almost pendent; and var. *brachystachys* (Scribn. & C.R. Ball) Farw., not strongly glaucous, lemmas smooth or scabrous and spikes nodding.

Dry to moist prairies, sand dunes, disturbed ground, river banks. NAmerica incl. Mex; NWT, BC, Alta to Que, Maritimes, s to Oreg, Nev, Ariz, NMex, Tex, Ark, Gt Lakes, NEngl, s to Va.

E. elymoides (Raf.) Swezey / Squirreltail

*Formerly *Sitanion hystrix* (Nutt.) J.G. Sm. Four subspecies; in Alberta subsp. *elymoides*.

Open woods, grasslands. NAmerica incl. Mex; BC, Alta, Sask, s to Calif, Ariz, NMex, Tex.

E. glaucus Buckley / Smooth Wild Rye

Three subspecies; in Alberta subsp. *glaucus*.

Moist to dry open woods and hillsides. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta, Sask, s to Calif, NMex, disjunct to Ont, Gt Lakes, Mo, Ark.

E. lanceolatus (Scribn. & J.G. Sm.) Gould /
Northern Wheat Grass

*Formerly *Agropyron dasystachyum* (Hook.) Scribn. Three subspecies; all in Alberta: subsp. *lanceolatus*, lemmas stiff-hairy, hairs <1 mm, not scabrous; subsp. *psammophilus* (J.M. Gillett & H. Senn) Á. Löve, lemma hairs flexible, some >1 mm; and subsp. *riparius* (Scribn. & J.G. Sm.) Barkworth, lemmas smooth, scabrous distally, mostly glabrous, sometimes with marginal hairs proximally. In Alberta, *E. lanceolatus* hybridizes with several species.

Prairie grasslands, sandhills, dry woodlands. NAmerica; Alas, Yuk, NWT, BC, Alta to Ont, s to Calif, Ariz, NMex, Gt Lakes.

E. repens (L.) Gould / Quack Grass, Couch Grass

*Formerly *Agropyron repens* (L.) P. Beauv.

Roadsides, disturbed areas, gardens. Introduced. Eurasia.

E. scribneri (Vasey) M.E. Jones / Scribner's Wheatgrass

*Formerly *Agropyron scribneri* Vasey.

Dry alpine slopes. NAmerica; Alta, s to Calif, Ariz, NMex.

E. trachycaulus (Link) Gould

*Formerly *Agropyron trachycaulum* (Link) Malte. A complex species with much hybridization. A number of subspecies are recognized, some not clearly. In Alberta subsp. *subsecundus* (Link) Á. Löve & D. Löve with lemma awns 17–40 mm, spikes somewhat secund; and subsp. *trachycaulus* with lemmas awnless or with awns ≤ 9 mm, spikes 2-sided.

Prairies, parklands, sandy woodlands. NAmerica incl. Mex; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Tex, Kans, Mo, Gt Lakes, NEngl, s to Va.

E. violaceus (Hornem.) J. Feilberg / Arctic Wheatgrass
*Formerly *Agropyron violaceum* (Hornem.) Lange.

Subalpine to alpine areas on calcareous substrates. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Man to Nfld/L, s to Oreg, Nev, Utah, NMex.

E. virginicus L. / Virginia Wild Rye

A number of varieties; two in Alberta: var. *jejunus* (Ramaley) Bush, plants glaucous, spikes partly sheathed; and var. *virginicus*, plants not glaucous, spikes fully exerted.

Open woods, thickets, grasslands. NAmerica incl. Mex; BC, Alta to Nfld/L, Maritimes, s to Ariz, NMex, Tex, La, Miss, Ala, Fla.

ERAGROSTIS WOLF

E. cilianensis (All.) Vignolo ex Janch. / Skunk-grass
*Formerly *E. megastachya* (Koeler) Link.

Disturbed areas. Introduced. Europe.

EREMOPYRUM (LEDEB.) JAUB. & SPACH

E. triticeum (Gaertn.) Nevski / Annual Wheat Grass
Disturbed often saline areas. Introduced. Asia.

FESTUCA L. / FESCUE

- | | | |
|---|--|-----------------|
| 1 | Plants viviparous, spikelets with proliferating vegetative shoots | F. viviparoidea |
| | Plants not viviparous | 2 |
| 2 | Leaf blades flat; panicles open, branches lax, spreading, sometimes reflexed | 3 |
| | Leaf blades various, not flat; panicle branches erect or ascending, often appressed, frequently contracted | 4 |

- 3 Lower glumes 1.8–4 mm; anthers 1.5–3 mm; lemma awns 2.5–15 (–20) mm F. subulata
- Lower glumes 4–7 mm; anthers 2.6–5 mm; lemma awns 0.2–0.7 mm F. altaica
- 4 Glumes ± equalling distal florets; lemma awns absent or 0.5–1.3 mm; anthers 4–6 mm F. hallii
- Glumes clearly exceeded by distal florets; lemma awns various; anthers 0.3–6 mm 5
- 5 Rhizomes usually present; leaf sheaths reddish, shredding in age F. rubra
- Rhizomes absent; leaf sheaths not shredding in age 6
- 6 Lemmas awnless, mucronate or with awns to 3.5 mm 7
- Lemmas awned, 3–12 mm 9
- 7 Ovary glabrous; lemmas 3.8–6.5 mm; anthers 1.8–3.4 mm F. trachyphylla
- Ovary apices pubescent or scabrous, rarely glabrous; lemmas 6–12 mm; anthers 2.6–6 mm 8
- 8 Lower glumes distinctly shorter than adjacent lemmas; anthers 2.6–4.5 (–5) mm; lemma keeled proximally, with 5 prominent veins F. altaica
- Lower glumes equal to or shorter than adjacent lemmas; anthers (3.3–) 4.5–6 mm; lemma backs rounded proximally, veins obscure F. campestris

- | | | |
|----|--|------------------------|
| 9 | Anthers (1.8–) 2–4.5 mm | 10 |
| | Anthers 0.3–1.8 (–2) mm | 11 |
| 10 | Ovary apices pubescent; spikelets 6–12 mm; lemma awns 3–12 mm | <i>F. occidentalis</i> |
| | Ovary apices glabrous; spikelets 7.5–13.5 (–19) mm; lemma awns 1.5–7 mm | <i>F. idahoensis</i> |
| 11 | Ovary apices densely pubescent | <i>F. occidentalis</i> |
| | Ovary apices glabrous or with only a few hairs | 12 |
| 12 | Culms densely pubescent below inflorescence; panicles ovoid, often somewhat secund | <i>F. baffinensis</i> |
| | Culms ± glabrous below inflorescence; panicles narrow | 13 |
| 13 | Panicles usually 3–10 (–13) cm; upper glumes 2.5–5 mm; spikelets mostly 4.5–8.8 (–10) mm | <i>F. saximontana</i> |
| | Panicles 1–5.5 cm; upper glumes 2–4 (–4.6) mm; spikelets 2.5–7 (–8.5) mm | 14 |
| 14 | Ovary glabrous; lemmas 2.5–4.5 (–6) mm; spikelets 3.5–7 (–8.5) mm | <i>F. brachyphylla</i> |
| | Ovary with apical trichomes (30× lens); lemmas 2–3.5 (–4) mm; spikelets 2.5–5 mm | <i>F. minutiflora</i> |

***F. altaica* Trin.**

Often formerly included in *F. scabrella* Torr.

Plants densely tufted; culms (25–) 30–90 cm, glabrous or slightly scabrous; leaf blades 2–4 mm wide, convolute, conduplicate or flat, glabrous or scabrous; panicles 5–16 cm, branches spreading, lax, lower

generally recurved or reflexed; spikelets purple, shining, 8–14 mm, generally 3–4 (–6)-flowered; glumes 4–7 mm, shorter than spikelets; lemmas mostly 7–9 mm, keeled proximally, chartaceous, awns 0.2–0.7 mm; paleas ± as long as or slightly shorter; anthers 2.5–4.5 (–5) mm; ovary usually with distal trichomes.

Subalpine meadows, alpine tundra. NAmerica; Alas, Yuk, NWT, BC, Alta, disjunct in Que, Nfld/L. Asia.

F. baffinensis Polunin

Hybrids between *F. brachyphylla* Schult. & Schult. f. and *F. baffinensis* Polunin have been reported for southwestern Alberta.

Dry alpine slopes. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Sask, Ont, Que, Idaho, Mont, Wyo, Colo. Eurasia.

F. brachyphylla Schult. & Schult. f.

Three subspecies; in Alberta subsp. *brachyphylla*.

Arctic and alpine tundra. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, s to Calif, Ariz, NMex, Gt Lakes, NEngl. Circumpolar.

F. campestris Rydb.

*Formerly *F. scabrella* Torr. (in part).

Plants densely tufted; culms (30–) 40–90 cm, scabrous; leaf blades flat or more usually conduplicate, 0.8–2 mm wide, 1.2–3.2 mm wide when flat, old blades breaking off, sheaths persisting; panicles 5–18 cm, branches erect to stiffly spreading; spikelets yellowish or grey green, 8–16 mm, 3–5 (–7)-flowered; glumes 4.5–8 (–9) mm, shorter than spikelets; lemmas 6–8.5 (–10) mm, rounded proximally, chartaceous to coriaceous, awns 0.5–1.5 mm; paleas somewhat shorter than lemmas; anthers 3.5–6 mm; ovary with distal trichomes.

Prairies, foothills, montane and subalpine grasslands. NAmerica; BC, Alta, Sask, Wash, Oreg, Idaho, Mont.

F. hallii (Vasey) Piper

*Formerly *F. scabrella* Torr. (in part).

Plants densely tufted; culms (15-) 25-65 (-85) cm, glabrous, sometimes scabrous below inflorescence; leaf blades usually conduplicate, 0.5-1.2 mm diam., rarely flat, 1-2.5 mm wide; panicles 6-16 cm, open at anthesis, \pm contracted at maturity, branches erect or stiffly spreading; spikelets 6.5-9.5 mm, 2-3 (-4)-flowered; glumes 5-8 (-9) mm, almost as long as spikelets; lemmas 5.5-8 (-9) mm, rounded proximally, chartaceous to coriaceous, awns 0.5-1.3 mm; paleas somewhat shorter than lemmas; anthers 4-6 mm; ovary with sparse trichomes distally.

An important component of Northern Great Plains grassland. NAmerica; Alta to Ont, Mont, NDak, Wyo, Colo.

F. idahoensis Elmer / Bluebunch Fescue

Mesic to dry grasslands. NAmerica; BC, Alta, Sask, s to Calif, Ariz, NMex.

F. minutiflora Rydb.

This species is similar to *F. brachyphylla*. In Alberta, distinguish *F. minutiflora* from small or depauperate specimens of *F. brachyphylla* by apical trichomes on the ovary of *F. minutiflora*.

Plants tufted; culms 4-15 (-20) cm; leaves mostly basal blades, setaceous; panicles narrow, 1-5 cm, branches very short, erect or slightly spreading; spikelets 2.5-5 mm, (2-) 3-4 (-5)-flowered; glumes 1.3-3.5 mm, shorter than spikelets; lemmas 2-3.5 (-4) mm, awns 0.5-1.5 (-1.7) mm; paleas 0.5-2.0 mm; ovary with a few distal trichomes.

Alpine tundra. NAmerica; Alas, Yuk, BC, Alta, s to Calif, Ariz, NMex.

F. occidentalis Hook.

Dry to moist woodlands. NAmerica; Alas, BC, Alta, s to Calif, Utah, Wyo, disjunct to Ont and Gt Lakes states.

F. rubra L. / Red Fescue

F. rubra is a highly complex, polyploid circumpolar species aggregate, which in North America is complicated by both native and widely distributed introduced populations. A number of subspecies are recognized, but their merit remains to be established.

Diverse habitats. NAmerica incl. Mex; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Tex, Mo, Tenn, Ga. Circumpolar.

F. saximontana Rydb.

Three subspecies; in Alberta subsp. *saximontana*.

Grasslands, dunes, open woods to montane and subalpine elevations. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Que, Nfld/L, s to Calif, Ariz, NMex, Okla, Iowa, Gt Lakes. eRussia.

F. subulata Trin.

Moist woods. NAmerica; BC, Alta, s to Calif, Nev, Utah, Colo, SDak.

F. trachyphylla (Hack.) Krajina

*Formerly *F. ovina* L.

Plants densely tufted, often blue green or glaucous; culms 20–60 (–75) cm, generally glabrous; leaf blades usually conduplicate, 0.5–1.2 mm diam.; panicles mostly 3–12 cm, contracted, branches erect or stiffly spreading; spikelets 5–10 mm, 3–8-flowered; glumes 2–5.5 mm, shorter than spikelets; lemmas 4–5 (–6.5) mm, rounded on back, often pubescent distally, glabrous proximally, awn 0.5–3 mm; paleas ± as long as lemmas; ovary glabrous.

