

## 8.09 BECKMANNIA Host

Stephan L. Hatch

**Pl** ann and tufted, or per and rhz. **Clm** 20–150 cm, smt tuberous at the base, erect. **Lvs** mostly cauline; **shth** open, glab, ribbed; **aur** absent; **lig** memb, acute; **bld** flat, glab. **Infl** dense, spikelike pan; **br** 1-sided, rcmlly arranged, sec br few, at least some br longer than 1 cm, with closely imbricate spklt; **dis** below the glm, the spklt falling entire. **Spklt** lat compressed, circular, ovate or obovate in side view, subsessile, with 1–2 flt; **rchl** not prolonged beyond the base of the distal flt. **Glm** subequal, slightly shorter than the lm, inflated, keeled, D-shaped in side view, unawned; **cal** blunt, glab; **lm** lanceolate, inconspicuously 5-veined, unawned; **pal** subequal to the lm; **lod** 2, free; **anth** 3; **ov** glab. **Car** shorter than the lm, concealed at maturity.  $x = 7$ . Named for Johann Beckmann (1739–1811), a German botanist and author of one of the first botanical dictionaries.

*Beckmannia* is a genus of two species: an annual species usually with one fertile floret per spikelet that is native to North America and Asia, and a perennial species with two fertile florets per spikelet that is restricted to Eurasia.

1. *Beckmannia syzigachne* (Steud.) Fernald

AMERICAN SLOUGHGRASS [p. 359, 500]

**Pl** ann; tufted. **Clm** 20–120 cm. **Lig** 5–11 mm, pubescent, entire or lacerate, usu folded back; **bld** 4–10(20) mm wide, flat, scabrous. **Pan** 7–30 cm; **br** spikelike, usu 1–2 cm. **Spklt** 2–3 mm, round to ovate in side view, with 1 flt, a second undeveloped or well-developed flt occ present. **Glm** appearing inflated, strongly keeled,

3-veined, apiculate; **lm** 2.4–3.5 mm, unawned, smt mucronate; **pal** subequal to the lm, acute; **anth** 0.5–1(1.5) mm, pale yellow. **Car** shorter than 2 mm, light to medium brown.  $2n = 14$ .

*Beckmannia syzigachne* grows in damp habitats such as marshes, floodplains, the edges of ponds, lakes, streams, and ditches, and in standing water. It is a good forage grass, but frequently grows in easily damaged habitats.

## 8.10 POA L.

Robert J. Soreng

**Pl** ann or per; usu synoecious, smt monoecious, gynodioecious, dioecious, and/or asex; with or without rhz or stln, densely to loosely tufted or the clm solitary. **Bas brchg** invag, psdinvag, or exvag; **prophylls** of invag shoots 2-keeled and open, of psdinvag shoots not keeled and tubular, of exvag shoots scalelike. **Clm** 1–150 cm, hollow, usu unbrchd above the base. **Shth** from almost completely open to almost completely closed, terete or weakly to strongly compressed; **aur** absent; **lig** memb, truncate to acuminate; **bld** 0.4–12 mm wide, flat, folded, or involute, adx surfaces with a groove on each side of the midvein, other intercostal depressions shallow, indistinct, apc often prow-shaped. **Infl** usu tml pan, rarely rdcd and rcmlke. **Spklt** 2–12 mm, usu lat compressed, infrequently terete to subterete, usu lanceolate, smt ovate; **flt** (1)2–6(13), usu sex, smt bulb-forming; **rchl** usu terete, smt prolonged beyond the base of the distal flt; **dis** above the glm and beneath the flt. **Glm** usu shorter than the lowest lm in the spklt, usu keeled, 1–3(5)-veined, unawned; **cal** blunt, usu terete or slightly lat compressed, smt slightly dorsally compressed, glab or hairy, hairs often concentrated in 1(3) tufts or webs, smt distributed around the cal below the lm as a crown of hairs; **lm** usu keeled, infrequently weakly keeled or rounded, similar in texture to the glm, 5(7–11)-veined, lat veins smt faint, mrg scarious-hyaline distally, apc scarious-hyaline, truncate or obtuse to acuminate, unawned; **pal** from  $\frac{2}{3}$  as long as to subequal to the lm, distinctly 2-keeled, mrg and intercostal regions milky white to slightly greenish; **lod** 2, broadly lanceolate, glab, lobed; **fnctl anth** (1–2)3, 0.1–5 mm; **ov** glab. **Car** 1–4 mm, ellipsoidal, often shallowly ventrally grooved, solid, with lipid; **hila** sub-bas, round or oval, to  $\frac{1}{6}$  the length of the car.  $x = 7$ . Name from the Greek *poa*, 'grass'.

*Poa* includes about 500 species. It grows throughout the world, principally in temperate and boreal regions. It is taxonomically difficult because most species are polyploid, many are apomictic, and hybridization is common. A variety of sexual reproductive systems are present within the genus, although individual species are usually uniform in this regard. Apomicts derived from bisexual species usually have functional anthers; they require fertilization to stimulate endosperm (and hence seed) development. Apomicts derived from dioecious species do not require fertilization; they are normally pistillate with vestigial anthers 0.1–0.2 mm long.

Herbivores find most species of *Poa* both palatable and nutritious. *Poa fendleriana*, *P. secunda*, and *P. wheeleri* are important native forage species in western North America; *P. alpina*, *P. arctica*, and *P. glauca* are common components of alpine and arctic vegetation. Species of *Poa* sect. *Abbreviatae* are found near the limits of vegetation in both arctic and alpine regions.

Several introduced species of *Poa* are economically important. *Poa pratensis* is commonly cultivated for lawns and pasture, and is a major forage species in cooler regions of North America; *P. compressa* and *P. trivialis* are widely planted for soil stabilization and forage; *P. annua* is one of the world's most widespread weeds. *Poa bulbosa* has been cultivated; it is now widely established in the Intermountain Region.

Characteristics that may be useful for distinguishing *Poa* from other morphologically similar genera are: the two-grooved, prow-shaped blades; multiple, relatively small, unawned florets; webbed calluses; and the greenish or milky white intercostal regions of the paleas.

There is a strong correlation between the type of basal branching, prophyll structure, and blade development of the initial leaves. Extravaginal shoots have scalelike prophylls 0.5–3 mm long and initial leaves that are bladeless; intravaginal shoots have prominently keeled prophylls 10–50 mm long that are open on the abaxial side and initial leaves with well-developed blades; pseudointravaginal shoots develop intravaginally but have tubular, indistinctly keeled prophylls, and initial leaves with rudimentary blades.

In bulbiferous spikelets, the upper florets form a single tardily disarticulating offset or bulb, each lemma being thickened at the base and leaflike distally. The bulb falls as a unit, with or without the basal floret. The basal floret(s) may have pistils and stamens, and occasionally sets seed. Generally, there is a progression within an inflorescence, the earlier spikelets being bulbiferous and the later spikelets normal.

Callus hairs in *Poa* follow one of three patterns. In the most common pattern, there is an isolated dorsal tuft of crinkled or pleated hairs, the web, below the lemma keel. In a few species, additional webs may be present below the marginal veins. In the second pattern, crinkled hairs are distributed around the lemma base, but are somewhat concentrated and longer towards the back; this pattern is called a diffuse web. Webbed calluses are found only in *Poa*. In the third pattern, the hairs are straight to slightly sinuous, and more or less evenly distributed around the lemma bases; calluses with such a pattern are described as having a crown of hairs.

Two named infrasectional hybrids are included in this treatment. One, *Poa arida*, is accounted for in the key. The other, *Poa xlimosa*, is too variable to make its inclusion in the key helpful. Both are described at the end of this treatment, with comments on the probable parental taxa.

Unless stated otherwise, sheath closure is measured on the flag leaf, and ligule length on the upper 1–2 culm leaves; spikelet, floret, callus, lemma, and palea measurements are on non-bulb-forming florets; floret pubescence is evaluated on the lower florets within several spikelets; length of the callus hairs refers to their length when stretched out; anther measurements are based on functional anthers, i.e., those that produce pollen, as indicated by their being plump or, after the pollen is shed, by their open sacs. For hair lengths in the species descriptions, puberulent is to about 0.15 mm long, short-villous to about 0.3 mm long, and long-villous from 0.3–0.4+ mm long, but these are only guidelines, not discrete categories; some species are only on one end of the range, and ranges have not been confirmed for every species. In the key, no distinction is made between the different kinds of hairs. Many species key more than once, due in part to infraspecific variation.

The key below was developed by Barkworth, based on information in Soreng (2007). A multiaccess, interactive key is available at <http://utc.usu.edu/keys/IMRPoa>.

1. All or most spikelets bulbiferous, sometimes with a poorly developed floret below the bulbous plantlet; culm bases bulbous. .... 1. *P. bulbosa*
1. All or most spikelets forming only florets; culm bases not bulbous.
  2. Plants usually annual, sometimes surviving for a second season.
    3. Calluses glabrous; lemmas usually hairy over the keel and veins and glabrous between the veins, rarely glabrous throughout ..... 3. *P. annua*
    3. Calluses webbed; lemmas either completely glabrous or with hairs over the veins and sometimes between them.
      4. Lemmas glabrous over and between the keel and veins ..... 6. *P. bolanderi*
      4. Lemmas hairy over the keel and veins, glabrous or hairy between them. .... 7. *P. bigelovii*
  2. Plants perennial.
    5. Lemma backs rounded to weakly keeled over the midveins; spikelets little compressed ..... 27. *P. secunda*
    5. Lemma backs clearly keeled over the midveins; spikelets strongly laterally compressed.
      6. Calluses glabrous, even those of the lower florets in the spikelets [opposite lead on p. 111].
        7. Plants not rhizomatous; cauline blades not strongly reduced distally [opposite lead on p. 111].
          8. Sheaths of top cauline leaves closed  $\frac{1}{4}$ – $\frac{4}{5}$  their length; anthers 1.3–3.5 mm long.
            9. Culine blades 2–4.5 mm wide, flat; palea keels hairy all or most of their length, sometimes scabrous distally ..... 2. *P. alpina* (in part)
            9. Culine blades 0.5–3 mm wide, flat, folded, or involute; palea keels scabrous throughout.
              10. Panicle branches 2–4 cm long, ascending to widespread, bearing 1–2(3) spikelets; panicles with (1)6–17(22) spikelets; cauline leaf blades 0.5–1 mm wide, filiform, soon withering; anthers 1.3–3 mm; leaf sheaths closed  $\frac{2}{5}$ – $\frac{4}{5}$  their length; plants primarily of basaltic plateaus in Washington, Oregon, Idaho, and Nevada ..... 15. *P. leibergii*

10. Panicle branches 0.5–4(5) cm long, erect to steeply ascending, bearing 1–15 spikelets; panicles with 9–100 spikelets; cauline blades 0.5–3 mm wide, sometimes withering early; anthers 2–4 mm long; leaf sheaths closed  $\frac{1}{4}$ – $\frac{3}{4}$  their length; plants widespread in the Intermountain Region.
11. Lemmas hairy on the keel and marginal veins; cauline blades 0.5–1(2) mm wide, often withering early, distal blade often strongly reduced to vestigial; anthers usually 0.1–0.2 mm long, sometimes 2–3 mm long ..... 14. *P. x nematophylla*
11. Lemmas usually glabrous on the keel and marginal veins, sometimes puberulent near the base, not withering early, not strongly reduced distally; anthers usually 2–4 mm long, sometimes 0.1–0.2 mm long.
12. Sheaths closed  $\frac{1}{7}$ – $\frac{1}{3}$  their length; cauline leaf blades 1.5–3 mm wide, involute; panicle branches 0.5–1(2) cm long; lemmas 2–5 mm long ..... 16. *P. pringlei* (in part)
12. Sheaths closed  $\frac{1}{4}$ – $\frac{3}{4}$  their length; cauline blades 0.5–3 mm wide, flat, folded, or involute; panicle branches 0.5–4(5) cm long; lemmas (3)4–7 mm long ..... 13. *P. cusickii* (in part)
8. Sheaths of top cauline leaves closed  $\frac{1}{10}$ – $\frac{3}{10}$  their length; anthers 0.2–3 mm long.
13. Spikelets 6–10 mm long, lengths 3–6 times widths; panicle branches 3–15 cm long; lemmas 4–6 mm long ..... 28. *P. stenantha* (in part)
13. Spikelets 3–8(12) mm long, lengths to 3.5(3.8) times widths; panicle branches to 10 cm long; lemmas 2–4.9 mm long.
14. Spikelets 3.9–6.2 mm long, lengths 1.5–2.5 times widths; cauline blades 2–4.5 mm wide; lemmas hairy over the intercostal regions; palea keels hairy all or most of their length, sometimes scabrous distally ..... 2. *P. alpina* (in part)
14. Spikelets 3–6.5(12) mm long, lengths 2–4 times widths; cauline blades 1–3 mm wide; lemmas glabrous or hairy over the intercostal regions; palea keels scabrous for at least half their length, usually throughout.
15. Anthers 2–4 mm or 0.1–0.2 mm long; spikelets 6–8–12 mm long; lemma keels and marginal veins glabrous, scabrous, or smooth; plants unisexual; basal branching intravaginal ..... 16. *P. pringlei* (in part)
15. Anthers 0.2–2.5 mm long; spikelets 3–7(9) mm long; lemma keels and marginal veins usually hairy, sometimes glabrous; basal branching intra- or extravaginal.
16. Lemma keels and marginal veins hairy; lateral veins often hairy, sometimes glabrous; panicles 1–15(20) cm long.
17. Basal branching intravaginal; glumes longer than or subequal to the adjacent lemmas; plants 5–12(20) cm tall; panicles 1.5–5 cm long, branches erect ... 25. *P. abbreviata* (in part)
17. Basal branching extravaginal; glumes shorter than or subequal to the adjacent lemmas; plants 5–80 cm tall; panicles 1–20 cm long, branches erect to widely divergent.
18. Upper cauline node usually at  $\frac{1}{3}$ – $\frac{3}{5}$  culm height; lemmas usually glabrous over the lateral veins and intercostal region, rarely hairy over the lateral veins; ligules 0.5–1.5(3) mm long ... 21. *P. interior* (in part)
18. Upper cauline node usually at  $\frac{1}{10}$ – $\frac{1}{3}$  culm height; lemmas usually hairy over the lateral veins, hairy or glabrous over the intercostal regions; ligules 1–4(5) mm long ..... 22. *P. glauca* (in part)
16. Lemma keels and marginal veins usually glabrous, sometimes sparsely hairy; lateral veins glabrous; panicles 1–8 cm long.

19. Panicles 2–8 cm long; panicle branches 1–3(4) cm long, usually ascending to weakly spreading, rarely erect, smooth or sparsely scabrous; plants of southeastern Utah. .... 18. *P. laxa* (in part)
19. Panicles 1–4(6) cm long; panicle branches to 1.5 cm long, erect, smooth to densely scabrous; plants of California.
  20. Lower glumes usually exceeding the lower lemmas; upper florets frequently exceeded by or only slightly exceeding the glumes; anthers 0.2–0.8 mm long; spikelets 3–4 mm long ..... 24. *P. lettermanii*
  20. Lower glumes shorter than to equaling the lower lemmas; upper glumes always exceeded by the upper florets; anthers 0.3–1.6(1.8) mm long; spikelets 3.5–6 mm long ..... 26. *P. keckii*
7. Plants rhizomatous; cauline blades sometimes strongly reduced distally [opposite lead on p. 109].
  21. Culms, nodes, and basal leaf sheaths strongly compressed; plants long-rhizomatous ..... 23. *P. compressa* (in part)
  21. Culms, nodes, and basal leaf sheaths not or weakly compressed; plants often only shortly rhizomatous.
    22. Palea keels hairy at least on the distal half; lemmas hairy on the keels, marginal veins, lateral veins and between the veins.
      23. Palea keels hairy most of their length ..... 5. *P. arctica* (in part)
      23. Palea keels smooth or scabrous on the lower half ..... 29. *P. arida* (in part)
    22. Palea keels smooth or scabrous their whole length; lemmas usually glabrous or hairy only on the keel and marginal veins.
      24. Panicle branches 3–8 cm long and strongly divergent to reflexed at maturity ..... 9. *P. arnowiae*
      24. Panicle branches to 6.5 cm long, erect to weakly divergent at maturity.
        25. Sheaths of top cauline leaves closed for  $\frac{1}{10}$ – $\frac{1}{5}$  their length; plants 5–15(20) cm tall; panicles 1.5–5 cm long; panicle branches to 1.5 cm long ..... 25. *P. abbreviata* (in part)
        25. Sheaths of top cauline closed for  $\frac{1}{4}$ – $\frac{9}{10}$  their length; plants 10–80 cm tall; panicles 2–30 cm long; panicle branches 0.5–8 cm long.
          26. Cauline blades strongly reduced distally, usually involute; blade of the top cauline leaf to 1(3) cm long; sheath of top cauline leaf usually more than 9 times as long as the blade, sometimes as little as 5 times as long as the blade ..... 12. *P. fendleriana*
          26. Cauline leaves gradually reduced distally, flat, folded, or involute; blade of the top cauline leaf 0.5–10 cm long; sheath of the top cauline leaf 0.5–10 times as long as the blade ..... 10. *P. wheeleri*
  6. Calluses, at least those of the lowest florets in each spikelet, webbed [opposite lead on p. 109].
    27. Lemmas with hairy keels and glabrous marginal veins; spikelets 2.3–3.5 mm long ..... 17. *P. trivialis*
    27. Lemmas usually hairy on both the keel and the marginal veins, at least on the basal third, sometimes keel and marginal veins glabrous; spikelets (2.3)3–10 mm long.
      28. Culms, nodes, and basal sheaths strongly compressed ..... 23. *P. compressa* (in part)
      28. Culms, nodes, and basal sheaths not or only weakly compressed.
        29. Plants not rhizomatous, sometimes stoloniferous or rooting at the lower nodes.
          30. Callus hairs straight, surrounding the base of the lemma; lemma keels and marginal veins hairy ..... 28. *P. stenantha* (in part)



30. Callus hairs wrinkled, usually in one tuft at the base of the lemma midvein, sometimes somewhat distributed around the lemma base; lemma keels and marginal veins glabrous or hairy.
31. Sheaths of the top cauline leaves closed  $\frac{1}{5}$ – $\frac{3}{4}$  their length.
  32. Calluses with a diffuse web, the wrinkled hairs somewhat distributed around the base of the lemma but concentrated below the midvein; sheaths closed  $\frac{1}{4}$ – $\frac{3}{4}$  their length ..... 13. *P. cusickii* (in part)
  32. Calluses with a single web, the wrinkled hairs localized beneath the lemma midvein; sheaths closed  $\frac{1}{5}$ – $\frac{2}{3}$  their length.
    33. Panicle branches usually spreading to reflexed at maturity; cauline blades 1–4 mm wide, flat.
      34. Palea keels usually softly puberulent at midlength; lateral veins of lemmas usually softly puberulent at least on 1 side; panicle branches smooth or sparsely scabrous ..... 8. *P. reflexa*
      34. Palea keels glabrous or pectinately ciliate; lateral veins of lemmas glabrous; panicle branches usually densely scabrous, sometimes sparsely scabrous ..... 19. *P. leptocoma* (in part)
    33. Panicle branches erect to weakly divergent at maturity; cauline blades 0.8–2(3) mm wide, often involute, sometimes flat or folded.
      35. Lemma keels and marginal veins hairy, rarely glabrous; plants 5–12(20) cm tall; panicle branches to 1.5 cm long. .... 25. *P. abbreviata* (in part)
      35. Lemma keels and marginal veins usually glabrous, sometimes sparsely hairy; plants 8–35 cm tall; panicle branches 1–3(4) cm long ..... 18. *P. laxa* (in part)
  31. Sheaths of top cauline leaves closed  $\frac{1}{10}$ – $\frac{1}{5}$  their length.
    36. Culms often rooting at lower nodes; plants sometimes stoloniferous; panicles (9)13–30(41) cm long; panicle branches strongly spreading to reflexed at maturity ..... 20. *P. palustris*
    36. Culms not rooting at lower nodes; plants not stoloniferous; panicles 1–15(20) cm long; panicle branches erect to strongly spreading at maturity.
      37. Panicle branches smooth or slightly scabrous, often terete; culms 5–15(20) cm tall. .... 25. *P. abbreviata* (in part)
      37. Panicle branches moderately to densely scabrous, slender to moderately stout; culms 5–80 cm tall.
        38. Lemmas usually completely glabrous between the keel and marginal veins, occasionally sparsely hairy on the lateral veins; ligules 0.5–1.5(3) mm long. .... 21. *P. interior* (in part)
        38. Lemmas usually hairy on the lateral veins; ligules of cauline leaves 1–5 mm long ... 22. *P. glauca* (in part)
29. Plants always rhizomatous, sometimes shortly so.
  39. Lemmas hairy between the keel and marginal veins.
    40. Palea keels hairy most of their length. .... 5. *P. arctica* (in part)
    40. Palea keels smooth or scabrous  $\frac{1}{2}$  or more of their length ..... 29. *P. arida* (in part)
  39. Lemmas glabrous between the keel and marginal veins.
    41. Sheaths of top culm leaves closed  $\frac{1}{10}$ – $\frac{3}{4}$  their length ..... 29. *P. arida* (in part)
    41. Sheaths closed  $\frac{1}{4}$ – $\frac{9}{10}$  their length.

- 42. Keel and marginal veins hairy for  $\frac{1}{2}$  the length of the lemma ..... 11. *P. chambersii*
- 42. Marginal veins hairy for more than  $\frac{1}{2}$  the length of the lemma.
- 43. Ligules of cauline leaves 0.8–1(3.1) mm long; plants common in many habitats ..... 4. *P. pratensis*
- 43. Ligules of cauline leaves 1.5–6 mm long; plants of wet areas in subalpine and alpine habitats ..... 19. *P. leptocoma* (in part)

### **Poa** L. subg. **Poa**

**Pl** ann or per; smt unisex; with or without rhz or stln, densely to loosely tufted or the clm solitary. **Bas brchg** invag and/or exvag or psdinvag. **Clm** spindly to stout, terete or weakly to strongly compressed; **nd** 0–5, exserted. **Shth** terete or weakly to strongly compressed, closed only at the base or up to full length, bas shth usu glab, rarely sparsely retrorsely strigose, hairs about 0.1 mm; **lig** 0.1–18 mm, thinly memb and white to milky white or hyaline, truncate to acuminate, entire or erose to lacerate, smooth or ciliate; **bld** flat, folded, or involute, thin to thick, smooth or sparsely to densely scabrous, adx surfaces glab or hairy, hispidulous or puberulent, apc narrowly to broadly prow-shaped. **Pan** 1–41 cm, erect to nodding or lax, tightly contracted to open, with 1–100+ spklt; **br** 0.5–20 cm, erect to reflexed, terete or angled, smooth or sparsely to densely scabrous, usu glab, rarely hispidulous, with 1 to many spklt. **Spklt** 2–12 mm, subterete to strongly lat compressed, smt bulbiferous; **flt** (1)2–8(13); **rchl intnd** smooth or scabrous, glab or pubescent. **Glm** shorter than to slightly exceeding the adjacent lm, weakly to distinctly keeled, smooth or scabrous; **cal** blunt, usu terete or slightly lat compressed, smt slightly dorsally compressed, glab, dorsally webbed, diffusely webbed, or with a crown of hairs; **lm** 1.7–11 mm, rounded to weakly or distinctly keeled, thinly memb to chartaceous, glab or hairy on the keel and veins, smt the intercostal regions also hairy, 5–7(11)-veined, mrg smooth or scabrous, glab, apc obtuse to acuminate; **pal** keels usu scabrous, infrequently smooth, glab or with hairs; **anth** (1–2)3, 0.1–4.5(5) mm.

*Poa* subg. *Poa* is the largest subgenus of *Poa*. It includes all of the species in the Intermountain Region.

### **Poa** sect. **Arenariae** (Hegetschw.) Stapf

**Pl** per; not rhz, not stln, densely tufted. **Bas brchg** invag. **Clm** 2–60 cm, terete, bases bulbous. **Shth** closed for about  $\frac{1}{4}$  their length, lowest shth with swollen bases; **lig** 1–6 mm, smooth or scabrous, obtuse to acute; **bld** (0.5)1–2.5 mm wide, flat, thin, lax, soon withering. **Pan** (0.8)2–10 cm, ovoid, loosely contracted; **nd** with 2–5 br; **br** usu ascending, infrequently spreading, terete, usu smooth or sparsely scabrous, rarely moderately scabrous. **Spklt** 3–7 mm, lat compressed, some or all bulbiferous; **flt** (2)3–7, forming a bulblet, smt the bas 1–2 flt normal. **Glm** shorter than the adjacent lm, distinctly keeled, keels scabrous; **lo glm** 3-veined; **cal** terete or slightly lat compressed, glab or dorsally webbed, hairs wrinkled; **lm** normal or lflike, normal lm 2–4 mm, distinctly keeled, glab throughout or the keels and mrgl veins villous, intercostal regions glab or puberulent, lflike lm thickened at the base, bldlike distally; **pal** scabrous, keels often softly puberulent at midlength; **anth** 3, (0.6)1.2–2 mm, smt aborted late in development, smt not developed.

*Poa* sect. *Arenariae* is native to Eurasia and North Africa. It includes 14 species. These are easily recognized as members of the section by the bulbous bases of their new shoots. One species is established in the Intermountain Region.

#### 1. **Poa bulbosa** L. BULBOUS BLUEGRASS [p. 360, 500]

**Pl** per; densely tufted, not rhz, not stln. **Bas brchg** invag. **Clm** 15–60 cm, erect or spreading, bases bulbous. **Shth** closed for about  $\frac{1}{4}$  their length, terete, lowest shth with swollen bases; **lig** 1–3 mm, smooth or scabrous, apc obtuse to acute; **bld** 1–2.5 mm wide, flat, thin, lax, soon withering. **Pan** 3–12 cm, ovoid; **nd** with 2–5 br; **br** ascending to spreading, terete, usu smooth or sparsely scabrous, infrequently moderately scabrous. **Spklt** 3–5 mm, lat compressed, usu bulbiferous; **flt** 3–7, the bas flt, and smt additional

flt, normal; **rchl intnd** smooth, glab. **Glm** keeled, keels scabrous; **lo glm** 3-veined; **up glm** shorter than or subequal to the lowest lm; **cal** webbed or glab; **lm** 3–4 mm, lanceolate, keeled, glab or the keels and mrgl veins short- to long-villous, intercostal regions glab or softly puberulent, apc acute; **pal** scabrous, keels often softly puberulent at midlength; **anth** 1.2–1.5 mm and fnctl, smt aborted late in development, smt not developed.  $2n = 14, 21, 28, 39, 42, 45$ .

*Poa bulbosa* is a European species that is now established in North America. Only one subspecies is present in the Intermountain Region.

***Poa bulbosa* subsp. *vivipara* (Koel.) Arcang.**  
[p. 360]

**Clm** 15–60 cm. **Spklt** bulbiferous; **flt** modified into lfy bracts, smt the bas flt within a spklt more or less normal. **Cal** usu sparsely webbed, smt glab; **lm** glab or softly puberulent over the keel and lat veins, smt between the veins; **anth** in the least deformed flt 1.2–1.5 mm or aborted late in

development, absent from modified flt.  $2n = 21, 28, 31, 32, 33, 34, 35, 37, 39, 42+I, 44, 46, 48, 49$ .

*Poa bulbosa* subsp. *vivipara* was introduced from Europe into the Pacific Northwest as a forage grass; it has since spread across temperate areas of North America, particularly in the Pacific Northwest and northern Great Basin. It is highly tolerant of grazing and disturbance.