Lawns and roadsides. Introduced. Europe.

F. viviparoidea Krajina ex Pavlick

Two subspecies; in Alberta subsp. *krajinae* Pavlick. Morphologically similar to *F. brachyphylla* Schult. & Schult. f. and *F. baffinensis* Polunin in its vegetative characters. The status of viviparous fescues remains uncertain. Some authors regard them to be environmentally induced

variations of normal sexually reproducing species such as *F. brachyphylla* Schult. & Schult. f. and *F. baffinensis* Polunin; others treat them as a distinct species. The species is included here so a name can be applied to collections of viviparous fescue from Alberta, which will be of value in resolving this problem.

Alpine tundra. N America; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta. Circumpolar.

GLYCERIA R. BR. / MANNA GRASS

- | | | |
|---|---|--------------|
| 1 | Panicles narrow, erect; spikelets linear, nearly terete, >7 mm | G. borealis |
| | Panicles usually broad, open, nodding; spikelets ovate or oblong, somewhat flattened, 2–7 mm | 2 |
| 2 | First glume usually ≤ 1 mm | 3 |
| | First glume usually ± 1.5 mm | 4 |
| 3 | Leaf blades mostly 2–4 mm wide; lower ligules 1.5–3.0 mm long; first glume 0.5–0.8 mm; lemmas barely 2 mm | G. striata |
| | Leaf blades mostly 4–10 mm wide; lower ligules 3–6 mm long; first glume ± 1 mm; lemmas 2.0–2.2 mm | G. elata |
| 4 | Lemmas with broad scarious margins; glumes commonly obtuse | G. pulchella |
| | Lemmas gradually narrowed to a firm blunt apex; glumes acute | G. grandis |

G. borealis (Nash) Batch.

Shallow water, shores, streamsides. N America incl. Mex; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Neb, Iowa, Gt Lakes, N Engl.

G. elata (Nash) M.E. Jones

Wet meadows, shady moist woods. N America; BC, Alta, s to Calif, Ariz, NMex.

G. grandis S. Watson

Two varieties; in Alberta var. *grandis*.

Standing water, shores, ditches. N America; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Neb, Iowa, Gt Lakes, N Engl, Tenn, Va.

G. pulchella (Nash) K. Schum.

Marshes, ponds, ditches. N America; Alas, Yuk, NWT, BC, Alta, Sask, Man.

G. striata (Lam.) Hitchc. / Fowl Manna Grass

Two varieties; in Alberta var. *stricta* (Scribn.) Fernald.

Lakeshores, streams, marshes. N America incl. Mex; Alas, Yuk, BC, Alta to Que, Nfld/L, Maritimes, s throughout US.

HESPEROSTIPA (M.K. ELIAS) BARKWORTH

A segregate of *Stipa* L.; Alberta species previously included in that genus.

Plants perennial, cespitose; culms erect, 10–110 cm; leaf sheaths glabrous or pubescent, not ciliate, ligules membranous, often ciliate; inflorescences terminal, contracted or open panicles; spikelets 1.5–6 cm with 1 floret, calluses densely strigose distally, 2–6 mm; glume apices soft and attenuate; lemmas indurate, margins overlapping at maturity, awns persistent, twice geniculate, sometimes weakly so; paleas equal to lemmas, coriaceous, pubescent apices indurate, 2–7-veined; anthers 1.2–9 mm; caryopsis fusiform.

- 1 Lemmas evenly pubescent (sometimes glabrous directly above calluses), 8–15 mm; awns slender, flexuous, indistinctly geniculate; glumes 16–35 mm; ligules of lowest leaves 1–6.5 mm, often lacerate H. comata
- Lemmas pubescent only at base and along margins, 7–18 mm; awns stiff and strongly geniculate; glumes 15–45 mm; ligules of lowest leaves 0.2–3 mm, not lacerate 2
- 2 Glumes 15–30 mm; awns 50–105 cm; lower nodes glabrous, sometimes evenly pubescent; florets 8.5–14 mm H. curtisetata
- Glumes 22–45 mm; awns 90–190 cm; lower nodes with lines of pubescence; florets 15–25 mm H. spartea

H. comata (Trin. & Rupr.) Barkworth /
Needle and Thread, Spear Grass

*Formerly *Stipa comata* Trin. & Rupr. Two subspecies; both in Alberta: subsp. *comata* and subsp. *intermedia* (Scribn. & Tweedy) Barkworth. The former subspecies is widespread, with lower culm nodes concealed, panicles not fully exerted from upper leaf sheath; the latter subspecies is rare, with lower culm nodes exposed and panicle fully exerted from upper leaf sheath.

Grasslands of dry plains and hillsides. N America; Yuk, BC, Alta to Man, s to Calif, Ariz, NMex, Tex, Kans, Iowa, Gt Lakes.

H. curtisetata (Hitchc.) Barkworth

*Formerly *Stipa curtisetata* (Hitchc.) Barkworth.

Prairie grasslands. N America; BC, Alta, Sask, Man, Mont, NDak, Wyo.

H. spartea (Trin.) Barkworth / Porcupine Grass

*Formerly *Stipa spartea* Trin.

Prairie grasslands. N America; BC, Alta to Ont, s to Nev, Ariz, NMex, Okla, Mo, Gt Lakes.

HORDEUM L. / BARLEY

- | | | |
|---|---|--------------------------|
| 1 | Leaf blades with conspicuous basal auricles | 2 |
| | Leaf blades lacking conspicuous basal auricles | 3 |
| 2 | Glume margins, of at least central spikelet, ciliate-pectinate; spike disarticulating | <i>H. murinum</i> |
| | Glume margins not ciliate-pectinate; spike not disarticulating | <i>H. vulgare</i> |
| 3 | Plants annual; glumes not all alike, some capillary, others 0.8–1.8 mm broad above base | <i>H. pusillum</i> |
| | Plants perennial; glumes all capillary | 4 |
| 4 | Glumes 1.5–8.5 mm, divergent at maturity | <i>H. jubatum</i> |
| | Glumes 0.7–1.9 mm, usually straight, not divergent at maturity | <i>H. brachyantherum</i> |

H. brachyantherum Nevski

*Formerly *H. jubatum* subsp. *breviaristatum* Bowden. Two subspecies; in Alberta subsp. *brachyantherum*.

Plants perennial, cespitose; culms 30–100 cm, erect or decumbent at base; leaf sheaths usually glabrous, blades ≤ 20 cm \times 8 mm, usually glabrous, flat; spikes 3–8.5 cm, green or purplish; central spikelets with glumes 9–19 mm, usually straight at maturity, lemmas 5–10 mm, usually glabrous, awns 3.5–14 mm, straight; lateral spikelets staminate,

glumes 7–19 mm, straight, lemma awns to 6.5 mm, usually straight; anthers 0.8–3.5 mm.

Dry to moist grasslands, stream banks, meadows, woodlands. NAmerica incl. Mex; Alas, Yuk, BC, Alta, Sask, s to Calif, Ariz, NMex. A few scattered localities in Nfld/L and eUS are probably introductions. eAsia.

H. jubatum L. / Foxtail Barley

*Formerly *H. jubatum* L. (in part). Two subspecies, both in Alberta: subsp. *intermedium* Bowden with glumes of central spikelets 1.5–3.5 cm, lemma awns 1.1–3.5 cm; and subsp. *jubatum* with glumes of central spikelets 3.5–8.5 cm, lemma awns 3.5–9 cm.

Plants perennial, cespitose; culms 20–80 cm, geniculate or straight; leaf sheaths glabrous or pubescent, blades ≤ 15 cm \times 5 mm; spikes 3–15 cm, usually nodding, light green to purple; lateral glumes 1.5–8.5 cm, divergent at maturity; central spikelet glumes 1.5–8.5 cm, spreading, lemmas 4–8.5 mm, glabrous, awns 1–9 cm, straight to ascending; lateral spikelets staminate or sterile, glumes 1.7–8.3 cm, lemmas 4–6.5 mm, awns 2–15 mm, divergent; anthers 1–1.5 mm.

Shores, meadows, roadsides, disturbed areas, often in saline habitats. NAmerica incl. Mex; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Que, Nfld/L, Maritimes, s through most of US except La to Ga. eAsia.

H. murinum L.

*Formerly *H. glaucum* Steud. Three subspecies; in Alberta subsp. *glaucum* (Steud.) Tzvelev.

Disturbed areas. Introduced. Eurasia.

H. pusillum Nutt. / Little Barley

Open grasslands, pastures, marsh margins, disturbed areas. NAmerica incl. Mex; Alta, s throughout US.

H. vulgare L. / Barley

Two-row barley, *H. distichon* L., with only the central spikelet fertile, is also an occasional escape from cultivation.

An escape from cultivation. Introduced. Eurasia.

KOBLERIA (LEDEB.) SCHULT. F.

K. macrantha (Ledeb.) Schult. f. / June Grass

Dry to mesic sandy prairie grasslands, open woods. N America incl. Mex; Alas, Yuk, NWT, BC, Alta to Que, s to Calif, Ariz, NMex, Tex, Mo, Gt Lakes. S America, Eurasia.

LEYMUS HOCHST.

A segregate of *Elymus* L.

Plants perennial, generally rhizomatous; culms erect; leaf sheaths open, auricles usually present, ligules membranous, blades firm, strongly nerved abaxially; inflorescence solitary terminal spikes; spikelets 1–several at each node, spikelets overlapping bases of those above, usually distichous; glumes lanceolate to subulate, glabrous or pubescent, awns usually lacking, if present, not longer than florets; lemmas acute, awned or not, awns terminal, to 7 mm; anthers 2.5–10 mm.

- 1 Glumes lanceolate, generally 2–4 mm wide,
3 (–5) distinct nerves at midlength; clearly
rhizomatous; plants of sand dunes and shores L. mollis

Glumes subulate to narrowly lanceolate,
generally 0.5–2.5 mm wide, 1 (–3)
inconspicuous nerves at midlength or none;
cespitose or rhizomatous; plants not of dunes
and shores 2

- 2 Ligules 2–8 mm; glumes 8–18 mm; lemmas
glabrous or shortly pubescent; anthers
4–7 mm L. cinereus
- Ligules 0.1–0.5 mm; glumes 5–12 mm;
lemmas usually distinctly villous; anthers
7–10.5 mm L. innovatus

L. cinereus (Scribn. & Merr.) Á. Löve / Giant Wild Rye

*Formerly *Elymus piperi* Bowden.

Streamsides, woodlands, moist slopes. NAmerica; BC, Alta, Sask,
Man, s to Calif, Ariz, NMex, Neb.

L. innovatus (Beal) Pilg. / Hairy Wild Rye

*Formerly *Elymus innovatus* Beal. Two subspecies; in Alberta subsp.
innovatus.

Woodlands, especially pine, prairies. NAmerica; Alas, Yuk, NWT,
Nunavut, BC, Alta to Ont, Mont, Wyo, SDak.

L. mollis (Trin.) Pilg. / American Dune Grass

*Formerly *Elymus mollis* Trin. Two subspecies; in Alberta subsp. *villosissimus* (Scribn.) Á. Löve.

Sand dunes, shores. NAmerica; Alas, Yuk, NWT, Nunavut, Green-
land, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Calif, Gt Lakes.
eAsia.

LOLIUM L. / RYEGRASS, DARNEL

- | | | |
|---|---|----------------|
| 1 | Glumes shorter than spikelet | 2 |
| | Glumes (of at least some spikelets) equal to
or longer than spikelet | 3 |
| 2 | Lemmas awnless; leaves seldom >3 mm wide | L. perenne |
| | Lemmas awned; leaves 3–10 mm wide | L. multiflorum |

- | | | |
|---|------------------------------------|---------------|
| 3 | Lemmas 9–10 mm; leaves 2–4 mm wide | L. persicum |
| | Lemmas 6–8 mm; leaves 3–10 mm wide | L. temulentum |

L. multiflorum Lam. / Italian Ryegrass
 Used in revegetation and escaped to disturbed areas. Introduced.
 Europe.

L. perenne L. / Ryegrass
 Lawns, pastures, disturbed areas. Introduced. Eurasia.

L. persicum Boiss. & Hohen. / Persian Darnel
 Grain fields, disturbed areas. Introduced. swAsia.

L. temulentum L. / Darnel
 Two subspecies; in Alberta subsp. *temulentum*.
 Grain fields, disturbed areas. Introduced. Eurasia, Africa.