***Poa* sect. *Alpinae* (Hegetschw. ex Nyman) Stapf**

**Pl** per; not rhz, not stln. **Bas brchg** invag. **Clm** 10–40 cm, terete. **Lvs** mostly bas; **shth** closed for  $\frac{1}{2}$ – $\frac{2}{3}$  their length, terete, bas shth persistent, bases usu not swollen; **bld** flat, moderately thick, soft, straight, apc prow-shaped. **Pan** 2–6(8) cm, erect, ovoid to pyramidal, open or loosely contracted at maturity; **nd** with 1–2 br; **br** 1–3(4) cm, ascending to spreading, straight, terete, smooth or very sparsely scabrous, rarely moderately scabrous. **Spklt** ovate, lat compressed, occ bulbiferous; **flt** usu normal, bisex. **Glm** broadly lanceolate to narrowly ovate, shorter than to subequal to the adjacent lm, keeled, keels sparsely scabrous; **lo glm** 3-veined; **cal** terete, glab; **lm** broadly lanceolate, keeled, keels and mrgl veins short- to long-villous, intercostal regions glab or sparsely to moderately short-villous; **pal keels** mostly softly puberulent to short-villous, scabrous distally; **anth** 3, 1.3–2.3 mm.

*Poa* sect. *Alpinae* includes seven species. They are all caespitose perennials with intravaginal branching and broad leaves. Six species are native to Europe; one, *P. alpina*, is circumboreal.

**2. *Poa alpina* L.** [p. 360, 500]

**Pl** per; not glaucous; densely ces, not rhz, not stln. **Bas brchg** invag. **Clm** 10–40 cm. **Lvs** mostly bas; **shth** closed for  $\frac{1}{8}$ – $\frac{2}{3}$  their length, terete, bas shth persistent, overlapping, bases usu not swollen; **lig** of innovations 1–2(3) mm, those of the up cauline lvs to 4(5) mm, milky white, smooth, glab, obtuse; **bld** of innovations widely spreading, persisting through the season, bld of cauline lvs 1–5(12) cm long, 2–4.5 mm wide, flat, moderately thick, soft, straight, smooth or the mrg sparsely scabrous, apc broadly prow-shaped, bld of up cauline lvs much rdcd in length. **Pan** 2–6(8) cm, erect, ovoid to pyramidal, open or loosely contracted at maturity, fairly congested; **nd** with 1–2 br, lowest intnd 0.6–1(1.5) cm; **br** 1–3(4) cm, ascending to spreading, straight, terete, usu smooth or sparsely scabrous, rarely moderately densely scabrous; **ped** divaricate, shorter than the spklt. **Spklt** 3.9–6.2 mm, ovate, lengths 1.5–2.5 times widths, lat compressed, plump, smt bulbiferous; **flt** 3–7, usu normal; **rchl intnd** 0.5–0.8 mm, smooth, glab or sparsely softly puberulent to short-villous. **Glm** broadly lanceolate to narrowly ovate, keeled,

keels sparsely scabrous; **lo glm** 3-veined; **up glm** shorter than or subequal to the lowest lm; **cal** glab; **lm** 3–5 mm, broadly lanceolate, keeled, keels and mrgl veins short- to long-villous, lat veins moderately prominent, intercostal regions sparsely to moderately short-villous, apc acute; **pal keels** softly puberulent to short-villous over most of their length, apc scabrous; **anth** 1.3–2.3 mm.  $2n = 22, 23, 24, 25, 26, 27, 28, 28+II, 30, 31, 32, 32+I, 33, 34, 35, 36, 37, 39, 40+I, 41, 42, ca. 43, 44, 46, ca. 48, 56$ .

*Poa alpina* is a fairly common circumboreal forest species of subalpine to arctic habitats, extending south in the Rocky Mountains to Utah and Colorado in the west, and to the northern Great Lakes region in the east. It often grows in disturbed ground and is calciphilic. The range of chromosome numbers suggests that *P. alpina* is predominantly apomictic.

***Poa alpina* L. subsp. *alpina* ALPINE BLUEGRASS**  
[p. 360]

**Spklt** not bulbiferous. **Anth** 1.3–2.3 mm, well formed.  $2n = 22, 23, 26, 27, 28, 28+I, 30, 31, 32, 32+I, 33, 34, 35, 36, 37, 39, 40+I, 41, 42, ca. 43, 44, 46, ca. 48, 56$ .

*Poa alpina* subsp. *alpina* is the only subspecies present in the Intermountain Region.

***Poa* sect. *Micrantherae* Stapf**

**Pl** ann or per; green; usu neither rhz nor stln, smt stln, densely to loosely tufted. **Bas brchg** invag. **Clm** 2–20(45) cm, terete or weakly compressed; **nd** terete. **Shth** closed for  $\frac{1}{4}$ – $\frac{1}{3}$  their length, terete or weakly compressed, smooth, glab; **col** smooth, glab; **lig** 0.5–3(5) mm, smooth, glab, truncate to obtuse, entire; **bld** 1–3(6) mm wide, flat or weakly folded, thin, soft, smooth, mrg usu slightly scabrous, apc broadly prow-shaped. **Pan** 1–7(10) cm, erect, loosely contracted or open, ovoid to pyramidal;

**nd** with 1–2(5) br; **br** ascending to reflexed, straight, terete, smooth or sparsely scabrous. **Spklt** 3–6 mm, lanceolate to narrowly ovoid, lat compressed, not bulbiferous; **flt** 2–7, normal, up 1–2 flt pist in some spklt; **rchl intnd** smooth, glab. **Glm** distinctly keeled, smooth; **lo glm** distinctly shorter than the lowest lm, 1-veined; **up glm** shorter than to subequal to the lowest lm; **cal** terete, glab; **lm** 1.7–4 mm, distinctly keeled, smooth and glab or the keels, mrgl veins, and, usu, lat veins hairy, lat veins moderately prominent to prominent, intercostal regions glab, mrg smooth, glab, apc whitish, obtuse to acute; **pal keels** smooth, usu softly puberulent to long-villous, smt glab; **anth** 3, 0.1–2.5 mm, smt vestigial in the up 1–2 flt.

*Poa* sect. *Micrantherae* includes eight species, all of which are native to Eurasia and North Africa. They are gynomonocious, with smooth or sparsely scabrous panicle branches. The calluses are glabrous in most species; the palea keels are usually hairy. One species grows in the Intermountain Region.

### 3. *Poa annua* L. ANNUAL BLUEGRASS [p. 361, 500]

**Pl** usu ann, rarely surviving for a second season; not rhz, smt stln, densely tufted. **Bas brchg** invag, innovations common, similar to the clm. **Clm** 2–20(45) cm, prostrate to erect, slender; **nd** terete, usu 1 exserted. **Shth** closed for about 1/3 their length, terete or weakly compressed, smooth; **lig** 0.5–3(5) mm, smooth, glab, decurrent, obtuse to truncate; **bld** 1–10 cm long, 1–3(6) mm wide, flat or weakly folded, thin, soft, smooth, mrg usu slightly scabrous, apc broadly prow-shaped. **Pan** 1–7(10) cm, lengths 1.2–1.6 times widths, erect; **nd** with 1–2(3) br; **br** ascending to spreading or reflexed, straight, terete, smooth, with crowded or loosely arranged spklt. **Spklt** 3–5 mm, lat compressed; **flt** 2–6; **rchl intnd** smooth, glab, concealed or exposed, distal intnd less than

1/2(3/4) the length of the distal lm. **Glm** smooth, distinctly keeled, keels smooth; **lo glm** 1-veined; **up glm** shorter than or subequal to the lowest lm; **cal** glab; **lm** 2.5–4 mm, lanceolate, distinctly keeled, smooth throughout, the keels, mrgl veins, and, usu, lat veins crisply puberulent to long-villous, rarely glab throughout, lat veins prominent, intercostal regions glab, mrg smooth, glab, apc obtuse to acute; **pal keels** smooth, usu short- to long-villous, rarely glab; **anth** 0.6–1.1 mm, oblong prior to dehiscence, those of the up 1–2 flt usu vestigial.  $2n = 28$ .

*Poa annua* is one of the world's most widespread weeds. It thrives in anthropomorphic habitats outside of the arctic. A native of Eurasia, it is now well established throughout most of North America, including the Intermountain Region. Forms with glabrous lemmas occur sporadically within populations.

### *Poa* L. sect. *Poa*

**Pl** per; rhz, rhz usu well developed and extensive, smt poorly developed, densely to loosely tufted or the shoots solitary. **Bas brchg** mainly exvag or equally exvag and invag. **Clm** 5–120 cm, terete or weakly compressed; **nd** terete or weakly compressed. **Shth** closed for (1/6)1/4–3/5 their length, terete to slightly compressed, smooth or sparsely scabrous, usu glab, infrequently sparsely to moderately hairy, distal shth usu longer than their bld; **col** smooth, glab; **lig** 0.9–7 mm, smooth or scabrous, truncate to acute, glab or ciliolate; **innovation bld** of invag shoots involute and narrower or similar to the cauline bld and bld of exvag sht; **cauline bld** subequal or the mid bld longest, flat, folded, or weakly involute, abx surfaces smooth, glab, adx surfaces smooth or sparsely scabrous, frequently sparsely hairy, hairs 0.2–0.8 mm, apc prow-shaped, smt narrowly prow-shaped, flag lf bld 1.5–10 cm. **Pan** 2–18(20) cm, loosely contracted to open, often slightly lax to nodding, sparsely to moderately congested, with 1–7(9) br per nd; **br** 1–9 cm, ascending to widely spreading or somewhat reflexed, flexuous to straight, terete or angled, usu smooth or sparsely to moderately scabrous, infrequently densely scabrous. **Spklt** 3.5–9(12) mm, lengths to 3.5 times widths, lanceolate to broadly lanceolate, lat compressed, smt bulbiferous; **flt** 2–5(6), usu normal, bisex; **rchl intnd** smooth, glab or pubescent. **Glm** unequal to subequal, distinctly shorter than to subequal to the adjacent lm, keels weak or distinct, smooth or scabrous; **lo glm** 1- or 3-veined; **cal** terete or slightly lat compressed, usu dorsally webbed, smt with additional webs below the mrgl veins, infrequently glab; **lm** 2–8 mm, lanceolate to broadly lanceolate, distinctly keeled, keels and mrgl veins, and smt also the lat veins, hairy, all veins prominent, intercostal regions glab or hairy; **pal keels** smt with hairs at midlength, intercostal regions glab or hairy; **anth** 3, 1.2–2.5 mm, infrequently aborted late in development.

*Poa* section *Poa* includes 32 species. All the species are synoecious perennials; most are strongly rhizomatous.

4. *Poa pratensis* L. KENTUCKY BLUEGRASS  
[p. 362, 500]

**Pl** per; green or anthocyanic, smt glaucous; extensively rhz, densely to loosely tufted or the shoots solitary. **Bas brchg** mainly exvag or evenly exvag and invag. **Clm** 5–70(100) cm, erect or the bases decumbent, not brchg above the base, terete or weakly compressed; **nd** terete or weakly compressed, 1–2(3) exposed, proximal nd(s) usu not exerted. **Shth** closed for  $\frac{1}{4}$ – $\frac{1}{2}$  their length, terete to slightly compressed, glab or infrequently sparsely to moderately hairy, bases of bas shth glab, not swollen, distal shth lengths 1.2–5(6.2) times bld lengths; **col** smooth, glab; **lig** 0.9–2(3.1) mm, smooth or scabrous, truncate to rounded, infrequently obtuse, ciliolate or glab; **bld** of exvag innovations like those of the clm, those of the invag shoots smt distinctly narrower, 0.4–1 mm wide, flat to involute; **cauline bld** 0.4–4.5 mm wide, flat, folded, or involute, soft and lax to moderately firm, abx surfaces smooth, glab, adx surfaces smooth or sparsely scabrous, frequently sparsely hairy, hairs 0.2–0.8 mm, erect to appressed, slender, curving, sinuous or straight, apc usu broadly prow-shaped, smt narrowly prow-shaped, bld subequal, the mid bld longest, the flag lf bld 1.5–10 cm. **Pan** 2–15(20) cm, narrowly ovoid to narrowly or broadly pyramidal, loosely contracted to open, sparse to moderately congested, with (25) 30–100+ spklt and (1)2–7(9) br per nd; **br** (1)2–9 cm, spreading early or late, terete or angled, smooth or sparsely to moderately densely scabrous, with 4–30(50) spklt usu fairly crowded in the distal  $\frac{1}{2}$ . **Spklt** 3.5–6(7) mm, lengths 3.5 times widths, lat compressed, smt bulbiferous; **flt** 2–5, usu normal, smt bulb-forming; **rchl intnd** usu shorter than 1 mm, smooth, glab. **Glm** unequal to subequal, usu distinctly shorter than the adjacent lm, narrowly lanceolate to lanceolate, infrequently broadly lanceolate, distinctly keeled, keels usu sparsely to densely scabrous, infrequently smooth; **lo glm** 1.5–4(4.5) mm, usu narrowly lanceolate to lanceolate, occ sickle-shaped, 1–3-veined; **up glm** 2–4.5(5) mm, distinctly shorter than to nearly equaling the lowest lm; **cal** dorsally webbed, smt with additional webs below the mrgl veins, hairs at least  $\frac{1}{2}$  as long as the lm, crimped; **lm** 2–4.3(6) mm, lanceolate, green or strongly purple-tinged, distinctly keeled, keels and mrgl veins long-villous, lat veins usu glab, infrequently short-villous to softly puberulent, lat veins prominent, intercostal regions glab, lo portion smooth or

finely muriculate, up portion smooth or sparsely scabrous, mrg narrowly to broadly hyaline, glab, apc acute; **pal** scabrous, keels smt softly puberulent, intercostal regions narrow, usu glab, rarely sparsely hispidulous; **anth** usu 1.2–2 mm, infrequently aborted late in development.  $2n = 27, 28, 32, 35, 37, 41–46, 48–147$ .

*Poa pratensis* is common, widespread, and well established in many natural and anthropogenic habitats of North America. The only taxa that are clearly native to North America are the arctic and subarctic subspp. *alpigena* and *colpodea*. Outside North America, *P. pratensis* is native in temperate and arctic Eurasia. It is established in temperate regions around the world.

*Poa pratensis* is a highly polymorphic, facultatively apomictic species, having what is probably the most extensive series of polyploid chromosome numbers of any species in the world. It is a hybridogenic species, i.e., it comprises numerous lineages with the same basic maternal genome, but different paternal genomes. The lineages are perpetuated by agamospermy and vegetative reproduction. Some major forms are recognized as microspecies or subspecies. These have some correlated ecological and morphological differences, but the morphological boundaries between them are completely bridged; in some cases the taxa may represent environmentally induced plasticity.

Natural hybrids have been identified between *Poa pratensis* and *P. alpina*, *P. arctica*, *P. wheeleri*, and *P. secunda*. Many other artificial hybrids have been made; these involve many different, often distantly related, species. In addition, there are many cultivated forms of the species; these have been seeded widely throughout the region for lawns, soil stabilization, and forage. Most cultivated forms favor subspp. *irrigata* morphologically; others tend towards subspp. *pratensis* and *angustifolia*, the latter occurring most commonly in xeric sites.

1. Panicle branches smooth or almost smooth . . . . .  
..... subsp. *alpigena*
1. Panicle branches more or less scabrous.
  2. Intravaginal innovation shoots present, intra- and extravaginal blades alike, 0.4–1 mm wide, folded to involute, somewhat firm, adaxial surfaces often sparsely and softly hairy; plants of dry meadows and forests. . . . . subsp. *angustifolia*
  2. Intravaginal innovation shoots present or absent, if present then differentiated or alike, at least some with blades 1.5–4.5 mm wide, flat or folded, adaxial surfaces rarely hairy; plants widespread, often of more mesic sites . . . . .  
..... subsp. *pratensis*

Cultivars of *Poa pratensis* L.

**Pl** densely to loosely tufted, often forming turf, shoots clustered. **Bas brchg** invag and exvag or mainly exvag. **Clm** 8–50 cm. **Innovation shoot bld** usu shorter than 45 cm, (0.4)1–4 mm wide, usu flat, smt some involute, usu soft, smt somewhat firm, adx surfaces usu glab; **cauline bld** flat or folded. **Pan** 3–15 cm, broadly pyramidal, open or somewhat contracted, with 2–7(9) br per nd; **br** ascending or widely spreading, sparsely to

densely scabrous, with few to many spklt per br. **Spklt** lanceolate to broadly lanceolate, not bulbiferous; **flt** normal. **Glm keels** strongly compressed, sparsely to moderately scabrous; **up glm** shorter than to nearly equaling the lowest **lm**; **lm** 2.8–4.3(6) mm, finely muriculate, lat veins glab; **pal keels** scabrous, glab, intercostal regions glab.  $2n = 41-45, 48-59, 62, 64-74, 76, 78, 80, 81, 84-90, 95$ .

More than 60 cultivars of *Poa pratensis* have been released in North America. Plants grown from commercially distributed seed have generally been placed in subsp. *pratensis* by North American authors, but they appear to include genetic contributions from at least three major subspecies: subsp. *angustifolia*, *pratensis*, and *irrigata*. They are intermediate forms and are best referred to as *Poa pratensis sensu lato* or labeled as cultivated material. The chromosome counts listed here are numbers reported for the species that are probably not subsp. *alpigena*, *angustifolia*, or *colpodea*; they may represent subsp. *irrigata* or *pratensis*.

***Poa pratensis* subsp. *alpigena* (Lindm.)**

Hiitonen ALPIGENE BLUEGRASS [p. 362]

**Pl** strongly anthocyanic; moderately to loosely tufted, shoots usu solitary. **Bas brchg** mainly exvag. **Clm** 15–70 cm. **Innovation shoot bld** shorter than 15 cm, 1–3.6 mm wide, flat or folded, soft, adx surfaces usu glab, smt sparsely pubescent; **cauline bld** flat or folded. **Pan** 3–13(20) cm, narrowly pyramidal or contracted, expanding well after emergence from the shth, with (1)2–5(7) br per nd; **br** 1–6 cm, steeply ascending to eventually spreading or somewhat reflexed, smooth or sparsely scabrous, with 5–15 spklt. **Spklt** 4–5.5 mm, narrowly lanceolate, not bulbiferous; **flt** normal. **Glm keels** distinct, smooth or sparsely scabrous near the apc; **up glm** nearly equaling the lowest **lm**; **lm** 2.5–3.5 mm, smooth or finely muriculate, lat veins frequently short-villous to softly puberulent; **pal keels** scabrous, often softly puberulent at midlength, intercostal regions usu glab, rarely sparsely hispidulous.  $2n = 28, 32, 35, 42, 48, 50, 53, 56, 60, 63, 64, 65, 67, \text{ca. } 68, 69, 70, 72, 73, 74, 76, 77, 78, 79, 82, 84, 86, 88, 89, 92, 94$ .

*Poa pratensis* subsp. *alpigena* is a circumpolar, mesophytic to subhydropytic, arctic and alpine subspecies that extends into boreal forests in northern parts of North America. It is infrequent south of Canada, with isolated collections being known from as far south as New Mexico in the Rocky Mountains, and New Hampshire and Maine in the east. It also grows in southern Patagonia.

***Poa pratensis* subsp. *angustifolia* (L.) Lej.**

[p. 362]

**Pl** moderately densely to densely tufted. **Bas brchg** invag and exvag, invag shoots clustered. **Clm** 25–80 cm. **Innovation shoot bld** 10–45 cm

long, 0.4–1 mm wide, all involute, smt narrower than the cauline bld, adx surfaces sparsely pubescent; **cauline bld** involute or folded, somewhat firm, adx surfaces sparsely pubescent. **Pan** 8–18 cm, narrowly pyramidal or loosely contracted, br ascending to spreading, smooth or sparsely to densely scabrous, with several to many spklt per br. **Spklt** narrowly lanceolate, not bulbiferous; **flt** normal. **Glm keels** strongly compressed, sparsely to moderately scabrous; **up glm** shorter than to nearly equaling the lowest **lm**; **lm** 2.5–3.5 mm, finely muriculate, lat veins glab; **pal keels** scabrous, glab, intercostal regions glab.  $2n = 28, 46, 48-54, 56, 57, 59, 60, 61, 62, 63, 64, 65, 66, 68, 70, 72, 83$ .

*Poa pratensis* subsp. *angustifolia* is a western Eurasian subspecies that is also known from scattered locations throughout temperate North America. It is characterized by the predominance of fascicles of elongate, narrow, involute blades on the intravaginal vegetative shoots, and slender panicles with small spikelets. Recent research has shown that it is primarily a low polyploid.

***Poa pratensis* L. subsp. *pratensis* [p. 362]**

**Pl** densely to loosely tufted, often forming turf, clm clustered. **Bas brchg** invag and exvag. **Clm** 8–100 cm. **Innovation shoot bld** 10–45 cm long, 0.4–4 mm wide, some distinctly narrower than the cauline bld, all flat or some involute, usu soft, adx surfaces sparsely pubescent; **cauline bld** flat or folded. **Pan** 5–18 cm, broadly pyramidal, open or somewhat contracted, with 3–5(7) br per nd; **br** spreading to somewhat reflexed, smooth or sparsely to fairly densely scabrous, with several to many spklt per br. **Spklt** lanceolate to broadly lanceolate, not bulbiferous; **flt** normal. **Glm keels** strongly compressed, sparsely to moderately scabrous; **up glm** shorter than or nearly equaling the lowest **lm**; **lm** 2.8–4.3 mm, finely muriculate, lat veins glab; **pal keels** scabrous, glab, intercostal regions glab.  $2n = 43, 44, 48, 49, 50, 51, 52, 54, 56, 58, 59, 62, 65, 66, 67, 74, \text{ca. } 85, \text{ca. } 86, 88, 89, 95$ .

*Poa pratensis* subsp. *pratensis* grows throughout most of the range of the species, but is absent from the high arctic, and only sporadic in the low arctic. It usually has a few narrow, flat or involute, intravaginal shoot leaves, in addition to some broader, extravaginal shoot leaves.

**5. *Poa arctica* R. Br. ARCTIC BLUEGRASS [p. 363, 500]**

**Pl** per; usu strongly anthocyanic; rhz usu well developed, smt poorly developed, shoots usu solitary. **Bas brchg** mainly exvag. **Clm** 7.5–60 cm, slender to stout, terete or weakly compressed, bases usu decumbent, not brchg above the bases; **nd** terete, proximal nd usu not exerted, 0–2

exserted above. **Shth** closed for  $(\frac{1}{6})^{\frac{1}{5}}-\frac{2}{5}$  their length, terete, glab, smooth or sparsely scabrous, bases of bassths glab, distal shth lengths 1.4–4(5.3) times bld lengths; **col** smooth, glab; **lig** (1)2–7 mm, glab, smooth or sparsely to infrequently moderately scabrous, apc usu rounded to obtuse or acute, rarely truncate, entire or lacerate; **bld** 1–6 mm wide, flat or folded, somewhat involute, smooth, glab, apc broadly prow-shaped, cauline bld subequal or gradually rcd distally, flag lf bld 0.7–9 cm. **Pan** (2)3.5–15 cm, ovoid to broadly pyramidal, usu open, sparse, with 10–40(60) spklt, proximal intnd shorter than 1.5(3) cm, with (1)2–5 br per nd; **br** 1.5–6 cm, spreading soon after emergence from the shth, thin, sinuous, and flexuous to fairly stout and straight, terete, smooth or sparsely to infrequently moderately scabrous, with (1)2–5 spklt, the spklt not crowded. **Spklt** (3.5) 4.5–8 mm, lengths to 3.5 times widths, lat compressed, smt bulbiferous; **flt** (2)3–6, infrequently bulb-forming; **rchl intnd** smooth or muriculate, proximal intnd glab or sparsely softly puberulent to long-villous. **Glm** lanceolate to broadly lanceolate, distinctly or weakly keeled, keels usu smooth, smt sparsely scabrous distally, lat veins usu moderately pronounced; **lo glm** (3)3.5–5(6) mm, 3-veined; **up glm** 3.5–5.5(6.5) mm, nearly equaling to slightly exceeding the lowest lm, or distinctly shorter; **cal** glab or webbed, hairs sparse and short to over  $\frac{1}{3}-\frac{2}{3}$  the lm length; **lm** (2.7)3–6(7) mm, lanceolate to broadly lanceolate, usu strongly purple, distinctly keeled, keels, mrgl veins, and lat veins long-villous, hairs on the lat veins smt shorter, lat veins prominent, intercostal regions short-villous to softly puberulent at least near the base, glab elsewhere, smooth to weakly muriculate and/or usu sparsely scabrous, infrequently moderately scabrous, mrg broadly hyaline, glab, apc acute; **pal keels** usu short- to long-villous for most of their length, rarely nearly glab and scabrous, intercostal regions broad, usu at least sparsely softly puberulent, rarely glab, apc scabrous; **anth** 1.4–2.5 mm, smt aborted late in development.  $2n = 36, 42, 56, 60, 62-68, 70, \text{ca. } 72, 74-76, 78-80, 82-84, 86, 88, 99, 106$ .

*Poa arctica* is a common circumboreal species of arctic and alpine regions, growing mainly in mesic to subhydric, acidic tundra and alpine meadows, and on rocky slopes. It extends south in the Rocky Mountains to New Mexico. In the southern portion of its range, *P. arctica* usually develops normal anthers. This and isozyme data for populations from alpine and low arctic regions suggest sexual reproduction is common in these habitats.

The most reliable way to distinguish *Poa arctica* from *P. pratensis* (see previous) is by the wider paleas and the presence of hairs between the palea keels. *Poa arctica* forms natural hybrids with both *P. pratensis* and *P. secunda* (p. 132).

1. Panicles erect, the branches relatively stout, fairly straight; longest branches of the lowest panicle nodes  $\frac{1}{4}-\frac{1}{2}$  the length of the panicles; culms wiry, usually several together; calluses glabrous or shortly webbed; paleas sometimes glabrous; plants glaucous, growing in the southern Rocky Mountains and adjacent portions of the Intermountain Region ..... subsp. *aperta*
1. Panicles lax to erect, the branches slender, flexuous to fairly stout and straight; longest branches of the lowest panicle nodes  $\frac{2}{5}-\frac{3}{5}$  the length of the panicles; culms slender to stout, varying from solitary to several together; calluses glabrous or webbed, the hairs usually more than  $\frac{1}{2}$  as long as the lemmas; paleas pubescent; plants sometimes glaucous, widespread in distribution.
2. Calluses webbed, often copiously so ... subsp. *arctica*
2. Calluses glabrous ..... subsp. *grayana*

***Poa arctica* subsp. *aperta* (Scribn. & Merr.)**  
Soreng [p. 363]

**Pl** pale green, often glaucous; usu densely tufted, rhz usu short, usu well developed. **Clm** 20–60 cm, several together, wiry, bases decumbent. **Shth** closed for  $(\frac{1}{6})^{\frac{1}{5}}-\frac{1}{3}$  their length; **lig** 3–7 mm, sparsely to moderately scabrous, acute; **bld** 1.5–2.5 mm wide, flat, folded, or somewhat involute. **Pan** 4–15 cm, erect, loosely contracted or open, with 1–3 br per nd; **br** ascending or widely spreading, fairly stout, fairly straight, smooth to very sparsely scabrous, proximal br  $\frac{1}{4}-\frac{1}{2}$  the pan length. **Spklt** narrowly lanceolate to lanceolate, not bulbiferous; **flt** 2–3(4), normal; **rchl intnd** usu glab, infrequently sparsely softly puberulent; **cal** glab or webbed, hairs to  $\frac{1}{4}$  the lm length; **lm** 3–4.5(6) mm; **pal keels** usu softly puberulent to long-villous at midlength, infrequently glab, intercostal regions usu softly puberulent; **anth** aborted late in development or fully developed.  $2n = 98+I$ .

*Poa arctica* subsp. *aperta* grows in subalpine and low alpine habitats on the Wasatch Escarpment and high mountains of the Colorado Plateau in southern Utah, and the Rocky Mountains of southern Colorado and northern New Mexico. *Poa arctica* subsp. *aperta* has softer leaves, and is more densely hairy between the lemma veins and the palea keels, than subsp. *arctica*. It can be distinguished from subsp. *grayana* by its more wiry culms, and less contracted panicles with straighter branches. Many reports of *P. arida* (p. 134) growing west of the Rocky Mountains are based on misidentification of this subspecies. *Poa arctica* subsp. *aperta* may reflect introgression from *P. secunda* (p. 132).