MELICA L. / MELIC GRASS

- | | | |
|---|--|----------------|
| 1 | Lemmas awned; plants not bulbous at base | M. smithii |
| | Lemmas not awned; plants mostly bulbous
at base | 2 |
| 2 | Lemmas narrow, long-acuminate, hairy on
nerves; glumes narrow | M. subulata |
| | Lemmas broad, acute or obtuse, glabrous;
glumes broad, papery | M. spectabilis |

M. smithii (Porter *ex* A. Gray) Vasey / Melic Grass
 Moist woods. NAmerica; BC, Alta, s to Oreg, Idaho, Wyo, disjunct
 Que, Gt Lakes.

M. spectabilis Scribn. / Onion Grass
 Moist meadows, woodlands, montane areas. NAmerica; BC, Alta, s to
 Calif, Nev, Utah, Colo.

M. subulata (Griseb.) Scribn. / Alaska Onion Grass
 Moist, shady woods. N America; Alas, BC, Alta, s to Calif, Idaho, Colo, SDak. S America.

MUHLENBERGIA SCHREB. / MUHLY GRASS

- | | | |
|---|---|-----------------|
| 1 | Panicles open, 4–12 cm wide; spikelets on long, slender pedicels | M. asperifolia |
| | Panicles narrow, spike-like; spikelets on short pedicels | 2 |
| 2 | Glumes awned, awn much exceeding lemma; panicle usually dense, 0.5–1.5 cm wide | 3 |
| | Glumes shorter than to almost equalling lemma; panicle very slender with short appressed branches | 4 |
| 3 | Internodes puberulent, dull; ligules 0.2–0.6 mm; anthers 0.8–1.5 mm | M. glomerata |
| | Internodes smooth, shiny; ligules 0.6–1.5 mm; anthers 0.4–0.8 mm | M. racemosa |
| 4 | Glumes lance-subulate, mostly 2–2.5 mm; ligule ≤0.5 mm; rhizomes lacking | M. cuspidata |
| | Glumes ovate-lanceolate, 1–1.5 mm; ligule 1–3 mm; rhizomes present | M. richardsonis |

M. asperifolia (Nees & Meyen *ex* Trin.) Parodi / Scratch Grass
 Moist alkaline meadows. N America incl. Mex; BC, Alta to Ont, s to Calif, Ariz, NMex, Tex, Mo, Gt Lakes. S America.

M. cuspidata (Torr. *ex* Hook.) Rydb. / Plains Muhly
 Dry gravelly prairies, limestone outcrops. N America; Alta to Man, s to NMex, Kans, Mo, Ky.

M. glomerata (Willd.) Trin. / Bog Muhly

Moist habitats, marshes, peaty meadows, shores. NAmerica; Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Gt Lakes, sporadic in western and midwestern US.

M. racemosa (Michx.) Britton, Sterns & Poggenb.

Sandhills, dry slopes, eroded banks. NAmerica incl. Mex; BC, Alta to Que, NS, s to Nev, Ariz, NMex, Tex, Okla, Mo, Gt Lakes.

M. richardsonis (Trin.) Rydb. / Mat Muhly

Prairie grasslands, thickets, shores, gravel bars, talus. NAmerica incl. Mex; Yuk, NWT, BC, Alta to NB, s to Calif, Ariz, NMex, Neb, Gt Lakes, NEngl.

MUNROA TORR.

M. squarrosa (Nutt.) Torr. / False Buffalo Grass

Dry sandy plains, disturbed, eroded areas. NAmerica incl. Mex; Alta, Sask, s to Oreg, Nev, Ariz, NMex, Tex, Okla.

Nassella (Trin.) É. Desv.

A segregate of *Stipa* L.

Plants usually perennial, caespitose, rarely rhizomatous; leaves mostly basal, sheaths open, sometimes with cleistogenes, auricles absent, ligules membranous, blades to 60 cm; inflorescence terminal, panicles sometimes partially included; spikelets with 1 floret; glumes mostly 3–5-veined, sometimes awned, calluses blunt or sharp, glabrous or strigose; lemmas glabrous or variously pubescent, strongly convolute, awns terminal, geniculate, persistent or deciduous; paleas $\leq 1/2$ as long as lemmas, glabrous; anthers 1 or 3; caryopses glabrous.

N. viridula (Trin.) Barkworth / Green Needle Grass

*Formerly *Stipa viridula* Trin. Produces a sterile hybrid with *Achnatherum hymenoides* (Roem. & Schult.) Barkworth.

Plants perennial, cespitose; culms 40–80 cm, erect; leaves mostly basal, sheaths open, generally glabrous, margins ciliate, ligules membranous, 0.2–1.2 mm, truncate to rounded, blades 10–30 cm; inflorescence a terminal panicle 3–7.5 cm, branches loosely contracted, appressed or ascending, somewhat remote, appearing fascicled; spikelets 8–13 mm, florets solitary, disarticulation above glumes; glumes subequal, lanceolate, often pigmented, generally 3–5-veined, 7–10 mm; lemmas 5–6 mm, strongly convoluted, enfolding the caryopsis, pubescent, not lobed apically, awns 20–32 mm, twice geniculate; paleas <1/2 length of lemma, membranous, glabrous; anthers 1, 2–3 mm.

Dry sandy grasslands, woodlands. N America; NWT, BC, Alta, Sask, Man, s to Calif, Ariz, NMex, Tex, Iowa, Ill.

ORYZOPSIS MICHX. / RICE GRASS

O. asperifolia Michx. is the only species in *Oryzopsis*. All other species formerly classified in the genus have been transferred to *Achnatherum* and *Piptatherum*.

Plants perennial, cespitose, not rhizomatous; culms erect 25–65 cm; leaf sheaths open, ligules membranous, blades flat or involute, 30–90 cm, cauline leaf blades 1 cm; panicles to 13 cm, contracted, branches erect; spikelets 5–7.5 mm excluding awn; florets 1, 5–7 mm, terete or laterally compressed; glumes subequal; callus blunt; lemmas indurate, pubescent at least basally, convolute, enclosing paleas, apices bifid, awn 7–15 mm; paleas same as lemmas in length, texture and pubescence; anthers 2–4 mm; caryopses 4–6.5 mm.

***O. asperifolia* Michx.**

Plants perennial, loosely tufted; culms 25–65 cm; leaf blades flat or involute, 30–90 cm, cauline leaf blades to ± 1 cm, ligules membranous; panicles contracted, 3.5–13 cm, branches erect; spikelets 5–7.5 mm (excluding awn), 1 floret; florets 5–7 mm, terete or laterally compressed, callus blunt; disarticulation above glumes; glumes subequal,

5–7.5 mm, green with scarious margins; lemmas convolute, indurate, pubescent, at least basally, apex lobed, awn 7–15 mm, margins enfolding paleas; paleas similar to lemmas in length, texture and pubescence, 2-veined; anthers 2–4 mm; ovaries glabrous; caryopses 4–6.5 mm.

Gravelly or rocky woodlands. NAmerica; Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Utah, NMex, SDak, Gt Lakes, NEngl.

PANICUM L. / PANIC GRASS

Spikelets <4 mm P. capillare

Spikelets >4 mm P. miliaceum

P. capillare L. / Witch Grass

Two subspecies; in Alberta subsp. *capillare*.

Open areas, fields, disturbed sites. NAmerica incl. Mex; BC, Alta to Maritimes, s throughout US.

P. miliaceum L. / Broomcorn Millet

Two subspecies; in Alberta subsp. *runderale* (Kitag.) Tzvelev.

An escape from cultivation, often introduced from bird seed. Introduced. Asia.

PASCOPYRUM Á. LÖVE

A segregate of *Agropyron* Gaertn.

Plants perennial, rhizomatous; leaves mostly basal, sheaths striate, usually glabrous, auricles present, ligules membranous; inflorescences terminal distichous spikes; spikelets 1 per node, occasionally 2 at lower nodes; glumes 1/2–2/3 length of spikelets, 3–5-veined proximally; lemmas lanceolate, rounded on backs, mucronate to awned, awns straight to 5 mm; paleas shorter than lemmas.

P. smithii (Rydb.) Barkworth & D.R. Dewey /
Western Wheatgrass

*Formerly *Agropyron smithii* Rydb.

Plants perennial, often glaucous, strongly rhizomatous; culms 20–100 cm, usually erect; leaf sheaths striate when dry, ligules membranous, 0.1 mm, blades flat to involute, 2–26 cm decreasing in length upwards, strongly nerved adaxially; inflorescences solitary, terminal spikes, 5–17 cm; spikelets 12–26 mm, 2-ranked, 1 per node (occasionally 2 at lower nodes), spikelets generally clearly overlapping base of one above, florets 2–12; glumes subequal, lower slightly longer, 5–15 mm, lanceolate, 3–5-nerved proximally, 1-nerved distally, awnless; lemmas 6–14 mm, glabrous or hairy, awnless or with awns 0.5–5 mm; anthers 2.5–6 mm. Several varieties previously recognized are no longer worthy of taxonomic recognition.

Dry grasslands, alkaline meadows. NAmerica; BC, Alta to Ont, s to Calif, Ariz, NMex, Tex, Ark, Mo, Gt Lakes.

PHALARIS L. / CANARY GRASS

Annual; mostly 30–80 cm tall; panicle ovoid,
dense, 1.5–4 cm

P. canariensis

Perennial; mostly 60–150 cm tall; panicle
narrow, 6–18 cm

P. arundinacea

P. arundinacea L. / Reed Canary Grass

Shores, marshes, wet meadows. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, throughout US except Ala to SC. Circumboreal, S America.

P. canariensis L. / Canary Grass

An escape from cultivation in fields, disturbed sites. Introduced. Europe.

PHLEUM L. / TIMOTHY

Panicle ovoid or short-cylindric, usually 1.5–3 cm; awns of glumes often >2 mm; base of culms not bulbous; upper sheaths inflated P. alpinum

Panicle cylindric, usually 5–10 cm; awns of glumes rarely >2 mm; base of culms enlarged or bulbous; sheaths not inflated P. pratense

P. alpinum L. / Mountain Timothy

*Formerly *P. commutatum* Gaudin. Two subspecies; in Alberta subsp. *alpinum*.

Moist montane meadows, forest margins to alpine elevations. NAmerica incl. Mex; Alas, Yuk, NWT, Greenland, BC, Alta, Sask, Ont, Que, Nfld/L, s to Calif, Ariz, NMex. Circumpolar, SAmerica.

P. pratense L. / Timothy

Hay fields, pastures, disturbed sites. Introduced. Eurasia.

PHRAGMITES ADANS.

P. australis (Cav.) Trin. *ex* Steud. / Reed

Two subspecies; in Alberta subsp. *americanus* Saltonst., P.M. Peterson & Soreng.

Marshes, ditches, ponds, lakes, shores. NAmerica incl. Mex; NWT, BC, Alta to Nfld/L, Maritimes, s throughout US. Eurasia, SAmerica.

PIPTATHERUM P. BEAUV.

Alberta species of *Piptatherum* were all formerly classified in *Oryzopsis* Michx.

Plants caespitose, not rhizomatous; culms 10–100 cm, erect, smooth, glabrous; leaf sheaths open, ligules membranous, auricles absent, blades flat or involute; inflorescences terminal panicles, open or contracted, 3–40 cm, branches straight or flexuous; spikelets with 1 floret;

glumes membranous, as long as or slightly longer than florets; florets terete or compressed, coriaceous or stiffly membranous, glabrous or pubescent, awned; paleas similar to lemmas, as long as or slightly longer than lemmas; anthers 3, 0.6–5 mm; caryopses ovoid or obovoid, glabrous.

- | | | |
|---|---|----------------------|
| 1 | Lemmas and calluses usually glabrous; florets
1.5–2.5 mm; caryopses \pm 1.2 mm | <i>P. micranthum</i> |
| | Lemmas and calluses usually hairy; florets
2.2–6 mm; caryopses 1.8–2.5 mm | 2 |
| 2 | Awns 1–2.5 mm, deciduous | <i>P. pungens</i> |
| | Awns 3.9–15 mm, persistent | 3 |
| 3 | Panicle branches straight, appressed; florets
3–6 mm; awns 4–7 mm | <i>P. exiguum</i> |
| | Panicles branches flexuous, often divergent;
florets 2.2–4.5 mm; awns 5–15 mm | <i>P. canadense</i> |

P. canadense (Poir.) Dorn

*Formerly *Oryzopsis canadensis* (Poir.) Torr.

Grasslands, open woods. N America; BC, Alta to Nfld/L, Maritimes, s to Gt Lakes, N Engl.

P. exiguum (Thurb.) Dorn

*Formerly *Oryzopsis exigua* Thurb.

Dry open sites, open woods, rocky slopes to subalpine elevations. N America; BC, Alta, s to Calif, Nev, Utah, Colo.

P. micranthum (Trin. & Rupr.) Barkworth

*Formerly *Oryzopsis micrantha* (Trin. & Rupr.) Thurb.