***Poa arctica* R. Br. subsp. *arctica* [p. 363]**

**Pl** usu loosely, smt densely, tufted, rhz, rhz short or long, well developed. **Lig** (1)2–4 mm, obtuse

to acute; **bld** 1.5–2.5(3) mm wide, flat or folded, thin and soon withering, flag lf bld 0.7–5.5 cm. **Pan** lax to erect, open; **br** ascending or widely spreading, sinuous and flexuous to fairly straight, smooth or sparsely scabrous, proximal br  $\frac{2}{5}$ – $\frac{3}{5}$  the pan length. **Spklt** (3.5)4.5–6(7) mm, infrequently bulbiferous; **rchl intnd** usu glab, infrequently sparsely softly puberulent to long-villous; **cal** sparsely to copiously webbed; **lm** (2.7)3–4.5 mm; **pal keels** puberulent to long-villous at midlength, intercostal regions usu hairy, smt glab; **anth** usu fully developed.  $2n = 56, 60, 62, 63, 64, 65, 68, 70, 72, 74, 75, 76, 77, 78, 79, 80, 82, \text{ca. } 83, 84, 85, 88, 106$ .

*Poa arctica* subsp. *arctica* is polymorphic and circumpolar. It grows in alpine and tundra habitats as far south as Wheeler Peak, New Mexico.

*Poa arctica* subsp. *arctica* has tougher leaves, and is less densely hairy between the lemma veins and palea keels, than subsp. *aperta*. Hultén (1942) recognized several variants within subsp. *arctica*; they are of ecotypic significance at best.

*Poa arctica* subsp. *grayana* (Vasey) Á. Löve, D.

Löve & B.M. Kapoor [p. 363]

**Pl** smt glaucous; densely to loosely tufted, rhz, rhz short or long, usu well developed, clm solitary or a few together. **Clm** 20–60 cm, bases decumbent, not wiry. **Shth** closed for  $\frac{1}{4}$ – $\frac{2}{5}$  their length; **lig** (2)3–7 mm, smooth, obtuse to acute; **bld** 1–3 mm wide, flat or folded. **Pan** lax to erect, open; **br** ascending or widely spreading, somewhat sinuous and flexuous to fairly straight, smooth to sparsely scabrous, proximal br  $\frac{2}{5}$ – $\frac{1}{2}$  the pan length. **Spklt** (4)4.5–7 mm, not bulbiferous; **rchl intnd** usu glab, infrequently sparsely softly puberulent; **cal** glab; **lm** (2.7)3–5 mm; **pal keels** puberulent to long-villous at midlength; **anth** usu fully developed.  $2n = 36?$

*Poa arctica* subsp. *grayana* grows only in the alpine regions of the middle and southern Rocky Mountains of Utah, Wyoming, Colorado, and New Mexico. It is characterized by its glabrous calluses, densely hairy lemmas, and paleas that are densely hairy between the keels. It has less wiry culms, and panicles with more flexuous branches, than subsp. *aperta* and, like that subspecies, can be difficult to distinguish from *P. arida* (p. 134).

### *Poa* sect. *Homalopoa* Dumort.

**Pl** ann or per; densely to loosely tufted or with solitary clm, shoots usu neither rhz nor stln, infrequently rhz. **Bas brchg** both invag and exvag or mainly exvag. **Clm** 2–120 cm, terete or somewhat compressed; **nd** terete or weakly compressed. **Shth** usu closed for  $\frac{1}{2}$ – $\frac{7}{8}$  their length, smt only  $\frac{1}{20}$ – $\frac{1}{10}$  their length, terete to distinctly compressed, smooth or scabrous; **lig** 0.7–12 mm, milky white, smooth or scabrous, truncate to acuminate; **innovation shoot bld** similar to the cauline bld; **cauline bld** 0.6–15 mm wide, flat or folded, thin or moderately thick, lax or moderately straight, abx surfaces usu smooth, smt scabrous over the midvein, adx surfaces smooth or scabrous over the veins, mrg scabrous, apc narrowly to broadly prow-shaped. **Pan** (1)2–40 cm, erect or nodding to lax, contracted or open, sparse or congested, with 1–7 br per nd; **br** erect to reflexed, terete or angled, angles smooth or scabrous, smooth or sparsely scabrous between angles. **Spklt** (2)2.4–9 mm, lat compressed, rarely bulbiferous; **flt** (1)2–7, usu normal, smt the anth aborting, rarely bulb-forming. **Glm** unequal to subequal, distinctly shorter than the adjacent lm, usu bisex, distinctly keeled; **lo glm** 1–3-veined; **cal** terete or slightly lat compressed, usu dorsally webbed, smt glab; **lm** 2–6 mm, narrowly to broadly lanceolate, distinctly keeled, glab or hairy, lat veins obscure to prominent, mrg milky white, apc obtuse to narrowly acute; **pal keels** scabrous, glab or hairy at midlength; **anth** (1, 2) 3, usu 0.1–1.1(1.8) mm, smt 1.5–3 mm and then smt aborting late in development.

*Poa* sect. *Homalopoa* is the largest and most heterogeneous section of the genus, having at least 170 species, including many annuals and short-lived perennials. Most species are cespitose, have sheaths closed for  $\frac{1}{4}$ – $\frac{3}{4}$  their length and anthers up to 1 mm long. The section is widespread in its distribution, growing almost everywhere the genus is native.

### 6. *Poa bolanderi* Vasey BOLANDER'S BLUEGRASS [p. 364, 500]

**Pl** usu ann, rarely longer-lived; often glaucous; densely tufted, tuft bases narrow, strl shoots few, not stln, not rhz. **Bas brchg** both invag and exvag. **Clm** 20–60(70) cm, erect or geniculate at the base; **nd** terete, usu 1–3 exserted. **Shth** closed for  $\frac{1}{2}$ – $\frac{3}{4}$  their length, usu compressed and keeled, usu smooth, infrequently scabrous; **lig** 2.5–7 mm, smooth or scabrous, usu decurrent, obtuse to

acute; **bld** 1.5–5 mm wide, usu flat, rarely folded, lax, soft, smooth or sparsely scabrous, mrg scabrous, apc broadly prow-shaped, cauline bld 3–15 cm, flag lf bld 1–4 cm. **Pan** (5)10–15(25) cm long,  $\frac{1}{4}$ – $\frac{1}{2}$  the pl height, usu erect, infrequently slightly nodding, usu eventually open, smt interrupted, sparse, with 1–3(5) br per nd; **br** initially erect and straight, usu some eventually spreading or reflexed, smooth or sparsely to moderately scabrous. **Spklt** (3)4–7 mm, lat



compressed; **flt** 2–3(4); **rchl intnd** usu 1–1.2+ mm, smooth or sparsely scabrous, glab. **Glm** unequal, distinctly shorter than the adjacent **lm**, distinctly keeled, keels smooth or sparsely scabrous; **lo glm** 1–3-veined,  $\frac{2}{3}$  the length of the up **glm**,  $\frac{1}{2}$ – $\frac{2}{3}$  the length of the lowest **lm**; **up glm** shorter than or subequal to the lowest **lm**; **cal** of some or all **flt** sparsely webbed; **lm** 2.5–4 mm, lanceolate to narrowly lanceolate, distinctly keeled, smooth or scabrous throughout, glab, lat veins obscure to moderately prominent, apc narrowly acute, usu anthocyanic near the tip; **pal keels** sparsely scabrous; **anth** 3, 0.5–1(1.8) mm.  $2n = 28$ .

*Poa bolanderi* grows mainly in pine to fir forest openings of mountain slopes in the western United States, from Washington to California and Utah. It grows mostly at 1500–3000 m.

7. *Poa bigelovii* Vasey & Scribn. BIGELOW'S  
BLUEGRASS [p. 364, 500]

**Pl** usu ann, rarely longer-lived; densely tufted, tuft bases narrow, usu without strl sht, not stln, not rhz. **Bas brchg** invag. **Clm** (2)5–60 (70) cm tall, 0.3–1 mm thick, usu erect, bases rarely geniculate; **nd** terete, usu 1 exserted. **Shth** closed for  $\frac{1}{4}$ – $\frac{1}{2}$  their length, usu compressed and keeled, smooth or the keels scabrous; **lig** 2–6 mm, smooth or scabrous, usu decurrent, obtuse to acute; **bld** 1.5–5 mm wide, flat, thin, soft, finely scabrous, apc broadly prow-shaped, cauline **bld** (1)4–15 cm, flag lf **bld** usu 1–4 cm. **Pan** (1)5–15 cm, erect, cylindrical, contracted, smt interrupted, congested, with 2–3(5) br per nd; **br** erect or steeply ascending, smooth or sparsely to densely scabrous. **Spklt** 4–7 mm, lat compressed; **flt** 3–7; **rchl intnd** to 1 mm, smooth, glab. **Glm** subequal, distinctly keeled, keels and smt the lat veins scabrous; **lo glm** 1(3)-veined; **up glm** shorter than or subequal to the lowest **lm**; **cal** webbed; **lm** 2.6–4.2 mm, lanceolate, distinctly keeled, smooth, keels, mrgl veins, and smt the lat veins short- to long-villous, keels hairy to near

the apc, mrgl veins to  $\frac{2}{3}$  their length, lat veins obscure to moderately prominent, intercostal regions glab or softly puberulent, up mrg white, apc acute; **pal keels** softly puberulent to short-villous at midlength, scabrous near the apc, intercostal regions usu softly puberulent; **anth** 1–3, 0.2–1 mm.  $2n = 28, 28+I$ .

*Poa bigelovii* grows in arid upland regions, particularly on shady, rocky slopes of the southwestern United States and northern Mexico.

8. *Poa reflexa* Vasey & Scribn. NODDING  
BLUEGRASS [p. 365, 501]

**Pl** per, short-lived; densely tufted, tuft bases narrow or not, not stln, not rhz. **Bas brchg** mixed invag and exvag. **Clm** 10–60 cm. **Shth** closed for  $\frac{1}{3}$ – $\frac{2}{3}$  their length, terete, smooth; **lig** 1.5–3.5 mm, smooth or sparsely scabrous; **bld** 1.5–4 mm wide, flat, thin, soft, apc broadly prow-shaped. **Pan** 4–15 cm, nodding, open, with numerous spklt and 1–2 br per nd; **br** (2)3–7 cm, spreading to reflexed, lo br usu reflexed, flexuous, usu terete, smooth or sparsely scabrous, with (3)6–18 spklt. **Spklt** 4–6 mm, lanceolate to broadly lanceolate, usu partly to wholly purplish, with 3–5 flt; **rchl intnd** shorter than 1 mm, smooth. **Glm** narrowly to broadly lanceolate, distinctly keeled, keels smooth or nearly so; **lo glm** 1-veined; **up glm** shorter than or subequal to the lowest **lm**; **cal** webbed; **lm** 2–3.5 mm, lanceolate, partly purple to fairly strongly purple, distinctly keeled, keels and mrgl veins short- to long-villous, keels hairy for  $\frac{2}{3}$ – $\frac{4}{5}$  their length, lat veins usu sparsely softly puberulent at least on 1 side, lat veins obscure to moderately prominent, intercostal regions smooth, minutely bumpy, glab, apc acute, slightly bronze-colored or not; **pal keels** scabrous, usu softly puberulent at midlength; **anth** 0.6–1 mm.  $2n = 28$ .

*Poa reflexa* grows in subalpine forests, meadows, and low alpine habitats, primarily in the central and southern Rocky Mountains.

*Poa* sect. *Madropoa* Soreng

**Pl** per; densely to loosely tufted or with solitary sht, smt stln, smt rhz. **Bas brchg** invag and/or exvag. **Clm** (5)10–125 cm, terete or weakly compressed; **nd** terete or slightly compressed. **Shth** closed from  $\frac{1}{7}$  their length to their entire length, terete to compressed, smooth or scabrous, glab or pubescent; **lig** 0.2–18 mm, milky white or colorless, usu translucent, truncate to acuminate, glab or ciliolate; **innovation bld** with the adx surfaces usu moderately to densely scabrous or hispidulous on and between the veins, smt smooth and glab; **cauline bld** flat, folded, or involute, thin or thick, lax or straight, smooth or scabrous, adx surfaces smt hairy, apc narrowly to broadly prow-shaped. **Pan** 1–29 cm, contracted to open, usu with fewer than 100 spklt; **nd** with 1–5 br; **br** 0.5–18 cm, terete or angled, smooth or scabrous, glab or hispidulous. **Spklt** 3–17 mm, lengths 3.5 times widths, lat compressed, not sex dimorphic, not bulbiferous; **flt** 2–10(13) mm, normal; **rchl intnd** smooth or scabrous, glab or

hairy. **Glm** distinctly keeled, keels smooth or scabrous; **lo glm** 1, 3(5)-veined; **up glm** 3- or 5-veined; **cal** terete or slightly lat compressed, glab, webbed, or with a crown of hairs; **lm** 2.6–11 mm, lanceolate, distinctly keeled, keels, veins, and intercostal regions glab or hairy, 5–7(11)-veined; **pal** keels scabrous, glab or with hairs at midlength; **anth** 3, vestigial (0.1–0.2 mm) or 1.3–4.5(5) mm.

*Poa* sect. *Madropoa* is confined to North America. Its 20 species exhibit breeding systems ranging from sequential gynomonoecy to gynodioecy and dioecy. The gynomonoecious species usually grow in forests and have broad, flat leaves. The gynomonoecious and dioecious species grow mainly in more open habitats. They have normally developed anthers that are 1.3–4 mm long, and involute innovation blades that, in several species, are densely scabrous or hairy on the adaxial surfaces.

9. ***Poa arnowiae*** Soreng WASATCH BLUEGRASS  
[p. 365, 501]

**Pl** per; loosely tufted or with solitary sht, short-rhz. **Bas brchg** all or mostly exvag. **Clm** (15)30–80 cm, erect or the bases decumbent, terete or weakly compressed; **nd** terete, 1–3 exerted. **Shth** closed for  $\frac{1}{2}$ – $\frac{9}{10}$  their length, compressed, smooth, glab, bases of bas shth glab, distal shth lengths 1–3 times bld lengths; **col** smooth, glab; **lig** 0.5–4 mm, smooth or sparsely scabrous, truncate to obtuse; **innovation bld** similar to the cauline bld; **cauline bld** 2–5 mm wide, flat, thin, smooth or sparsely scabrous mainly over the veins, apc broadly prow-shaped, mid and up cauline bld subequal in length, flag lf bld (2.5)4–7(11) cm long. **Pan** (5)12–22 cm, usu narrowly pyramidal, open, sparse, with 20–70 spklt, proximal intnd usu (3.5)4+ cm, with 2–3(4) br per nd; **br** 3–8 cm, spreading to eventually reflexed, terete or weakly angled, sparsely to moderately scabrous, with 3–12 spklt. **Spklt** 5–9 mm, lengths to 3.5 times widths, lat compressed, not sex dimorphic; **flt** 2–6; **rchl intnd** smooth, glab, distal intnd 1+ mm. **Glm** lanceolate, distinctly keeled; **lo glm** 1–3-veined; **cal** glab; **lm** 3–6.5 mm, lanceolate, distinctly keeled, keels and mrgl veins glab or short-villous to softly puberulent to  $\frac{1}{3}$  their length, lat veins obscure, intercostal regions glab or sparsely hispidulous, rarely softly puberulent, smooth or sparsely finely scabrous, mrg glab, apc acute; **pal keels** scabrous, glab, intercostal regions glab; **anth** vestigial (0.1–0.2 mm) or (1.3)2–3.6 mm.  $2n$  = unknown.

*Poa arnowiae* grows in openings within the coniferous forests of the mountain ranges in southeastern Idaho, northern Utah, and adjacent Wyoming. It is sequentially gynomonoecious.

10. ***Poa wheeleri*** Vasey WHEELER'S  
BLUEGRASS [p. 365, 501]

**Pl** per; densely to loosely tufted or with solitary sht, shortly rhz. **Bas brchg** mainly exvag. **Clm** 35–80 cm, erect or the bases decumbent, terete or weakly compressed; **nd** terete, 1–2 exerted. **Shth** closed for  $\frac{1}{3}$ – $\frac{3}{4}$  their length, terete to slightly compressed, at least some proximal

shth densely retrorsely scabrous, hispidulous, or softly puberulent for the up  $\frac{1}{4}$  of their length, bases of bas shth glab, distal shth lengths (1.4)1.7–4.6(6.2) times bld lengths; **col** of proximal lvs glab or with hairs the same length as those of their shth; **lig** 0.5–2 mm, smooth or scabrous, smt puberulent, truncate, those of the lo clm and innovation lvs 0.5–1.5 mm, abx surfaces scabrous to softly puberulent, truncate; **innovation bld** folded or involute, infrequently flat, moderately thick, soft, adx surfaces usu densely scabrous to hispidulous; **cauline bld** 2–3.5 mm wide, flat or folded, smooth or sparsely scabrous, glab or hispidulous, apc narrowly to broadly prow-shaped, bld gradually rcd distally or the mid bld longest, flag lf bld 1–10 cm long. **Pan** 5–12(18) cm, erect or nodding, ovoid to pyramidal, loosely contracted to open, with 20–70 spklt, proximal intnd usu shorter than 3.5 cm; **nd** with 2–5 br; **br** (1)1.7–6.5 cm, ascending to spreading or reflexed, lax, terete or weakly angled, sparsely to moderately scabrous, with 2–8(12) spklt. **Spklt** 5.5–10 mm, lengths to 3.5 times widths, lat compressed, not sex dimorphic; **flt** 2–7; **rchl intnd** smooth or scabrous, glab or sparsely to densely hispidulous. **Glm**  $\frac{1}{4}$ – $\frac{2}{3}$ ( $\frac{3}{4}$ ) as long as the adjacent lm, lanceolate, distinctly keeled; **lo glm** 1–3-veined,  $\frac{1}{4}$ – $\frac{1}{2}$  as long as the adjacent lm; **cal** glab; **lm** 3–6 mm, lanceolate, distinctly keeled, keels and mrgl veins glab or softly puberulent to short-villous, intercostal regions glab or hispidulous, infrequently puberulent, smooth or finely scabrous, lat veins obscure to moderately prominent, mrg glab, apc acute; **pal keels** scabrous, intercostal regions glab; **anth** usu vestigial (0.1–0.2 mm) or aborted late in development and up to 2 mm, rarely normal.  $2n$  = 56, 61, 62, 63, 64, 66, 67, 70, ca. 74, 75, 79, 80, 81, 87, 89, 90, 91.

*Poa wheeleri* is common at mid- to high elevations, generally on the east side of the coastal mountains from British Columbia to California, and from Manitoba to New Mexico. It usually grows in submesic coniferous forests to subalpine habitats. Most plants have densely retrorsely pubescent or scabrous sheaths, involute innovation blades that are pubescent adaxially, and pistillate florets.

*Poa wheeleri* resembles *P. chambersii* (see next), but differs in having at least some proximal sheaths that are densely retrorsely scabrous or pubescent (sometimes obscurely so), and folded or involute innovation blades that are scabrous to hispidulous on the adaxial surfaces. Natural hybrids have been found between *P. wheeleri* and *P. pratensis* (p. 116).

**11. *Poa chambersii* Soreng CHAMBERS'**  
BLUEGRASS [p. 366, 501]

**Pl** per; loosely tufted or with solitary sht, short-rhz. **Bas brchg** all or mainly exvag. **Clm** 10–50 cm, erect or the bases decumbent, terete or weakly compressed; **nd** terete, 0–1 exerted. **Shth** closed for  $\frac{1}{3}$ – $\frac{7}{8}$  their length, terete to slightly compressed, smooth, glab, bases of bas shth glab, distal shth lengths (1.15)1.5–4.6(6.6) times bld lengths; **col** smooth, glab; **lig** 0.5–2(2.5) mm, smooth, truncate to obtuse; **innovation bld** similar to the cauline bld; **cauline bld** gradually rdcd in length distally, 2–5 mm wide, flat or folded, smooth or the adx surfaces sparsely scabrous, primarily over the veins, apc broadly prow-shaped, flag lf bld 0.7–6 cm. **Pan** 2–9 cm, erect, lanceoloid to ovoid, tightly to loosely contracted, with 15–35 spklt, proximal intnd shorter than 2 cm; **nd** with 1–2 br; **br** 0.9–3.2 cm, erect to ascending or slightly spreading, terete, smooth or sparsely scabrous, with 1–4 spklt. **Spklt** 6–12 mm, lengths to 3 times widths, lat compressed, not sex dimorphic; **flt** 2–7; **rchl intnd** 0.8–1.5 mm, smooth or sparsely scabrous, glab. **Glm**  $\frac{3}{5}$ – $\frac{4}{5}$  as long as the adjacent lm, distinctly keeled; **lo glm** 3-veined; **cal** of at least some proximal flt sparsely webbed, with 1–2 mm hairs, others glab, rarely all glab; **lm** 5–7 mm, lanceolate, 5–7-veined, distinctly keeled, smooth or sparsely finely scabrous, glab throughout or the keels and mrgl veins sparsely softly puberulent over the proximal  $\frac{1}{4}$ , lat veins moderately prominent, intercostal regions glab, mrgl glab, apc acute; **pal keels** sparsely scabrous, intercostal regions glab; **anth** vestigial (0.1–0.2 mm), aborted late in development, or 1.8–3.7 mm.  $2n$  = unknown.

*Poa chambersii* is known only from upland forest openings in the Cascades of western Oregon, where it is dioecious, and from high elevations on Steens Mountain in southeastern Oregon, where it is gynodioecious. It differs from *P. wheeleri* (see previous) in having glabrous sheaths and flat or folded, glabrous innovation blades.

**12. *Poa fendleriana* (Steud.) Vasey VASEY'S**  
MUTTONGRASS [p. 366, 501]

**Pl** per; densely to loosely tufted, rhz, often weakly so, rhz usu short and inconspicuous. **Bas brchg** mainly invag, usu some exvag. **Clm** 15–70 cm, smt stout, erect or the bases

decumbent, terete or weakly compressed; **nd** terete, 0–1 exerted. **Shth** closed for about  $\frac{1}{3}$  their length, terete, smooth or scabrous, glab or occ retrorsely pubescent, bases of bas shth glab, distal shth lengths usu (5)9+ times bld lengths; **col** smooth or scabrous, glab or hispidulous; **lig** 0.2–18 mm, smooth or scabrous, decurrent or not, apc truncate to acuminate, ciliolate or glab; **innovation bld** usu moderately to densely scabrous or hispidulous on and between the veins, infrequently nearly smooth and glab; **cauline bld** strongly rdcd in length distally, (0.5)1–3(4) mm wide, usu involute, moderately thick and firm, infrequently moderately thin, abx surfaces usu smooth, infrequently scabrous, apc narrowly prow-shaped, steeply rdcd in length distally along the clm, flag lf bld often absent or very rdcd, smt to 1(3) cm. **Pan** 2–12(30) cm, erect, contracted, narrowly lanceoloid to ovoid, congested, frequently with 100+ spklt; **nd** with 1–2 br; **br** 1–8 cm, erect, terete to weakly angled, smooth or scabrous, with 3–15(25) spklt. **Spklt** (3)4–8(12) mm, lengths to 3 times widths, broadly lanceolate to ovate, lat compressed, not sex dimorphic; **flt** 2–7(13); **rchl intnd** 0.8–1.3 mm, smooth, glab or hairy, hairs to 0.3 mm. **Glm** lanceolate, distinctly keeled; **lo glm** 1–3-veined, distinctly shorter than the lowest lm; **cal** glab; **lm** 3–6 mm, lanceolate, distinctly keeled, keels, mrgl veins, and lat veins glab or short- to long-villous or softly puberulent, lat veins moderately prominent, intercostal regions softly puberulent or glab, smooth or sparsely scabrous, mrgl glab, apc acute; **pal keels** scabrous, smt softly puberulent or long-villous at midlength, hairs to 0.4+ mm; **anth** vestigial (0.1–0.2 mm) or 2–3 mm.  $2n$  = 28+II, 56, 56–58, 58–64.

*Poa fendleriana* grows on rocky to rich slopes in sagebrush-scrub, interior chaparral, and southern (rarely northern) high plains grasslands to forests, and from desert hills to low alpine habitats. Its range extends from British Columbia to Manitoba and south to Mexico. It is one of the best spring fodder grasses in the eastern Great Basin, Colorado plateaus, and southern Rocky Mountains. It is dioecious. Each of the subspecies has regions of sexual reproduction in which staminate plants are common within populations, and extensive regions where only apomictic, pistillate plants are found. The sexual populations set little seed; the apomictic populations are highly fecund.

*Poa fendleriana* hybridizes with *Poa cusickii* subsp. *pallida* (p. 124). The hybrids are called *P. xematophylla* (p. 124).

There are two subspecies in the Intermountain Region. They intergrade where sexual or partially sexual populations have come into contact.

1. Ligules of the middle cauline leaves 0.2–1.2 (1.5) mm long, not decurrent, usually scabrous, apices truncate to rounded, upper margins ciliate or scabrous..... subsp. *fendleriana*
1. Ligules of the middle cauline leaves (1.5)1.8–18 mm long, decurrent, usually smooth to sparsely scabrous, apices obtuse to acuminate, upper margins usually smooth, glabrous.... subsp. *longiligula*

***Poa fendleriana* (Steud.) Vasey subsp. *fendleriana* [p. 366]**

**Col** often scabrous or hispidulous near the throat; **lig** of mid cauline lvs 0.2–1.2(1.5) mm, scabrous, mrg not decurrent, apc truncate to rounded, usu scabrous or ciliate; **innovation bld** usu scabrous or puberulent adx. **Rchl intnd** usu smooth and glab. **Lm** long-villous on the keels and mrgl veins, intercostal regions usu glab, infrequently softly puberulent.  $2n = 56, 58-60, 59, 58-64$ .

*Poa fendleriana* subsp. *fendleriana* grows chiefly in the southern and middle Rocky Mountains, and in the mountains surrounding the Colorado plateaus. Sexually reproducing populations are mainly confined to Arizona, New Mexico, and Texas, are rare in California, and infrequent in Colorado and Utah. Pistillate populations are common from southern British Columbia to Manitoba and south to northern Mexico, but infrequent in the Great Basin.

***Poa fendleriana* subsp. *longiligula* (Scribn. & T. A. Williams) Soreng LONGTONGUE MUTTONGRASS [p. 366]**

**Col** smooth to scabrous near the throat; **lig** of mid cauline lvs (1.5)1.8–18 mm, smooth or sparsely scabrous, mrg decurrent, apc obtuse to acuminate, usu smooth, glab; **innovation bld** usu scabrous, smt puberulent adx. **Rchl intnd** usu sparsely hispidulous or sparsely softly puberulent. **Lm** long-villous on the keels and mrgl veins, intercostal regions usu glab, infrequently softly puberulent.  $2n = 56, 56-58$ .

*Poa fendleriana* subsp. *longiligula* tends to grow to the west of subsp. *fendleriana*, in areas where winter precipitation is more consistent and summer precipitation less consistent. Apomixis is far more common and widespread than sexual reproduction in this subspecies. Apomictic populations range from southwestern British Columbia to Baja California, Mexico, throughout the Great Basin and Colorado plateaus, and eastward across the Rocky Mountains. Sexual populations are mainly confined to northern Arizona, California, Nevada, and Utah.