Dry grasslands, gravelly slopes and banks. N America; BC, Alta to Man, s to Calif, Nev, Ariz, NMex, Tex.

P. pungens (Torr.) Dorn

*Formerly *Oryzopsis pungens* (Torr.) Hitchc.

Dry to moist sand, rocky open areas. NAmérica; Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Gt Lakes, NEngl, disjunct Wyo, Neb, Colo, NMex.

POA L. / BLUEGRASS

The following key is adapted from Soreng (2007). In the key, we refer to webbing, in the traditional way, as applying to lemmas, not calluses.

- | | | |
|---|--|------------------------|
| 1 | Culms swollen (bulbous) at base | <i>P. bulbosa</i> |
| | Culms not swollen at base | 2 |
| 2 | Anthers 0.2–1 (–1.2) mm | 3 |
| | Anthers (1.2–) 1.3–4.5 mm or longer | 10 |
| 3 | Plants annual; lemmas not webbed, keels and margins pubescent; palea keels smooth; leaves often transversely wrinkled; weedy, widespread | <i>P. annua</i> |
| | Plants not as above | 4 |
| 4 | Plants alpine, not stoloniferous or rhizomatous; culms mostly 1–15 cm; panicles 1–5 cm, contracted, congested | 5 |
| | Plants not as above | 6 |
| 5 | Lemmas glabrous or keel and marginal nerves sparsely puberulent; spikelets 3–4 mm; lemmas 2.5–3 mm | <i>P. lettermannii</i> |
| | Lemmas short- to long-villous on marginal veins and keel; spikelets 4–6.5 mm; lemmas 3–4.6 mm | <i>P. abbreviata</i> |

6	Sheaths closed for 1/10–1/5 of their length	7
	Sheaths closed for 1/5–9/10 of their length	8
7	Ligules 1–5 mm	<i>P. glauca</i>
	Ligules to 1 mm	<i>P. nemoralis</i>
8	Panicles 2–8 cm, branches 1–3 (–4) cm, usually ascending or weakly spreading; lower glumes 1–3-veined	<i>P. laxa</i>
	Panicles 2.5–15 cm, branches 2–8 cm, spreading to reflexed; lower glumes 1-veined	9
9	Lower glumes generally subulate, occasion- ally lanceolate, keels usually scabrous	<i>P. leptocoma</i>
	Lower glumes generally narrowly to broadly lanceolate, keels smooth	<i>P. paucispicula</i>
10	Plants alpine, not stoloniferous or rhizom- atous; culms mostly 5–15 cm; panicles 1–5 cm, congested	<i>P. abbreviata</i>
	Plants not as above	11
11	Culms and nodes strongly compressed, ge- nuculate; lower culm nodes usually exerted, differing in colour from distal parts	<i>P. compressa</i>
	Plants not as above	12
12	Plants of moist habitats, 30–100 cm tall; panicles 10–30 (–40) cm, often nodding; leaf blades generally ≥ 8 cm; lemmas 2–3 mm, distinctly webbed	<i>P. palustris</i>
	Plants not as above	13
13	Plants stoloniferous or rhizomatous	14
	Plants not rhizomatous or stoloniferous	20

- 14 Leaf blades abruptly reduced in length upwards; uppermost blades absent or vestigial; sheaths closed 1/3 of their length *P. fendleriana*
- Leaf blades generally gradually reduced in length upwards, or middle leaf blades longest; upper leaf blades present; sheaths closed 1/10–1/4 of their length 15
- 15 Lemmas webbed 16
- Lemmas not webbed 17
- 16 Culms usually decumbent; panicles open; lemmas generally >4 mm, pubescent between veins at least near base *P. arctica*
- Culms not decumbent; panicles contracted, branches erect or appressed; lemmas generally <4 mm, glabrous between veins, intermediate veins prominent *P. pratensis*
- 17 Spikelets rounded or weakly compressed, (3.8–) 4–5× longer than wide; panicles contracted; leaf sheaths closed 1/10–1/4 of their length; glumes not distinctly keeled *P. secunda*
- Plants not as above 18
- 18 Leaf sheaths closed 1/10–1/4 of their length; panicles narrowly lanceolate, contracted, spikelets congested; plants of moist saline or alkaline prairie habitats *P. arida*
- Leaf sheaths closed 1/5–9/10 of their length; panicles ovoid to pyramidal, open or loosely contracted; plants of montane to alpine areas 19

- 19 Ligules 2–7 mm; leaf blades 1–3 mm wide; lower glumes 3.5–6 mm, upper glumes 3.5–6.5 mm; plants of alpine areas *P. arctica*
- Ligules 0.5–2 mm; leaf blades 2–4.5 mm wide; lower and upper glumes much smaller; plants of montane and subalpine areas *P. wheeleri*
- 20 Lemmas webbed 21
- Lemmas not webbed 25
- 21 Cauline leaf sheaths closed $1/5$ – $3/4$ of their length 22
- Cauline leaf sheaths closed $1/20$ – $1/4$ ($-1/3$) of their length 23
- 22 Culms 8–35 cm; spikelets 4–6 mm; lower glumes equal to or longer than adjacent lemmas; anthers 0.8–1.3 mm *P. laxa*
- Culms 10–70 cm; spikelets 4–10 mm; lower glumes much shorter than adjacent lemmas; anthers 2–3.5 mm *P. cusickii*
- 23 Lemmas with lateral veins usually minutely hairy, sometimes also puberulent between veins; ligules 1–4 (-5) mm *P. glauca*
- Lemmas glabrous between veins, lemma veins rarely with a few hairs; ligules 0.2–1.5 (-3) mm 24
- 24 Glumes subulate to narrowly lanceolate, upper glumes equalling or slightly shorter than lowest lemmas; ligules 0.2–0.8 (-1) mm *P. nemoralis*
- Glumes lanceolate to broadly lanceolate, upper glumes distinctly shorter than lowest lemmas; ligules 0.5–1.5 (-3) mm *P. interior*

- 25 Lemmas and calluses glabrous 26
 Lemmas pubescent, calluses with or without hairs 27
- 26 Panicles 2–7 cm; leaf sheaths closed
 1/4–3/4 of their length; lower glumes much shorter than lowest lemmas *P. cusickii*
- Panicles 2–25 (–30) cm; leaf sheaths closed
 1/20–2/5 of their length; lowest glumes ± equalling lowest lemmas or somewhat shorter *P. secunda*
- 27 Panicles open, 2–6 cm, ± as long as wide; spikelets 4–6 mm, cordate or subcordate at base; leaf blades seldom >5 mm; ligules of distal cauline leaves 4–5 mm; plants of alpine areas *P. alpina*
- Plants not as above 28
- 28 Culms 20–60 (–100) cm; cauline leaves not greatly reduced upwards, blades thin, sheaths 1/10–1/4 of their length, ligules 2–5 mm; panicles mostly 5–20 cm; spikelets 6–10 mm, 3–3.5× longer than wide, lanceolate to narrowly ovate; lemmas 4–6 mm, keels and marginal nerves short- to long-villose, glabrous between veins or slightly pilose near base; anthers 1.2–2 mm *P. stenantha*
- Plants not as above 29

- 29 Plants often anthocyanic; culms (10-) 15-120 cm, sheaths closed 1/10-1/4 of their length, blades gradually reduced in length upwards, ligules 0.5-6 (-10) mm; panicles 2-25 (-30) cm; spikelets (4-) 5-10 mm, often subterete, generally 4-5x longer than wide; lemmas 3.5-6 mm, weakly keeled, softly puberulent to short-villous, marginal nerves likewise, areas between veins glabrous or pubescent; anthers 1.5-3 mm P. secunda
- 30
- Plants not as above
- 30 Cauline leaf sheaths closed \pm 1/3 of their length, blades strongly reduced in length upwards, 1-3 cm, sometimes absent; ligules of mid-cauline leaves 0.2-1.2 (-1.5) mm; lemmas 3-6 mm P. fendleriana
- 31
- Cauline leaf sheaths closed 1/10-1/5 of their length, blades not abruptly reduced in length upwards; ligules 0.5-5 mm; lemmas 2.2-4 mm
- 31 Culms with 1-3 nodes exerted, ligules 0.5-1.5 (-3) mm; lemmas glabrous on lateral veins and between veins P. interior
- P. glauca
- Culms with 0-1 nodes exerted, ligules 1-4 (-5) mm; lemmas usually sparsely puberulent on lateral veins, areas between veins with similar hairs or glabrous

P. abbreviata R. Br.

*Formerly *P. pattersonii* Vasey. Three subspecies; in Alberta subsp. *pattersonii* (Vasey) Å. Löve, D. Löve & B.M. Kapoor.

Stony alpine slopes. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, s to Calif, Nev, Utah, Colo. Russia.

P. alpina L. / Alpine Bluegrass

Subalpine to alpine rocky slopes, screes. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Que, Nfld/L, s to Nev, Utah, Colo, Gt Lakes. Circumpolar.

P. annua L. / Annual Bluegrass

Lawns, gardens, disturbed sites. Cultivars are used in golf-course greens. Introduced. Eurasia.

P. arctica R. Br.

Several subspecies; in Alberta subsp. *arctica* with webbed lemmas and subsp. *grayana* Á. Löve, D. Löve & B.M. Kapoor with lemmas not webbed.

Subalpine to alpine meadows, streamsides. NAmerica; Alas, Yuk, NWT, Nunavut to Greenland, BC, Alta to Nfld/L, s to Nev, Utah, NMex. Circumpolar.

P. arida Vasey / Plains Bluegrass

Plains, saline meadows. NAmerica; Alta to Man, s to NMex, Tex, Okla.

P. bulbosa L.

Plants perennial, densely tufted, not rhizomatous or stoloniferous; culms erect, 15–60 cm, bases bulbous; leaf sheaths closed 1/4 of their length, lowest with swollen bases, ligules 1–3 mm, blades flat, 1–2.5 mm wide, soon withering; panicles 3–12 cm, ovoid; spikelets 3–5 mm, florets mostly replaced by viviparous bulbils, normal florets 3–7; glumes keeled, calluses glabrous or webbed; lemmas 3–4 mm, keeled, glabrous or keels and nerves short- to long-villous, intercostal regions glabrous or puberulent; paleas scabrous, keels sometimes puberulent.

Pastures, disturbed areas. Introduced. Europe.

P. compressa L. / Canada Bluegrass

Wet meadows, disturbed areas. Introduced. Europe.

P. cusickii Vasey

Several subspecies, three in Alberta: subsp. *epilis* (Scribn.) W.A. Weber (*formerly *P. epilis* Scribn.) with panicle branches smooth or slightly scabrous and/or basal leaf blades >1.5 mm wide, lemmas glabrous; subsp. *purpurascens* (Vasey) Soreng, similar to subsp. *epilis* but with puberulent lemmas; and subsp. *pallida* Soreng with strongly scabrous panicle branches and leaf blades <1.5 mm wide. *P.* × *nematophylla* Rydb., an apomictic hybrid suspected to be between *P. cusickii* Vasey subsp. *pallida* Soreng and *P. fendleriana* (Steud.) Vasey, has been recorded in Alberta.

Dry grasslands, meadows to subalpine and alpine elevations. NAmérica; Yuk, BC, Alta, Sask, Man, s to Calif, Nev, Utah, Colo, NDak.

P. fendleriana (Steud.) Vasey

A number of subspecies; in Alberta subsp. *fendleriana*. *P.* × *nematophylla* Rydb., an apomictic hybrid suspected to be between *P. cusickii* Vasey subsp. *pallida* Soreng and *P. fendleriana* (Steud.) Vasey, has been recorded in Alberta.

Plants perennial, densely or loosely tufted, rhizomatous, rhizomes usually short and inconspicuous; culms 15–70 cm; leaf sheaths closed 1/3 of their length, ligules 0.5–1.7 mm, smooth or scabrous, blades sharply reduced in length upwards, most distal 0–3 cm, 1–3 (–4) mm wide, involute; panicles 2–12 (–30) cm, erect, contracted, narrow, branches angled; spikelets 4–8 (–12) mm, florets 2–7 (–13); glumes lanceolate, distinctly keeled, much shorter than lowest lemmas, calluses glabrous; lemmas lanceolate, 3–6 mm, keels, marginal and lateral veins glabrous or with short- to long-villous hairs, sometimes puberulent; paleas keeled, scabrous to puberulent or villous; anthers vestigial in unisexual florets, 2–3 mm in bisexual florets.

Foothills grasslands. NAmérica incl. Mex; BC, Alta, Sask, Man, s to Calif, Ariz, NMex, Tex.