**13. *Poa cusickii* Vasey CUSICK'S BLUEGRASS [p. 367, 501]**

**Pl** per; usu densely tufted, rarely moderately densely tufted, usu neither rhz nor stln, infrequently short-rhz or stln, rarely with distinct rhz. **Bas brchg** invag or invag and exvag. **Clm** 10–60(70) cm tall, 0.5–1.8 mm thick, erect or the bases decumbent, terete or weakly compressed;

**nd** terete, 0–2 exserted. **Shth** closed for  $\frac{1}{4}$ – $\frac{3}{4}$  their length, terete, smooth or scabrous, glab, bases of bas shth glab, distal shth lengths 1.6–10 times bld lengths; **col** smooth or scabrous, glab; **lig** of cauline lvs 1–3(6) mm, smooth or scabrous, truncate to acute, lig of the innovation lvs 0.2–0.5(2.5) mm, scabrous, usu truncate; **innovation bld** smt distinctly different from the cauline bld, 0.5–2 mm wide, involute, moderately thick, moderately firm, adx surfaces usu densely scabrous or hispidulous to softly puberulent, infrequently nearly smooth and glab; **cauline bld** subequal or the midcauline bld longest or the bld gradually rdcd in length distally, 0.5–3 mm wide, flat, folded, or involute, usu thin, usu withering, abx surfaces smooth or scabrous, apc narrowly to broadly prow-shaped, flag lf bld 0.5–5(6) cm. **Pan** 2–10(12) cm, usu erect, contracted or loosely contracted, narrowly lanceoid to ovoid, congested or moderately congested, with 10–100 spklt and 1–3(5) br per nd; **br** 0.5–4(5) cm, erect or steeply ascending, fairly straight, slender to stout, terete to angled, smooth or scabrous, with 1–15 spklt. **Spklt** (3)4–10 mm, lengths to 3 times widths, broadly lanceolate to narrowly ovate, lat compressed, not sex dimorphic; **flt** 2–6; **rchl intnd** 0.5–1.2 mm, smooth or scabrous. **Glm** lanceolate, distinctly keeled; **lo glm** 3-veined, distinctly shorter than the lowest lm; **cal** glab or diffusely webbed, hairs less than  $\frac{1}{4}$  the lm length; **lm** (3)4–7 mm, lanceolate to broadly lanceolate, distinctly keeled, memb to thinly memb, smooth or sparsely to densely scabrous, glab or the keels and/or mrgl veins puberulent proximally, lat veins obscure to prominent, mrg glab, apc acute; **pal keels** scabrous, intercostal regions glab; **anth** vestigial (0.1–0.2 mm), aborted late in development, or 2–3.5 mm.  $2n = 28, 28+II, 56, 56+II, 59, ca. 70$ .

*Poa cusickii* grows in rich meadows in sagebrush scrub to rocky alpine slopes, from the southwestern Yukon Territory to Manitoba and North Dakota, south to central California and eastern Colorado. It is gynodioecious or dioecious.

Sexually reproducing plants of *Poa cusickii* subsp. *cusickii* and *pallida* grow in different geographic areas, but pistillate plants of these two subspecies have overlapping ranges. Only pistillate plants are known in *Poa cusickii* subsp. *epilis*. All the alpine plants studied were pistillate.

1. Panicle branches smooth or slightly scabrous, or the basal blades more than 1.5 mm wide and flat or folded; cauline blades more than 1.5 mm wide, often flat; some basal branching extravaginal; lemmas and calluses sometimes sparsely puberulent..... subsp. *epilis*
1. Panicle branches moderately to strongly scabrous; basal and cauline blades usually less than 1.5 mm

wide, involute, rarely flat or folded; basal branching intravaginal; lemmas and calluses glabrous.

3. Panicle branches longer than 1.7 cm in at least some panicles; panicles open or contracted . . . subsp. *cusickii*
3. Panicle branches up to 1.7 cm long, stout; panicles contracted . . . subsp. *pallida*

***Poa cusickii* Vasey subsp. *cusickii* [p. 367]**

**Pl** densely tufted. **Bas brchg** invag. **Clm** 10–60(70) cm, mostly erect, with 0–1 well-exserted nd. **Shth** closed for  $\frac{1}{4}$ – $\frac{2}{3}$  their length, distal shth lengths 3–10 times bld lengths; **innovation bld** 0.5–1 mm wide; **cauline bld** less than 1.5 mm wide, flat, folded, or involute, apc narrowly prow-shaped, flag lf bld (0.5)1.5–5 cm. **Pan** usu 5–10(12) cm, contracted or loosely contracted, with 20–100 spklt; **nd** with 1–5 br; **br** 1.7–4(5) cm, slender to stout, moderately to densely scabrous, with 2–15 spklt. **Spklt** 4–10 mm. **Cal** glab; **lm** 4–7 mm, glab; **anth** vestigial (0.1–0.2 mm) or 2–3.5 mm.  $2n = 28$ .

*Poa cusickii* subsp. *cusickii* grows mainly in mesic desert upland and mountain meadows, on and around the Columbia plateaus of northern California, Oregon, southern Washington, and adjacent Idaho and Nevada. It is highly variable, with fairly open- to contracted-panicle populations, and from gynodioecious to dioecious populations. The modal and mean longest branch lengths of the narrower-panicked populations of subsp. *cusickii* serve to distinguish it from subsp. *pallida* in most cases. It appears to have hybridized with *P. pringlei* around Mount Rose, Nevada.

***Poa cusickii* subsp. *epilis* (Scribn.) W.A. Weber  
SKYLINE BLUEGRASS [p. 367]**

**Pl** densely tufted. **Bas brchg** invag and exvag. **Clm** 20–45 cm, mostly erect, with 1–2 well-exserted nd. **Shth** closed for  $\frac{1}{3}$ – $\frac{3}{4}$  their length, distal shth lengths 2–5 times bld lengths; **innovation bld** 0.7–1 mm wide; **cauline bld** more than 1.5 mm wide, flat or folded, apc narrowly to broadly prow-shaped, flag lf bld 1.5–5 cm, apc broadly prow-shaped. **Pan** usu 2–7 cm, usu contracted, with 20–70 spklt; **nd** with 2–5 br; **br** 1–3 cm, moderately stout, smooth to sparsely scabrous, with 1–8 spklt. **Spklt** (3)4–8 mm. **Cal** glab; **lm** 3–6 mm, glab or, rarely, the keels and mrgl veins sparsely puberulent proximally; **anth** usu aborted late in development.  $2n = 56$ , ca. 70.

*Poa cusickii* subsp. *epilis* tends to grow around timberline. It is strictly pistillate and is usually quite distinct from subspp. *cusickii* and *pallida*. It occurs throughout most of the range of the species, and is fairly uniform even though widespread.

***Poa cusickii* subsp. *pallida* Soreng [p. 367]**

**Pl** densely tufted. **Bas brchg** invag. **Clm** 10–40(55) cm, mostly erect, with 0(1) scarcely exserted nd. **Shth** closed for  $\frac{1}{4}$ – $\frac{2}{3}$  their length, distal shth

lengths 3.6–10 times bld lengths; **innovation bld** 0.5–1 mm wide, apc usu narrowly prow-shaped; **cauline bld** usu less than 1.5 mm wide, flat, folded, or involute, usu narrowly prow-shaped, infrequently broadly prow-shaped, flag lf bld 0.5–2(3) cm. **Pan** 2–6 cm, contracted, with 10–40 spklt; **nd** with 1–3 br; **br** 0.5–1.7 cm, stout, moderately to densely scabrous, with 2–5 spklt. **Spklt** 4–10 mm. **Cal** glab; **lm** 4–7 mm, glab; **anth** vestigial (0.1–0.2 mm) or 2–3.5 mm.  $2n = 56$ , 56+II, 59.

*Poa cusickii* subsp. *pallida* grows in forb-rich mountain grasslands to alpine habitats, from the southern Yukon Territory to California, across the Great Basin and through the Rocky Mountains to central Colorado. It is found mainly east and north of subsp. *cusickii*, but pistillate plants extend into the range of that subspecies in the eastern alpine peaks of California, Nevada, and Oregon. The shorter branch length usually serves to distinguish it from narrow-panicked plants of subsp. *cusickii*. It hybridizes with *P. fendleriana* (see previous), forming *P. xnematophylla* (see next). The hybrids may have hairy lemmas or, less often, broader leaf blades and glabrous lemmas.

**14. *Poa xnematophylla* Rydb. [p. 368, 501]**

**Pl** per; densely tufted, not stln, not rhz. **Bas brchg** invag. **Clm** 10–35 cm, erect or the bases decumbent; **nd** terete, 0–1 exserted. **Shth** closed for  $\frac{1}{4}$ – $\frac{3}{4}$  their length, terete, apc acuminate; **innovation bld** 0.5–1(2) mm wide, involute, moderately thick, moderately firm, abx surfaces smooth or scabrous, adx surfaces usu densely scabrous or hispidulous; **cauline bld** usu gradually rcd distally, 0.5–1(2) mm wide, flat, folded, or involute, thin, smt withering, abx surfaces smooth or scabrous, apc narrowly prow-shaped, smt the flag lf bld vestigial. **Pan** 2–8 cm, erect, narrowly lanceoloid to ovoid, contracted, congested; **nd** with 1–2 br; **br** 0.5–3 cm, erect, terete to angled, scabrous. **Spklt** 4–8 mm, lengths to 3 times widths, broadly lanceolate to narrowly ovate, lat compressed, not sex dimorphic; **flt** 2–5; **rchl intnd** 0.5–1.2 mm, smooth or scabrous. **Glm** lanceolate, distinctly keeled; **lo glm** 3-veined, distinctly shorter than the lowest lm; **cal** glab; **lm** 4–7 mm, lanceolate, distinctly keeled, memb, keels and mrgl veins usu softly puberulent, smt short-villous, intercostal regions usu glab, infrequently softly puberulent proximally, lat veins moderately prominent, mrg glab, apc acute; **pal keels** scabrous; **anth** mostly vestigial (0.1–0.2 mm), rarely 2–3 mm.  $2n =$  unknown.

*Poa xnematophylla* is believed to consist of hybrids between *P. cusickii* subsp. *pallida* (see previous) and *P. fendleriana* (p. 122). It is mostly pistillate and apomictic; few staminate plants have been found. It usually resembles *P. cusickii* most,

but grades towards *P. fendleriana*. It tends to grow on drier slopes than either parent, mainly in and around sagebrush desert/forest interfaces.

15. ***Poa leibergii*** Scribn. LEIBERG'S BLUEGRASS  
[p. 368, 501]

**Pl** per; densely tufted, tufts slender, not stln, not rhz. **Bas brchg** invag. **Clm** 5–35 cm tall, 0.5–0.7 mm thick, erect or the bases decumbent, with 0–1 exerted nd. **Shth** closed for  $\frac{2}{5}$ – $\frac{4}{5}$  their length, terete, smooth and glab, bases of bas shth glab; **col** smooth, glab; **lig** (1)2–4 mm, colorless, transparent, smooth, mrg decurrent or not, apc truncate to acute, lig of innovation and cauline lvs alike; **innovation bld** smooth or sparsely scabrous abx; **cauline bld** 0.5–1 mm wide, flat, folded, or involute, thin, lax, filiform, usu soon withering, both surfaces smooth or sparsely scabrous, apc narrowly prow-shaped. **Pan** 1–5(8) cm, erect to lax, lanceoloid to ovoid or pyramidal, contracted to open, sparse, with (1)6–17(22) spklt; **nd** with 1–2 br; **br** 1–4 cm, erect to spreading, slender, terete, smooth or sparsely to rarely moderately densely scabrous, with 1–2(3) spklt. **Spklt** 4–8 mm, lengths to 3 times widths, broadly lanceolate to broadly ovate, lat compressed, not sex dimorphic; **flt** 2–8; **rchl intnd** glab. **Glm** thin, somewhat lustrous, distinctly keeled; **lo glm** 3-veined, distinctly shorter than the lowest lm; **cal** glab; **lm** 3.5–7 mm, lanceolate, distinctly keeled, thinly memb, smooth or scabrous, glab, lat veins moderately prominent to prominent, mrg glab, apc acute to truncate and erose; **pal keels** smooth or scabrous, glab or pectinately ciliate; **anth** vestigial (0.1–0.2 mm) or 1.3–3 mm.  $2n$  = unknown.

*Poa leibergii* grows on mossy ledges and around vernal pools and the outer margins of *Camassia* swales, in sagebrush desert to low alpine habitats, especially where snow persists. It is found primarily on and around the basaltic Columbia plateaus, and is gynodioecious. All reports of *P. leibergii* from California, and most of those from Nevada, are based on misidentified specimens of *P. cusickii* subsp. *cusickii* (p. 124) and *P. stebbinsii*.

***Poa* sect. *Pandemos* Asch. & Graebn.**

**Pl** per; smt stln, smt rhz. **Bas brchg** invag and exvag. **Clm** 25–120 cm, terete or weakly compressed; **nd** terete or slightly compressed. **Shth** closed for about  $\frac{1}{4}$ – $\frac{1}{2}$  their length, compressed, distal shth lengths 0.5–4 times bld lengths; **lig** 3–10 mm, scabrous, acute to acuminate; **bld** 1–5 mm wide, flat, lax, soft, veins and mrg scabrous, apc narrowly prow-shaped. **Pan** 8–25 cm, erect or lax, pyramidal, open; **nd** with 3–7 br; **br** 2–8(10) cm, ascending to spreading, flexuous to fairly straight, angled, angles densely scabrous, crowded. **Spklt** 2.3–3.5 mm, lengths to 3 times widths, lat compressed, not bulbiferous; **flt** 2–4, bisex. **Glm** distinctly keeled, keels scabrous; **lo glm** subulate to narrowly lanceolate, usu arched to sickle-shaped, 1-veined, distinctly shorter than the lowest lm; **cal** terete or slightly lat compressed, glab or dorsally webbed; **lm** 2.3–3.5 mm, lanceolate, distinctly keeled, keels

16. ***Poa pringlei*** Scribn. PRINGLE'S BLUEGRASS  
[p. 369, 501]

**Pl** per; densely tufted, not stln, not rhz. **Bas brchg** invag. **Clm** 5–35 cm tall, 0.5–0.9 mm thick, erect or the bases decumbent, with 0(1) exerted nd. **Shth** closed for  $\frac{1}{4}$ – $\frac{1}{3}$  their length, terete, smooth or sparsely scabrous, glab, bases of bas shth glab, distal shth lengths 2–4 times bld lengths; **col mrg** smooth or scabrous to hispidulous; **lig** of cauline lvs 1–6 mm, colorless, translucent, smooth or scabrous, truncate to acute, lig of the innovations 1–2.5 mm; **innovation bld** similar to the cauline bld, 1.5–3 mm wide, involute, thick, frequently somewhat arcuate, abx surfaces smooth, adx surfaces densely scabrous or hispidulous; **cauline bld** becoming only slightly shorter distally, 1.5–3 mm wide, involute, moderately thick, soft to moderately firm, abx surfaces smooth, apc narrowly prow-shaped. **Pan** 1–6 cm, erect, narrowly lanceoloid to ovoid, moderately congested, with 6–20(25) spklt; **nd** with 1–2 br; **br** 0.5–1.5(2) cm, erect, moderately stout, terete or weakly angled, angles smooth to fairly densely scabrous, with 1–3 spklt. **Spklt** 6–8(12) mm, lengths to 3.5 times widths, broadly lanceolate, lat compressed, not sex dimorphic, lustrous; **flt** 2–5; **rchl intnd** smooth. **Glm** subequal, isomorphic, lanceolate to broadly lanceolate, thin, lustrous, distinctly keeled, keels smooth or sparsely scabrous; **lo glm** shorter than the adjacent lm, 3-veined; **cal** glab; **lm** 5–8 mm, lanceolate, distinctly keeled, thinly memb, smooth or sparsely finely scabrous, glab, lat veins moderately prominent, mrg glab, apc acute; **pal keels** coarsely scabrous; **anth** vestigial (0.1–0.2 mm) or 2–4 mm.  $2n$  = unknown.