P. glauca Vahl

Two subspecies; in Alberta subsp. *glauca* usually with lemmas sparsely webbed, glabrous or sericeous between veins; and subsp. *rupicola* (Nash) W.A. Weber with lemmas not webbed, puberulent between veins.

Dry to moist montane woodlands to subalpine and alpine areas. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, SDak, Gt Lakes, NEngl. SAmerica, Circumpolar.

P. interior Rydb.

Dry to moist plains, woodlands. NAmerica; Alas, Yuk, NWT, BC, Alta, Ont, Que, NY, s to Oreg, Nev, Ariz, NMex, Neb.

P. laxa Haenke

Several subspecies; in Alberta subsp. *banffiana* Soreng.

Plants perennial, tufted, lacking rhizomes and stolons; culms 10–35 cm; leaf blades 1–3 mm wide, ligules 2–4 mm; panicles 2–8 cm, lax, loosely contracted; spikelets 4–6 cm, compressed; glumes \pm as long as adjacent lemmas, lower glumes 3-nerved; lemmas 3–4.5 mm, distinctly keeled, not webbed, keels and marginal veins short-villous, usually glabrous between veins; paleas sparsely scabrous on keels; anthers 0.8–1.1 mm.

Moist alpine areas. NAmerica; BC, Alta, Mont, Idaho, Utah, Colo. Europe.

P. leptocoma Trin. / Bog Bluegrass

A probable hybrid between *P. secunda* J. Presl and *P. pratensis* L. (no subspecies specified) is known from Alberta.

Marshy ground at subalpine and alpine elevations. NAmerica; Alas, Yuk, NWT, BC, Alta, s to Calif, Ariz, NMex. eAsia.

P. lettermanii Vasey

Rocky alpine ridges and summits. NAmerica; BC, Alta, s to Calif, Nev, Utah, Colo.

P. nemoralis L.

Plants perennial, densely tufted, not rhizomatous or stoloniferous; culms 30–80 cm, erect; leaf sheaths closed 1/10–1/5 of their length, ligules usually <1 mm, blades ascending or spreading, 1–3 mm wide; panicles 7–20 cm, erect, lanceolate to ovoid, somewhat congested; spikelets 3–8 mm, florets 2–5; lemmas narrowly lanceolate, 2.5–4 mm, distinctly keeled, base sparsely webbed, keel and marginal nerves pubescent.

Low-elevation forests. Introduced. Eurasia.

P. palustris L. / Fowl Bluegrass

Moist meadows, ditches. NAmerica; Alas, Yuk, NWT, BC, Alta to Que, Nfld/L, Maritimes, s to Calif, Ariz, NMex, Neb, Mo, Gt Lakes, NEngl, s to NC. Circumboreal.

P. paucispicula Scribn. & Merr.

Plants perennial, loosely tufted, not rhizomatous or stoloniferous; culms 10–30 cm; leaf blades 1–3 mm wide, ligules 1–3 mm; panicles 2.5–10 cm, spreading to erect, open with 1–2 branches per node, sometimes reflexed or drooping; spikelets 4–6 mm, compressed; glumes keeled, smooth; lemmas purple, keeled, webbed, keels and marginal veins long-villous, intermediate veins and between veins glabrous; paleas sparsely scabrous on keels.

Mesic rocky slopes at alpine elevations. NAmerica; Alas, Yuk, NWT, BC, Alta, s to Wash, Mont, Wyo. eRussia.

P. pratensis L. / Kentucky Bluegrass

A number of subspecies recognized; in Alberta two putatively native taxa are subsp. *agassizensis* (B. Boivin & D. Löve) Roy L. Taylor & MacBryde and subsp. *alpigena* (Lindm.) Hiitonen, both with smooth

panicle branches; the former with panicles 4–8 cm, lateral lemma veins glabrous, in grasslands; the latter with panicle branches mostly 3–13 cm, lateral lemma veins short-villous or softly puberulent, alpine and subalpine areas. Also occurring in Alberta is the widely introduced subsp. *pratensis* and possibly other introduced subspecies or cultivars with scabrous panicle branches. Forms a hybrid *P. × limosa* Scribn. & T.A. Williams with *P. secunda* J. Presl subsp. *juncifolia* (Scribn.) Soreng, which has been reported from Alberta.

Wide range of habitats from low-elevation grasslands to alpine meadows, lawns, pastures and other disturbed sites. NAmerica incl. Mex; Alas, Yuk, NWT, Nunavut, Greenland, throughout Canada and US. SAmerica, Circumpolar.

P. secunda J. Presl

Two subspecies; both in Alberta: subsp. *secunda*, which includes several taxa formerly recognized as species (*P. canbyi* (Scribn.) Piper, *P. gracillima* Vasey and *P. sandbergii* Vasey), with lemmas puberulent or shortly villous, generally lax leaves, ligules of tillers 2–6 mm, occurring in drier habitats and alpine areas; and subsp. *juncifolia* (Scribn.) Soreng, which includes *P. juncifolia* Scribn. and *P. nevadensis* Vasey ex Scribn. (both formerly recognized as species), occurring in moist, often saline, habitats, with lemmas glabrous, keels and marginal nerves rarely puberulent at base, leaves generally firm, erect, and ligules of tillers 0.5–2 mm. Forms a hybrid *P. × limosa* Scribn. & T.A. Williams with *P. pratensis* L., which has been reported from Alberta.

Plants perennial, densely tufted; culms 10–120 cm, erect or slightly decumbent; leaf sheaths closed for 1/10–1/4 of their length, blades 0.4–3 mm wide, ligules 0.5–6 (–10) mm; panicles 2–25 cm, lax or erect, narrowly lanceolate to ovoid, usually contracted and congested; spikelets 4–10 mm, 4–5× longer than wide, rounded, only weakly flattened; glumes rounded on back, keels indistinct; lemmas 3.5–6 mm, weakly keeled, not webbed, glabrous or keels and marginal nerves

puberulent or short-villous, margins inrolled basally; paleas scabrous on keel; anthers 1.5–3 mm.

Various habitats from dry grasslands to saline wetlands, to open forests and mountain slopes. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta to Que, s to Calif, Ariz, NMex, Okla, Me. SAmerica.

P. stenantha Trin.

Montane woods, subalpine slopes, ridges. NAmerica; Alas, Yuk, BC, Alta, s to Oreg, Idaho, Colo. SAmerica.

P. wheeleri Vasey

Includes *P. nervosa* (Hook.) Vasey.

Plants perennial, short-rhizomatous, tufted; culms 35–80 cm; leaf blades 2–3.5 mm wide, ligules 0.5–2 mm; panicles 5–12 (–18) cm, ovoid or pyramidal, erect or nodding, loosely contracted to open; spikelets 5.5–10 mm, 3.5× longer than wide, flattened; glumes keeled, distinctly shorter than adjacent lemmas, calluses glabrous; lemmas 3–6 mm, keeled, keels and marginal veins glabrous or puberulent to short-villous, usually glabrous or hispidulous between veins; paleas scabrous on keels; anthers usually vestigial, 0.1–0.2 mm.

Moist montane coniferous forests, meadows. NAmerica; BC, Alta, Sask, Man, s to Calif, Ariz, NMex.

PODAGROSTIS (GRISEB.) SCRIBN. & MERR.

A segregate of *Agrostis* L.

Plants perennial, cespitose; culms erect or decumbent at base; leaves mainly basal, sheaths open, smooth, auricles absent, ligules membranous, blades flat or involute; panicles exserted, not disarticulating; spikelets pedicellate, weakly compressed laterally, florets 1; glumes equal or lower longer; lemmas membranous, apices truncate to rounded, awned or not; paleas >1/2 length of lemmas, 2-veined; anthers 2; caryopses shorter than lemmas.

P. humilis (Vasey) Björkman / Alpine Bent Grass

*Formerly *Agrostis humilis* Vasey.

Moist subalpine and alpine areas. N America; Alas, BC, Alta, s to Calif, Ariz, Colo.

POLYPOGON DESF.

P. monspeliensis (L.) Desf. / Rabbitfoot Grass

Dry stream banks. Introduced. Eurasia.

PSATHYROSTACHYS NEVSKI

A segregate of *Elymus* L.

Plants perennial, cespitose, stoloniferous or rhizomatous; sheaths of basal leaves closed, proximally shredding in age, open distally, auricles present or absent, ligules membranous; inflorescences terminal spikes, 2–3 spikelets per node; glumes equal or unequal, obscurely 1-veined, awned; lemmas elliptic, rounded on backs, 5–7-veined, glabrous or pubescent, awn straight or divergent; paleas equal or slightly longer than lemmas; caryopses tightly enveloped by lemmas.

P. juncea (Fisch.) Nevski / Russian Wild Rye

*Formerly *Elymus junceus* Fisch.

Dry, often saline, pastures, disturbed areas. Introduced. Eurasia.

PSEUDOROEGNERIA (NEVSKI) Á. LÖVE /

BLUEBUNCH WHEATGRASS

Formerly included in *Agropyron* L.

Plants perennial, sometimes rhizomatous; culms usually erect; leaves basal and cauline, sheaths open, auricles prominent, ligules membranous, blades flat to somewhat involute; inflorescence terminal spikes, 1 spikelet per node; glumes unequal; lemmas faintly 5-veined, with or without awns, awns terminal, straight or bent and divergent.

P. spicata (Pursh) Á. Löve

*Formerly *Agropyron spicatum* (Pursh) Scribn. & J.G. Sm. Varieties previously recognized based on the presence or absence of an awn are no longer worthy of taxonomic recognition.

Dry to mesic grasslands, foothills. NAmerica incl. Mex; Yuk, BC, Alta, Sask, Man, s to Calif, Ariz, NMex, SDak.

PUCCINELLIA PARL.

Glumes rounded on back; lemmas 1.5–
2.0 mm, apex rounded to truncate; anthers
<1 mm; lower branches often reflexed

P. distans

Glumes ± keeled; lemmas 2–3 mm, apex
abruptly triangular; anthers >1 mm; lower
branches seldom reflexed

P. nuttalliana

P. distans (Jacq.) Parl.

A native species, *P. hauptiana* (V.I. Krecz.) Kitag. previously recognized, with collections from Alaska, Yukon, Saskatchewan and Alberta, is included here in *P. distans* (Jacq.) Parl., which thus includes both native and introduced components. The relationship of Alberta native material to the introduced Eurasian *P. distans* requires further investigation.

Saline areas, shores, disturbed areas. NAmerica; Alas, Yuk, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Neb, Iowa, Gt Lakes, NEngl, NJ. More or less circumpolar.

P. nuttalliana (Schult.) Hitchc.

Includes the formerly recognized *P. cusickii* Weath.

Moist alkaline areas. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Que, Maritimes, s to Calif, Ariz, NMex, Kans, Gt Lakes.

SCHEDONNARDUS STEUD.

S. paniculatus (Nutt.) Trel. / Tumble Grass

Dry plains, disturbed areas. N America incl. Mex; Alta, Sask, Man, s to Ariz, NMex, Tex, La.

SCHEDONORUS P. BEAUV.

Included in *Festuca* in earlier Alberta works but now considered to be distinct and more closely related to *Lolium*.

Plants perennial, caespitose; culms decumbent to erect; leaves with sheaths open, auricles present, usually clasping, falcate, ligules membranous, blades flat; inflorescences terminal panicles; spikelets laterally compressed; glumes membranous, 3–7-veined, awnless; lemmas rounded on back, 3–7-veined, awned or awnless; paleas keeled, ciliate; anthers 3; ovaries glabrous.

Auricles ciliate (may be sparse, check several leaves); panicle branches at lowest node usually paired, the shorter with 1–13 spikelets; lemmas awnless or with awn to 4 mm

S. arundinaceus

Auricles glabrous; panicle branches at lowest node usually 1, if 2, shorter with 1–3 spikelets; lemmas awnless or with mucronate tip to 0.2 mm

S. pratensis

S. arundinaceus (Schreb.) Dumort.

*Formerly *Festuca arundinacea* Schreb.

Culms 150 (–200) cm; leaf blades 10–30 cm × 4–12 mm, ligules 1–2 mm; panicles 10–35 cm; spikelets 8–16 mm, florets 3–6 (–9); glumes mostly 3–9 mm; lemmas mostly 4–9 mm, scabrous or hispidulous at least distally, with or without awn; anthers 2.5–4 mm.

Pastures, hay fields, disturbed areas. Introduced. Eurasia.

S. pratensis (Huds.) P. Beauv. / Meadow Fescue

*Formerly *Festuca pratensis* Huds.

Pastures, hay fields, an escape on roadsides and disturbed areas. Introduced. Eurasia.

SCHIZACHNE HACK.

S. purpurascens (Torr.) Swallen / False Melic

Moist woodlands, northern prairies. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Utah, NMex, Neb, Iowa, Gt Lakes, NEngl, Ky. eRussia.

Schizachyrium Nees

S. scoparium (Michx.) Nees / Little Bluestem

Three varieties; in Alberta var. *scoparium*.

Prairies, grasslands. NAmerica incl. Mex; BC, Alta to Que, NB, s to Ariz, NMex, Tex, La, Miss, Ala, Fla.

SCOLOCHLOA LINK

S. festucea (Willd.) Link

Shallow water, marshes, vernal pools. NAmerica; Alas, Yuk, NWT, BC, Alta to Man, s to Oreg, Idaho, Wyo, Neb, Iowa. Eurasia.

SECALE L.

S. cereale L. / Rye

An escape from cultivation, disturbed areas. Introduced. Eurasia.

SETARIA P. BEAUV. / BRISTLY FOXTAIL

- | | | |
|---|-----------------------------------|------------------|
| 1 | Bristles below each spikelet 4–12 | <i>S. pumila</i> |
| | Bristles below each spikelet 1–3 | 2 |

- 2 Upper lemmas smooth and shiny, occasionally obscurely rugose; spikelets 3 mm S. italica
- Upper lemmas rugose, dull; spikelets 1.8–2.2 mm S. viridis

S. italica (L.) P. Beauv. / Foxtail Millet

Plants annual; culms 1–10 cm; leaf blades $\leq 20 \times 1-3$ cm, flat, scabrous; panicles spike-like, 8–30 cm, dense; bristles 1–3, ≤ 12 mm; spikelets ± 3 mm; glumes 3–7-veined; fertile lemmas 2.2–2.8 mm; lower paleas absent or 1/2 as long as adjacent lemmas.

Fields and pastures, disturbed areas. Introduced. Eurasia.

S. pumila (Poir.) Roem. & Schult. / Yellow Foxtail

*Formerly *S. glauca* (L.) P. Beauv. Two subspecies; in Alberta subsp. *pumila*.

Lawns, fields, disturbed areas. Introduced. Europe.

S. viridis (L.) P. Beauv. / Green Foxtail

Two subspecies; in Alberta subsp. *viridis*.

Fields, disturbed areas. Introduced. Eurasia.

SPARTINA SCHREB. / CORD GRASS

Glumes scabrous, awned; ligules usually 2–3 mm S. pectinata

Glumes long-ciliate, awnless; ligules usually ± 1 mm S. gracilis

S. gracilis Trin. / Alkali Cord Grass

Saline meadows, marshes. N America incl. Mex; NWT, BC, Alta to Man, s to Calif, Ariz, NMex, Kans.

S. pectinata Link / Prairie Cord Grass

Saline shores, marshes. NAmerica; NWT, Alta to Nfld/L, Maritimes, s to Oreg, Utah, NMex, Tex, La, Tenn, NC.

SPHENOPHOLIS SCRIBN. / WEDGE GRASS

Panicle open, lax, nodding; second glume
± 3× long as wide, pointed or rounded, not
hooded

S. intermedia

Panicle dense, usually spike-like, erect or
nearly so; second glume nearly as broad as
long, rounded and ± hooded at summit

S. obtusata

S. intermedia (Rydb.) Rydb. / Slender Wedge Grass

Moist meadows, shores, disturbed areas. NAmerica; Alas, NWT, BC, Alta to Nfld/L, Maritimes, s to Ariz, NMex, Tex, La, Miss, Ala, Fla.

S. obtusata (Michx.) Scribn. / Prairie Wedge Grass

Moist meadows, shores, open woods. NAmerica incl. Mex; BC, Alta to NB, s throughout US. Caribbean.

SPOROBOLUS R. BR. / DROPSEED

Perennial; culms 30–80 cm; leaf sheaths
with conspicuous tuft of hairs at summit;
mature panicle usually open and spreading

S. cryptandrus

Annual; culms 5–30 cm; leaf sheaths gla-
brous or sparsely pilose near collar, upper
often inflated; panicle spike-like, mostly
included in sheath

S. neglectus

S. cryptandrus (Torr.) A. Gray / Sand Dropseed

Dry, sandy soils. NAmerica incl. Mex; BC, Alta to Que, s throughout US although sporadic in seUS.

S. neglectus Nash

Dry, open, sandy disturbed areas. N America; Alta to Que, s to Ariz, NMex, Tex, La, Ala, Va.

THINOPYRUM Á. LÖVE

All species introduced.

Plants perennial, cespitose or rhizomatous; culms 10–250 cm; leaf sheaths open, glabrous or ciliate, ligules membranous; spikelets 1 per node, appressed or ascending, often diamond-shaped and arching out; glumes lanceolate to rectangular, tapering beyond midlength, indurate or coriaceous, 4–9-veined, awnless; lemmas 5-veined, coriaceous, apices truncate, obtuse or acute, mucronate or awned to 3 cm; anthers 3, 2.5–12 mm.

Plants rhizomatous; midveins of glumes slightly longer and more pronounced than lateral veins; lemmas 7.5–10 mm T. intermedium

Plants lacking rhizomes; midveins of glumes equal in length and prominence to lateral veins; lemmas 7–12 mm T. ponticum

T. intermedium (Host) Barkworth & D.R. Dewey

Plants rhizomatous, often glaucous; culms 50–115 cm; leaf sheaths mostly glabrous, margins sometimes ciliate, ligules 0.1–0.8 mm; spikelets 11–18 mm, florets 3–10; glumes oblong, weakly keeled distally, scabrous distally, lower 4.5–7.5 mm, upper 5.5–8.5 mm, 5–7-veined; lemmas 7.5–10 mm, glabrous or hairy, occasionally awned to 5 mm; paleas 7–9.5 mm, keels scarious for 1/2 their length; anthers 5–7 mm.

Hay fields, pastures, disturbed areas. Used in erosion stabilization. Introduced. Eurasia.

T. ponticum Barkworth & D.R. Dewey

Plants lacking rhizomes, cespitose; culms 50–200 cm, glabrous; leaf sheaths ciliate on lower margins, ligules 0.3–1.5 mm; spikes 10–42 cm; spikelets 13–30 mm, florets 6–12; glumes oblong, glabrous, 5–9-veined, lateral and midveins equal in length and prominence, lower 6.5–10 mm, upper 7–20 mm; lemmas 7–12 mm, glabrous; paleas 7.5–11 mm, keels ciliate; anthers 4–6 mm.

Dry, saline disturbed sites. Introduced. Eurasia.

TORREYOCHLOA G.L. CHURCH

Formerly included in *Puccinellia* Parl. or sometimes *Glyceria* R. Br. but not closely related to either.

Plants perennial, rhizomatous, rooting at nodes; culms usually erect; leaf sheaths open, auricles absent, ligules membranous, blades flat; panicles terminal; spikelets pedicellate, florets 2–8; glumes unequal, shorter than lowest lemmas, rounded or weakly keeled, awnless; lemmas rounded pubescent proximally, 5–9-veined, veins parallel, awnless; paleas 2-veined; ovaries usually hairy.

T. pallida (Torr.) G.L. Church

*Formerly *Glyceria pauciflora* J. Presl or *Puccinellia pauciflora* (J. Presl) Munz. Three varieties; in Alberta var. *pauciflora* (J. Presl) J.I. Davis.

Culms 40–100 cm; leaf blades thin, flat, mostly 8–15 cm × 4–12 mm, sheaths open, ligules 5–6 mm; panicle open or rather dense, nodding, 10–20 cm; spikelets 4–5 mm, often purplish; glumes 1–2 mm, second glume 3-nerved, margins erose-scarious; lemmas 2–2.5 mm, with 5 prominent nerves and usually 2 faint marginal ones, tip rounded or truncate, broadly scarious and sometimes erose.

Marshes, lake margins, streams. N America; Alas, Yuk, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Gt Lakes, N Engl, s to Mo, Ga. e Asia.

TRISETUM PERS.

- | | | |
|---|---|----------------------|
| 1 | Awnless or with awn <2 mm and hidden by glumes | <i>T. wolffii</i> |
| | Awned, awn exerted and bent | 2 |
| 2 | Panicle dense, spike-like, sometimes slightly interrupted below; first glume lanceolate, abruptly acuminate; culms densely tufted | <i>T. spicatum</i> |
| | Panicle loose and open or contracted but not spike-like; first glume attenuate-acuminate; culms in small tufts or solitary | 3 |
| 3 | Second glume 3.5–4.5 mm, erose near apex, ± 2× as long as first | <i>T. cernuum</i> |
| | Second glume 4–7 mm, not erose at apex, <2× as long as first | 4 |
| 4 | Spikelets yellowish; ligules 0.5–1.0 mm; ovary usually glabrous | <i>T. flavescens</i> |
| | Spikelets green- or purple-tinged; ligules 1.0–4.0 mm; ovary pubescent | <i>T. canescens</i> |

T. canescens Buckley / Tall Trisetum

Moist to dry forests, stream banks. NAmerica; BC, Alta, s to Calif, Nev, Utah, NMex.

T. cernuum Trin. / Nodding Trisetum

Moist woods, stream banks. NAmerica; Alas, BC, Alta, s to Calif, Idaho, Mont.

T. flavescens (L.) P. Beauv.

Pastures, disturbed areas. Introduced. Eurasia, nAfrica.

T. spicatum (L.) K. Richt. / Spike Trisetum

Open woods, mountain slopes, alpine tundra. NAmerica incl. Mex; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Gt Lakes, NEngl. Circumpolar.

T. wolfii Vasey

Moist woods, meadows, streamsides. NAmerica; BC, Alta, Sask, s to Calif, Nev, Utah, NMex.

TRITICUM L.

T. aestivum L. / Common Wheat

An escape from cultivation. Introduced. Asia.

VAHLODEA FR.

V. atropurpurea (Wahlenb.) Fr. *ex* Hartm.

Moist woodlands, meadows, streamsides. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, s to Calif, Idaho, Colo, NEngl. Circumboreal, SAmerica.

VULPIA C.C. GMEL.

V. octoflora (Walter) Rydb. / Six-weeks Fescue

Three varieties; in Alberta var. *octoflora*.

Grasslands, open woods, depleted rangelands, disturbed areas. NAmerica incl. Mex; BC, Alta, Sask, Ont, s throughout US.

ZIZANIA L.

Z. aquatica L. / Wild Rice

Marshes, streams, lakes. Introduced in wNAmerica from eNAmerica.

POTAMOGETONACEAE / Pondweed Family

Leaves all submersed or some floating; stipule sheaths of submersed leaves free from leaf blade, if attached, attachment $<1/2$ length of stipule; peduncle stiff, flowers sometimes projecting above water

Potamogeton

Leaves all submersed; stipule sheaths of submersed leaves attached to leaf blade for $\geq 2/3$ length of stipule; peduncle lax, flowers not projecting above water

Stuckenia

POTAMOGETON L. / PONDWEED

Most *Potamogeton* species in Alberta hybridize freely, many of which have been named (e.g., *P. alpinus*). No useful purpose would be served by their enumeration here.

Leaves submersed or some floating; submersed leaves sessile or petiolate, flat; floating leaves all petiolate; stipules free or in some submersed leaves stipules attached to base of leaf blade for $<1/2$ length of stipule; floating blades elliptic to ovate, margins entire; inflorescence submersed or emersed, peduncles stiff.

- | | | |
|---|---|--------------|
| 1 | Submersed leaves with stipular sheaths adnate to leaf base, $\pm 1/4$ of sheath attached | P. robbinsii |
| | Submersed leaves with stipular sheaths free from leaf base or only $1/5$ of sheath attached | 2 |
| 2 | Submersed leaves mostly <5 mm wide | 3 |
| | Submersed leaves >5 mm wide | 9 |

3	Floating leaves present, 2–6 cm wide, base cordate to rounded; submersed leaves 10–20 cm × 1–2 mm	<i>P. natans</i>	
	Floating leaves absent		4
4	Leaves with 15–35 nerves; stem flattened; fruits 4–5 mm	<i>P. zosteriformis</i>	
	Leaves with 3–7 nerves; stems terete or only slightly flattened; fruits smaller		5
5	Stipules fibrous, strongly ribbed, becoming shredded		6
	Stipules membranous, not shredding		7
6	Leaves flat with 5–7 nerves, abruptly narrowed to a blunt tip	<i>P. friesii</i>	
	Leaves revolute with 3–5 nerves, tapered to a slender tip	<i>P. strictifolius</i>	
7	Leaves generally 2–3 mm wide; fruits 3–4 mm	<i>P. obtusifolius</i>	
	Leaves generally <1.5 mm wide; fruits 2–2.5 mm		8
8	Nodes usually without glands, peduncles clavate; fruits with sharp, wavy dorsal keel	<i>P. foliosus</i>	
	Nodes usually with glands, peduncles not markedly clavate; fruits with a low dorsal keel	<i>P. pusillus</i>	
9	Leaves minutely toothed; fruit with beak 2–3 mm and prominent basal appendage	<i>P. crispus</i>	
	Leaves usually entire; fruit with beak ≤1.5 mm		10

- | | | |
|----|---|-----------------|
| 10 | Floating leaves absent; submersed leaves with blades rounded-cordate at clasping base | 11 |
| | Floating and submersed leaves generally present; submersed leaves petioled or tapering to a sessile base, scarcely clasping | 13 |
| 11 | Submersed leaves long-petiolate, blades elliptic | P. nodosus |
| | Submersed leaves essentially sessile, bases clasping, blades linear-lanceolate to ovate-lanceolate | 12 |
| 12 | Stipules conspicuous, white, persistent; leaves linear-lanceolate to oblong, usually >10 cm | P. praelongus |
| | Stipules inconspicuous, soon disintegrating; leaves ovate-lanceolate to narrowly lanceolate, usually <10 cm | P. richardsonii |
| 13 | Submersed leaves not markedly different from floating leaves; plants generally reddish when fresh | P. alpinus |
| | Submersed leaves and floating leaves markedly dissimilar; plants generally greenish | P. gramineus |

P. alpinus Balb.

Produces hybrids of intermediate morphology with *P. gramineus* L. (*P. × nericus* Hagstr.), *P. nodosus* Poir. (*P. × subobtusus* Hagstr.), *P. perfoliatus* L. (*P. × prussicus* Hagstr.) and *P. praelongus* Wulfen (*P. × griffithii* A. Benn.).

Ponds, lakes, slow-moving streams. N America; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, SDak, Gt Lakes, NJ, N Engl, Calif, Nev, Utah, Colo. Circumpolar.

P. crispus L.

Quiet waters, lakes, ponds, streams. Introduced. Eurasia.

P. foliosus Raf.

Two subspecies; in Alberta subsp. *foliosus*.

Lakes, streams. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta to Maritimes, s throughout US. CAmerica.

P. friesii Rupr.

Hybridizes with *P. pusillus* L. and *P. obtusifolius* Mert. & W.D.J. Koch.

Lakes, slow-flowing streams. NAmerica; Alas, Yuk, NWT, BC, Alta to Maritimes, Wash, Idaho, Mont, Wyo, NDak, SDak, Neb, Gt Lakes, NEngl, Utah. Circumpolar.

P. gramineus L.

Ponds, lakes, streams, rivers. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, Colo, Kans, Iowa, Ky, Md. Circumpolar.

P. natans L.

Slow-flowing waters of ponds, lakes, streams. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Wyo, NDak, SDak, Neb, Iowa, Gt Lakes, NJ, NEngl, Calif, Nev, Utah, Colo, Kans, WV, Ariz, NMex. Circumpolar.

P. nodosus Poir.

Stems sparingly branched; leafblades all elliptical, light green adaxially; submersed leaves thin, dark to light green, linear-lanceolate, 9–20 cm, 7–15-nerved, cuneate at base, petioles 5–20 cm; floating leaves elliptic, 3–11 cm, 9–21-nerved, cuneate at base, petioles 5–20 cm; peduncles 5–10 cm; spikes dense, 3–15 cm; fruits reddish or brownish when mature, ± 4 mm, keels prominent, often roughened with hard points, beak short.

Clear to turbid water, lakes, ponds, rivers. NAmerica incl. Mex; BC, Alta, Sask, Ont, Que, NB, s throughout US. Eurasia, SAmerica.

P. obtusifolius Mert. & W.D.J. Koch

Lakes, slow-moving streams. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Wash, Mont, Wyo, Gt Lakes, NJ, NEngl. Eurasia.

P. praelongus Wulfen / White-stem Pondweed

Deep water. NAmerica incl. Mex; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, SDak, Neb, Iowa, Gt Lakes, NJ, NEngl, Calif, Utah, Colo.

P. pusillus L.

Three subspecies, two in Alberta: subsp. *pusillus* with an interrupted inflorescence, obovoid fruits and connate stipules; and subsp. *tenuissimus* (Mert. & W.D.J. Koch) R.R. Haynes & Hellq. with a continuous inflorescence, ovoid fruits and convolute stipules.

Shallow water, lakes, streams. NAmerica incl. Mex; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, s throughout US. Circumpolar.

P. richardsonii (A. Benn.) Rydb. / Clasping-leaf Pondweed

Lakes, streams, rivers. NAmerica; Alas, Yuk, NWT, BC, Alta to Maritimes, s to Calif, Nev, Utah, Colo, Neb, Iowa, Gt Lakes, NEngl.

P. robbinsii Oakes

Ponds, lakes, slow-moving rivers. NAmerica; Alas, Nunavut, BC, Alta to Maritimes, Wash, Oreg, Idaho, Mont, Wyo, Gt Lakes, NJ, NEngl, Calif, Utah.

P. strictifolius A. Benn.

Lakes, slow-moving streams. NAmerica; Yuk, Alta to Que, NB, s to Utah, Wyo, NDak, SDak, Neb, Gt Lakes, NEngl, disjunct Va.

P. zosteriformis Fernald

Lakes, ponds, slow-moving streams. N America; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Utah, Kans, Gt Lakes, NJ, N Engl.

STUCKENIA BÖRNER

A segregate of *Potamogeton* L.

Leaves all submersed, sessile, linear, channelled, stipules adnate to blade base for 2/3 length of stipule or more; inflorescences submersed, peduncles flexible.

- | | | |
|---|--|----------------------|
| 1 | Stipular sheaths conspicuous, loose, 2–5 cm long, much wider than stem | <i>S. vaginata</i> |
| | Stipular sheaths inconspicuous, 0.5–2 cm long, ± as wide as stem | 2 |
| 2 | Fruit 2–3 mm, almost beakless; leaves mostly rounded or obtuse at apex | <i>S. filiformis</i> |
| | Fruit 3–4 mm, beaked; leaves with long tapering apices | <i>S. pectinata</i> |

S. filiformis (Pers.) Börner

*Formerly *Potamogeton filiformis* Pers. Several subspecies recognized; two in Alberta: subsp. *occidentalis* (J.W. Robbins) R.R. Haynes, Les & M. Král, with stems 20–100 cm, stipules inflated on proximal portions of stem, disintegrating; and subsp. *alpina* (Blytt) R.R. Haynes, Les & M. Král, with stems 10–30 cm, stipules on proximal portions of stem clasping or slightly enlarged, persistent.

Ponds, lakes, streams, shallow and deep water. N America; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, s to Calif, Ariz, NMex, Neb, Gt Lakes, NJ, N Engl. Circumpolar.

S. pectinata (L.) Börner / Sago Pondweed

*Formerly *Potamogeton pectinatus* L.

Usually in shallow water. Produces an abundance of tubers, which are said to be an important food for ducks. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s throughout US except Miss, Ga, SC. Circumpolar.

S. vaginata (Turcz.) Holub / Large-sheath Pondweed

*Formerly *Potamogeton vaginatus* Turcz.

Deep water. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Ont, Wash, Oreg, Idaho, Mont, Wyo, NDak, SDak, Minn, Wisc, Utah, Colo. Eurasia.

RUPPIACEAE

RUPPIA L.

R. cirrhosa (Petagna) Grande / Widgeon Grass

*Formerly *R. maritima* L., a different species, which in North America has a coastal distribution contrasting with the inland distribution of *R. cirrhosa*.

Plants aquatic herbs, rooting at proximal nodes; stems to 55 cm; leaves 3–45 cm, blades linear, 0.2–0.5 mm wide, apices acute; inflorescences initially enclosed by sheathing leaf bases, terminal spikes appearing subumbellate; flowers hypogynous, hermaphroditic, perianth absent; stamens 2, bilocular, separated by broad connective; carpels 4–6, ovules solitary; fruits drupaceous, 1.5–2.0 mm.

Shallow to deep fresh water with high sulphur or calcium content. NAmerica; Alas, Yuk, NWT, BC, Alta to Man, s to Calif, Ariz, NMex, Tex, Mo, Gt Lakes. CAmerica, SAmerica, Eurasia.

RUSCACEAE

A segregate of Liliaceae.

Plants trees to rhizomatous herbs, occasionally with phylloclades (*Ruscus*); leaves alternate, simple, entire, venation parallel, exstipulate; inflorescences various; flowers bisexual, hypogynous, actinomorphic; tepals 4 or 6, distinct or connate, petaloid; stamens 4 or 6, often adnate to petals; carpels 2 or 3, connate, superior, placentation axile; stigmas 1; ovules 2 or few in each locule; fruit usually a berry. Lily-of-the-valley (*Convallaria*) belongs to this family.

MAIANTHEMUM F.H. WIGG.

Includes *Smilacina* Desf., which was formerly recognized as distinct.

Plants herbs, perennial, rhizomatous; stems erect; cauline leaves 3–12, distichous, sessile, clasping or short-petioled; inflorescences panicles or racemes; flowers white, few to many; perianth segments 4 (by reduction) or 6, distinct, in 2 similar series; stamens 4–6, inserted on perianth segment bases; ovary superior, 2–3-carpellate, placentation axile; fruits baccate, red at maturity; seeds 1–4.

- | | | |
|---|--|--------------|
| 1 | Flowers 2-merous | M. canadense |
| | Flowers 3-merous | 2 |
| 2 | Stems 30–100 cm; inflorescences paniculate; flowers ≤ 50 ; tepals inconspicuous | M. racemosum |
| | Stems 10–40 (–50) cm; inflorescences racemose; flowers < 50 ; tepals evident, 2–4 mm | 3 |

3 Leaves generally 3 (2–4), sessile, tapering at base; immature berries green with red spots; plants of wet woods and bogs, usually in sphagnum moss M. trifolium

Leaves generally 8–11, sessile, clasping at base; immature berries green with black stripes; plants of dry open woods, prairies and sand dunes M. stellatum

M. canadense Desf. / Wild Lily-of-the-valley

Two varieties; in Alberta var. *interius* Fernald.

Moist woods. NAmerica; Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Mont, Wyo, NDak, SDak, Neb, Gt Lakes, NEngl, s to Ga.

M. racemosum (L.) Link / False Solomon's-seal

*Formerly *Smilacina racemosa* (L.) Desf. Two subspecies; in Alberta subsp. *amplexicaule* (Nutt.) LaFrankie.

Damp woods, thickets. NAmerica incl. Mex; Alas, NWT, BC, Alta to Nfld/L, Maritimes, s throughout US.

M. stellatum (L.) Link / Star-flowered Solomon's-seal

*Formerly *Smilacina stellata* (L.) Desf.

Dry open woods, prairies, sand dunes. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s throughout US except Ark and coastal states Tex to NC.

M. trifolium (L.) Sloboda / Three-leaved Solomon's-seal

*Formerly *Smilacina trifolia* (L.) Desf.

Bogs, wet woods, usually in sphagnum moss. NAmerica; Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Gt Lakes, NJ, NEngl. Asia.

SCHEUCHZERIACEAE

SCHEUCHZERIA L.

S. palustris L.

Cold bogs, fens. N America; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Idaho, Mont, NDak, Iowa, Gt Lakes, NJ, NEngl, WVa. Circumpolar.

SPARGANIACEAE / Bur-reed Family

SPARGANIUM L. / BUR-REED

- | | | |
|---|---|-----------------------|
| 1 | Stigmas 2; achenes broadly obpyramidal, somewhat truncate at top when mature | <i>S. eurycarpum</i> |
| | Stigmas 1; mature achenes ellipsoid, tapering at each end | 2 |
| 2 | Achene beak absent or <1.5 mm; staminate head solitary | 3 |
| | Achene beak 1.5–5 mm; staminate heads 1–several | 4 |
| 3 | Achenes beakless or <0.5 mm; staminate head adjacent to upper pistillate head; leaves 1–5 mm wide, opaque, often yellowish | <i>S. hyperboreum</i> |
| | Achene beaks 0.5–1.5 mm; staminate head distant from upper pistillate head; leaves 2–8 mm wide, translucent, usually dark green | <i>S. natans</i> |
| 4 | Leaves and inflorescences emergent, stiff, erect | 5 |
| | Leaves and inflorescences limp | 6 |

- | | | |
|---|--|------------------|
| 5 | Staminate heads 1 (–2); achene beak 1.5–2 mm, straight | S. glomeratum |
| | Staminate heads 3–7; achene beak 2.5–4.5 mm, straight or curved | S. emersum |
| 6 | Inflorescence branched, pistillate spikes 1–2, tepals often with prominent apical dark spot | S. fluctuans |
| | Inflorescence not branched, pistillate spikes 1–6, tepals lacking an apical dark spot | 7 |
| 7 | Staminate heads, some or all not contiguous; achene beaks 2.5–4.5 mm, straight or curved | S. emersum |
| | Staminate heads contiguous, appearing as an elongate head; achene beaks 1.5–2.0 mm, straight | S. angustifolium |

S. angustifolium Michx.

Shallow lakes, ponds, streams. NAmerica; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, Gt Lakes, NEngl, Calif, Nev, Utah, Colo, Ariz, NMex. Circumboreal.

S. emersum Rehmman

Plants emergent or floating, stiff or limp to 2 m; emergent leaves keeled, floating leaves partially keeled; inflorescence rachises unbranched, erect; pistillate heads 1–6, contiguous with each other or not axillary, pedunculate or sessile, 1.6–3.5 cm in fruit; staminate heads 3–7 (–10), contiguous or not, not contiguous with pistillate heads; tepals lacking subapical dark spot, apices erose; stigmas 1; fruits stipitate, fusiform, green to reddish brown, lustrous, body 3–4 × 1.5–2 mm tapering to beak, beak 2.5–4.5 mm, straight or curved; tepals attached at base, reaching equator of fruit body.

Still to flowing eutrophic and mesotrophic water, neutral to alkaline. NAmerica; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, Colo, Neb, Iowa, Gt Lakes, NEngl, s to NC. Eurasia.

S. eurycarpum Engelm. / Giant Bur-reed

Shallow water. NAmerica incl. Mex; NWT, BC, Alta to Nfld/L, Maritimes, s to Calif, Ariz, NMex, Okla, Ky, Va. eAsia.

S. fluctuans (Engelm. ex Morong) B.L. Rob.

Lakes, streams. NAmerica; BC, Alta to Nfld/L, Maritimes, Gt Lakes, NJ, NEngl.

S. glomeratum (Beurl. ex Laest.) Newman

Ponds. Possibly introduced. NAmerica; BC, Alta, Sask, Ont, Que, Nfld/L, Minn, Wisc. Circumboreal.

S. hyperboreum (Beurl. ex Laest.) Newman

Shallow alpine lakes. NAmerica; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta, Man, Ont, Que, Nfld/L. Circumboreal.

S. natans L.

*Formerly *S. minimum* (Hartm.) Fr.

Shallow water. NAmerica; Alas, Yuk, NWT, Nunavut, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, Gt Lakes, NEngl, Calif, Utah, Colo. Circumboreal except Greenland.

TOFIELDIACEAE

A segregate of Liliaceae.

Plants herbs, perennial, rhizomatous; stems simple, bracteate; leaves 2-ranked, equitant, blade linear; inflorescences terminal, mostly racemose, open or congested, rarely solitary; flowers hypogynous, tepals 6, in 2 somewhat dissimilar series, distinct; stamens usually 6, 9 (–10), filaments flattened, dilated basally; anthers bilocular, introrse; gynoecium 3 (–6), carpellate, stipitate, partially connate, styles 3 (–6); ovules numerous; fruits capsular, dehiscence septicidal, seeds with or without appendages.

Plants glabrous; pedicels solitary, bractless below flowers; seeds not appendaged Tofieldia

Plants coarsely hairy and/or glandular distally; pedicels in fascicles of 3, each with 3 bractlets subtending flowers; seeds with tail-like appendages (often obscured by inflated whitish covering) Triantha

TOFIELDIA HUDS. / FALSE ASPHODEL

T. pusilla (Michx.) Pers.

Calcareous marshes, banks, wet ledges. N America; Alas, Yuk, NWT, Nunavut, Greenland, BC, Alta to Nfld/L, Mont, Minn, Mich. Eurasia.

TRIANTHA (NUTT.) BAKER

A segregate of *Tofieldia* Huds.

Plants herbs, perennial, rhizomatous; stems glandular-pubescent; leaves mostly basal, 2-ranked or equitant, linear; inflorescences racemose, bracteate, elongating in fruit; flowers in clusters of 3; perianth segments 6, in 2 slightly dissimilar series, distinct; stamens 6, anthers basifixed bilocular; ovary superior, stipitate, styles 3; fruit a capsule; seeds appendaged.

Individual seeds enclosed in inflated, net-like envelope; coarse, non-glandular hairs below inflorescence T. occidentalis

Individual seeds not enclosed in inflated, net-like envelope; coarse, non-glandular hairs below inflorescence lacking T. glutinosa

T. glutinosa (Michx.) Baker

*Formerly *Tofieldia glutinosa* (Michx.) Pers.

Marshes, wet meadows, calcareous soils. N America; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, Oreg, NDak, Gt Lakes, NEngl, WVa, Va, Tenn, NC.

T. occidentalis (S. Watson) R.R. Gates

Three subspecies; two in Alberta: subsp. *brevistyla* (C.L. Hitchc.) Packer and subsp. *montana* (C.L. Hitchc.) Packer. Subsp. *brevistyla* has a strongly inflated (almost spherical) whitish net-like envelope surrounding each seed, and the stem below inflorescence has dome-shaped or conical glands, intermixed with cylindrical hairs 2–4× longer than wide (Jasper area). Subsp. *montana* has a whitish not strongly inflated envelope surrounding each seed, 3–4× longer than wide, the stem below inflorescence has coarse, blunt cylindrical hairs 4–6× longer than wide, and glands sparse or lacking (Waterton area). Both subspecies formerly included in *Tofieldia glutinosa* (Michx.) Pers.

Stems 10–80 cm, variously glandular hairy below inflorescence; leaves ≤50 cm × 8 mm; inflorescence 1–8 cm, globose or cylindric-ovoid, proximal flowers sometimes remote; perianth segments 3–7 mm, inner series slightly narrower, white or yellow; stamens 3–6 mm; capsule ovoid to broadly ellipsoid, 4–9 mm, longer than perianth segments; seeds ± 1 mm, appendages 1 or 2, 1 at each end, rarely absent, each enclosed in inflated whitish envelope.

Wet meadows, marshes. N America; Alas, BC, Alta, Wash, Oreg, Idaho, Mont, Wyo, Calif.

TRILLIACEAE

A segregate of Liliaceae.

Plants herbs, perennial, rhizomes horizontal, subterranean; scapes (flowering shoots) axillary or terminal, leaves (actually bracts) in whorls of 3 (technically, *Trillium* produces no true leaves or stems above ground, but it is simpler to refer to leaves and stems because they appear and function as such); inflorescence terminal, solitary, bisexual, hypogynous; sepals 3, green, distinct; petals coloured, 3, distinct;

stamens 6, in 2 whorls of 3; carpels 3, connate; fruit capsule or baccate (berry-like); seeds many, elliptic, 2–4 mm with elaiosome (aril).

TRILLIUM L. / WAKE-ROBIN

T. ovatum Pursh

Two subspecies; in Alberta subsp. *ovatum*.

Moist woods. NAmerica; BC, Alta (Waterton Lakes National Park), s to Calif, Idaho, Colo.

TYPHACEAE / Cattail Family

TYPHA L.

T. latifolia L. / Common Cattail

Marshes or shallow water. NAmerica incl. Mex; Alas, Yuk, NWT, BC, Alta to Nfld/L, Maritimes, s throughout US. CAmerica, SAmerica, Eurasia.

UVULARIACEAE

A segregate of Liliaceae.

Plants herbs, rhizomatous; leaves alternate, cauline or in a basal rosette, simple, entire, venation parallel or reticulate between main veins (*Prosartes*), stipules lacking; inflorescence terminal; flowers bisexual, hypogynous, radial; tepals 6, free, petaloid; stamens 6; carpels 3, fused, placentation axile, ovules numerous; fruit a capsule, dehiscence septicidal or loculicidal, or a berry; seeds flat, not black.

Flowers greenish white or reddish, in leaf axils

Streptopus

Flowers yellow or greenish yellow, 1–4, at ends of branches

Prosartes

PROSARTES D. DON / FAIRY-BELLS

*Formerly included in *Disporum* Salisb.

Plants perennial herbs with prominent horizontal rhizome; stems 30–80 cm tall, scaly below, leafy with few branches above; leaves sessile or clasping, ovate or lanceolate, somewhat asymmetric; flowers 1–4 at branch tips, drooping, whitish or greenish yellow, 1–1.5 cm; perianth segments 6, equal, narrow; stamens 6, anthers extrorse; ovary 3-loculed; fruit a berry, reddish at maturity, nearly flavourless.

Fruit ovoid, not papillose; stigma not 3-cleft;
leaves hairy above P. hookeri

Fruit globose, surface roughened with fine
wart-like projections; stigma usually 3-cleft;
leaves glabrous above P. trachycarpa

P. hookeri Torr.

*Formerly *Disporum hookeri* (Torr.) G. Nicholson.

Moist woods. N America; BC, Alta, Wash, Oreg, Idaho, Mont, Calif, disjunct Mich.

P. trachycarpa S. Watson

*Formerly *Disporum trachycarpum* (S. Watson) Benth. & Hook. f.

Moist woods, thickets. N America; BC, Alta to Ont, s to Ariz, NMex, Neb, Minn, Mich.

STREPTOPUS MICHX.

1 Plants 50–120 cm; flowers greenish white;
nodes glabrous S. amplexifolius

Plants <30 cm; flowers reddish; nodes
fringed 2

- 2 Perianth campanulate; leaf margins entire or with irregularly spaced, multicellular teeth *S. lanceolatus*
- Perianth rotate; leaf margins with unicellular, hyaline, closely crowded teeth *S. streptopoides*

***S. amplexifolius* (L.) DC. / Twisted-stalk**

Moist woods and thickets. NAmerica; Alas, Yuk, NWT, Greenland, BC, Alta to Nfld/L, Maritimes, Wash, Oreg, Idaho, Mont, Wyo, SDak, Gt Lakes, NEngl, s to Tenn, NC, Calif, Utah, Colo, Ariz, NMex. Europe, eAsia.

***S. lanceolatus* (Ait.) Reveal**

*Formerly *S. roseus* Michx. Produces a sterile hybrid with *S. amplexifolius* (*S. × oreopolus* Fernald), but no western occurrence has been recorded.

Moist montane forests. NAmerica; Alas, BC, Alta, Man to Nfld/L, Maritimes, Wash, Oreg, Mont, Iowa, Gt Lakes, NJ, NEngl, s to Tenn, NC.

***S. streptopoides* (Ledeb.) Frye & Rigg**

Coniferous woods. NAmerica; Alas, BC, Alta, Wash, Oreg, Idaho. eAsia.

ZANNICHELLIACEAE

ZANNICHELLIA L.

***Z. palustris* L. / Horned Pondweed**

Ponds, streams, ditches. NAmerica incl. Mex; Alas, BC, Alta to Nfld/L, Maritimes, s throughout US except Ga, SC. CAmerica, SAmerica, Eurasia, Africa, Australia.

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Geographical Abbreviations

Ala	Alabama
Alas	Alaska
Alta	Alberta
Ariz	Arizona
Ark	Arkansas
BC	British Columbia
Calif	California
CAmerica	Central America
Colo	Colorado
Conn	Connecticut
Del	Delaware
Fla	Florida
Ga	Georgia
Gt Lakes	Great Lakes
Ill	Illinois
Ind	Indiana
Kans	Kansas
Ky	Kentucky
La	Louisiana
Man	Manitoba
Mass	Massachusetts
Md	Maryland

Me	Maine
Mex	Mexico
Mich	Michigan
Minn	Minnesota
Miss	Mississippi
Mo	Missouri
Mont	Montana
NAmerica	North America
NB	New Brunswick
NC	North Carolina
NDak	North Dakota
Neb	Nebraska
NEngl	New England
Nev	Nevada
Nfld/L	Newfoundland and Labrador
NH	New Hampshire
NJ	New Jersey
NMex	New Mexico
NS	Nova Scotia
NWT	Northwest Territories
NY	New York
Okla	Oklahoma
Ont	Ontario
Oreg	Oregon
Pa	Pennsylvania
PEI	Prince Edward Island
Que	Quebec
SAmerica	South America
Sask	Saskatchewan

SC	South Carolina
SDak	South Dakota
Tenn	Tennessee
Tex	Texas
US	United States
Va	Virginia
Vt	Vermont
Wash	Washington
Wisc	Wisconsin
WVa	West Virginia
Wyo	Wyoming
Yuk	Yukon

Note: n, s, e, w or c before the abbreviation refers to the north, south, east, west or central portion of the jurisdiction, respectively.

Vascular Plants is a user-friendly, portable key to the ferns, fern allies, gymnosperms, and monocots of Alberta. This key to the species of Alberta will delight all those interested in botany, with its intuitive and exhaustive presentation of the plants, including new names and taxonomical understandings that have emerged in recent years. Designed to be carried into the field for handy reference and use, *Vascular Plants* presents:

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