*Poa pringlei* grows on rocky subalpine and alpine slopes in Oregon and California. Sierra Nevada populations are pistillate and apomictic.

hairy, glab elsewhere or the mrgl veins pubescent, lat veins prominent; **pal keels** smooth, muriculate, tuberculate, or minutely scabrous; **anth** 3, 1.3–2 mm.

*Poa* sect. *Pandemos* includes two diploid species of European origin. One, *P. trivialis*, is now widespread around the world.

17. *Poa trivialis* L. ROUGH BLUEGRASS [p. 369, 501]

**Pl** per, short-lived; somewhat loosely to densely tufted, usu weakly stln. **Bas brchg** invag. **Clm** 25–120 cm, decumbent to erect, smt trailing and rooting at the nd, terete or weakly compressed; **nd** terete or slightly compressed, (0)1–3 exserted. **Shth** closed for about  $\frac{1}{3}$ – $\frac{1}{2}$  their length, compressed, usu densely scabrous, bases of bas shth glab, distal shth lengths 0.5–4 times bld lengths; **col** smooth or scabrous, glab; **lig** 3–10 mm, scabrous, acute to acuminate; **bld** 1–5 mm wide, flat, lax, soft, sparsely scabrous over the veins, mrg scabrous, apc narrowly prow-shaped. **Pan** 8–25 cm, erect or lax, pyramidal, open, with 35–100+ spklt; **nd** with 3–7 br; **br** 2–8(10) cm, ascending to spreading, flexuous to fairly straight, angled, angles densely scabrous, crowded, with 5–35 spklt in the distal  $\frac{1}{2}$ – $\frac{3}{4}$ . **Spklt** 3–4.5(5) mm, lengths to 3 times widths, lat compressed; **flt** 2–4,

bisex; **rchl intnd** smooth or muriculate. **Glm** distinctly keeled, keels scabrous; **lo glm** subulate to narrowly lanceolate, usu arched to sickle-shaped, 1-veined, distinctly shorter than the lowest lm; **cal** webbed, hairs over  $\frac{2}{3}$  the lm length; **lm** 2.3–3.5 mm, lanceolate, distinctly keeled, keels usu sparsely puberulent to  $\frac{3}{5}$  their length, mrgl veins usu glab, infrequently the proximal  $\frac{1}{4}$  softly puberulent, intercostal regions smooth, glab, up lm smt glab, lat veins prominent, mrg glab, apc acute; **pal keels** smooth, muriculate, tuberculate, or minutely scabrous; **anth** 1.3–2 mm.  $2n = 14$ .

*Poa trivialis* is an introduced European species. Only *Poa trivialis* subsp. *trivialis* is present in the Intermountain Region. Several cultivars have been planted for pastures and lawns, and have often escaped cultivation. *Poa trivialis* is easily recognized by its flat blades, long ligules, sickle-shaped lower glumes, prominent callus webs, and lemmas with pubescent keels and pronounced lateral veins.

*Poa* sect. *Oreinos* Asch. & Graebn.

**Pl** per; densely to loosely tufted, smt shortly rhz or stln. **Bas brchg** mostly exvag or mixed invag and exvag. **Clm** 5–100 cm tall, 0.5–1.5 mm thick, slender, smt weak, terete; **nd** terete. **Shth** usu closed for  $\frac{1}{5}$ – $\frac{3}{5}$  their length, hybrids smt closed for  $\frac{1}{10}$ – $\frac{1}{5}$  their length, terete, smooth or sparsely scabrous; **lig** 0.5–4(6) mm, smooth or sparsely scabrous, truncate to acute, smt lacerate; **innovation bld** similar to the cauline bld; **cauline bld** 0.8–4 mm wide, flat, thin, lax, soft, adx surfaces smooth or sparsely scabrous, narrowly prow-tipped. **Pan** 1.5–15 cm, lax or slightly lax, loosely contracted to open; **nd** with 1–3(5) br; **br** 1–8 cm, steeply ascending to reflexed, capillary to slender, drooping to fairly straight, sulcate or angled, smooth or the angles scabrous, with 1–15 spklt. **Spklt** 3.2–8 mm, lengths to 3.5 times widths, narrowly lanceolate to ovate, lat compressed, not bulbiferous; **flt** 2–5, bisex; **rchl intnd** smooth, glab. **Glm** subulate to broadly lanceolate, thin, distinctly keeled, keels smooth or scabrous; **lo glm** 1–3-veined; **cal** terete or slightly lat compressed, glab or dorsally webbed; **lm** 2.5–4.6 mm, lanceolate to broadly lanceolate, distinctly keeled, thin, keels and mrgl veins short- to long-villous, lat veins usu glab, infrequently sparsely softly puberulent, lat veins obscure or moderately prominent, intercostal regions glab; **pal keels** scabrous, usu glab, infrequently pectinately ciliate; **anth** 3, 0.2–1.1(1.3) mm.

*Poa* sect. *Oreinos* is circumboreal. It includes seven species: four strictly Eurasian, one amphiatlantic, one primarily western North American with isolated occurrences in the Russian Far East, and one restricted to North America. The species are boreal, alpine to low arctic, and grow in bogs and on alpine slopes. They are primarily slender perennials with extravaginal tillering.

18. *Poa laxa* Haenke LAX BLUEGRASS [p. 370, 501]

**Pl** per; not or only slightly glaucous; densely tufted, not rhz, not stln. **Bas brchg** mixed, mainly exvag or mainly psdinvag, smt invag. **Clm** 8–35 cm tall, 0.5–0.9 mm thick, ascending to erect, slender; **nd** terete, 0(1) exserted. **Shth** closed for  $\frac{1}{5}$ – $\frac{1}{3}$  their length, terete, smooth,

glab, bases of bas shth glab; **col** smooth or scabrous, glab; **lig** 2–4 mm, smooth, apc acute, often lacerate; **innovation bld** similar to the cauline bld; **cauline bld** 1–2(3) mm wide, flat, thin, soft, smooth, narrowly prow-tipped, bld not strongly graduated or rdcd upwards. **Pan** 2–8 cm, slightly lax, usu loosely contracted and sparse, infrequently contracted and dense; **nd**



with 1–3(5) br; **br** 1–3(4) cm, usu ascending or weakly spreading, infrequently erect, fairly straight or flexuous, slender, sulcate or angled, smooth or the angles sparsely scabrous, with 1–8 spklt. **Spklt** 4–6 mm, lengths to 3 times widths, lat compressed; **flt** 2–5; **rchl intnd** shorter than 1 mm, smooth, glab. **Glm** nearly equaling or slightly longer than the adjacent **lm**, lanceolate to broadly lanceolate, thin, distinctly keeled, keels smooth or sparsely scabrous; **lo glm** 1–3-veined; **up glm** shorter than or subequal to the lowest **lm**; **cal** glab or webbed, hairs usu shorter than  $\frac{1}{4}$  the **lm** length, sparse; **lm** 3–4.6 mm, lanceolate to broadly lanceolate, thin, distinctly keeled, keels and mrgl veins short- to long-villous, lat veins glab or sparsely softly puberulent, lat veins obscure, intercostal regions glab, mrg glab, apc acute; **pal** sparsely scabrous over the keels; **anth** (0.6)0.8–1.1(1.3) mm.  $2n = 28, 42, 84$ .

*Poa laxa* is a low arctic to high alpine amphiatlantic species. Its short anthers and smoother branches usually distinguish it from *P. glauca* (p. 129), with which it can hybridize to form *P. laxa* × *glauca*.

*Poa laxa* has four subspecies, one of which is found in the Intermountain Region.

***Poa laxa* subsp. *banffiana* Soreng [p. 370]**

**Bas brchg** mainly exvag. **Bld** thin. **Pan** 2–8 cm, lax, loosely contracted, sparse, with 2–3(5) br per nd; **br** steeply ascending, fairly straight, usu sparsely scabrous, infrequently smooth. **Glm** lanceolate to broadly lanceolate; **lo glm** 3-veined; **cal** glab; **lm** with keels short-villous for at least  $\frac{1}{2}$  their length, usu the lat veins on at least 1 side of some flt sparsely softly puberulent, infrequently all the lat veins glab; **anth** 0.8–1.1 mm.  $2n = 84$ .

*Poa laxa* subsp. *banffiana* grows primarily in mesic alpine locations in the Rocky Mountains. It is sometimes difficult to distinguish from *P. glauca* (p. 129).

***Poa* sect. *Stenopoa* Dumort.**

**Pl** per; densely to loosely tufted, not rhz, infrequently stln. **Bas brchg** all or mostly exvag. **Clm** 5–120 cm, terete or slightly compressed; **nd** terete or slightly compressed. **Shth** closed for  $\frac{1}{10}$ – $\frac{1}{5}$  their length, terete or slightly compressed, smooth or sparsely scabrous, distal shth shorter or longer than their bld; **lig** 0.2–6 mm, usu scabrous, smt smooth, apc truncate or obtuse and usu ciliate, or acute and not ciliate; **bld** 0.8–8 mm wide, mostly flat, smt folded, moderately thin, abruptly ascending to spreading, lax or straight, mrg scabrous, adx surfaces usu scabrous over the veins, apc narrowly prow-shaped. **Pan** 1–30(41) cm, erect or lax, open, narrowly lanceoloid to ovoid, sparse to moderately congested; **nd** with 2–9 br; **br** 0.4–15 cm, erect to reflexed, angled, angles scabrous. **Spklt** 3–8(9) mm, lengths 2–3.5 times widths, narrowly lanceolate to narrowly ovate, lat compressed, rarely bulbiferous; **flt** (1)2–5, bisex, rarely bulb-forming; **rchl intnd** mostly shorter than 1 mm, frequently muriculate or scabrous or pubescent. **Glm** subulate to broadly lanceolate, distinctly keeled, keels smooth or sparsely scabrous; **lo glm** 3-veined; **cal** terete or slightly lat compressed, glab or dorsally webbed; **lm** 2–4 mm, narrowly to broadly lanceolate, distinctly keeled, coriaceous-memb, usu finely

**19. *Poa leptocoma* Trin. WESTERN BOG BLUEGRASS [p. 370, 501]**

**Pl** per; dark to light green, often anthocyanic in part; loosely tufted, usu neither stln nor rhz, occ with short, slender rhz. **Bas brchg** mostly exvag. **Clm** 15–100 cm, slender to middling. **Shth** closed for  $\frac{1}{4}$ – $\frac{3}{5}$  their length, terete, smooth or sparsely scabrous, mrg not ciliate; **lig** 1.5–4(6) mm, smooth to sparsely scabrous, obtuse to acute; **bld** 1–4 mm wide, flat, thin, lax, soft, apc narrowly prow-shaped. **Pan** 5–15 cm, lax, open, sparse; **nd** with 1–3(5) br; **br** (2)3–8 cm, spreading to reflexed, capillary, usu angled, infrequently only sulcate or subterete, angles usu moderately densely scabrous, smt only sparsely so, with (3)4–15 spklt. **Spklt** 4–8 mm, lanceolate or narrowly lanceolate, green or partly purple to dark purple; **flt** 2–5; **rchl intnd** smooth, glab. **Glm** subulate to lanceolate, thin, distinctly keeled, keels usu scabrous; **lo glm** subulate to narrowly lanceolate, 1-veined; **up glm** distinctly shorter than to nearly equaling the lowest **lm**; **cal** sparsely webbed; **lm** 3–4 mm, lanceolate, often partly purple, distinctly keeled, thin, smooth, or with sparse hooks apically, keels and mrgl veins softly puberulent to long-villous, hairs extending  $\frac{1}{4}$ – $\frac{2}{3}$  the keel length, smt sparse, lat veins and intercostal regions glab, mrg glab, infolded, apc sharply acute to acuminate, usu bronze-colored; **pal keels** nearly smooth, scabrous, or pectinately ciliate; **anth** 0.2–1.1 mm.  $2n = 42$ .

*Poa leptocoma* grows around lakes and ponds and along streams, in subalpine and alpine to low arctic habitats, in western North America from Alaska to California and New Mexico, and on the Kamchatka Peninsula, Russia. It often grows with or near *P. reflexa* (p. 120), from which it differs in its more scabrous panicle branches, shorter anthers, glabrous or pectinately ciliate palea keels, and preference for wet sites. The two also differ in their ploidy level, *P. leptocoma* being hexaploid, and *P. reflexa* tetraploid.



muriculate, keels and mrgl veins long- to short-villous, intercostal regions glab or softly puberulent to short-villous, lat veins obscure, apc usu partially bronze-colored; **pal keels** scabrous, smt softly puberulent at midlength, intercostal regions glab or puberulent; **anth** 3, 0.8–2.5 mm.

*Poa* sect. *Stenopoa* includes 30 species. Most are Eurasian; three are native in, and one is restricted to, North America. The North American species are caespitose or weakly stoloniferous, and have sheaths open for much of their length, scabrous panicle branches, and faint lateral lemma veins. The new shoots for the following year are initiated late in the growing season, after flowering and fruiting; vegetative and flowering shoots are usually not present at the same time.

20. ***Poa palustris* L.** FOWL BLUEGRASS [p. 370, 501]

**Pl** per; usu loosely, smt densely, tufted, frequently stln. **Bas brchg** exvag or mixed exvag and invag. **Clm** 25–120 cm, erect or the bases decumbent, smt brchg above the base, terete or weakly compressed, scabrous below the pan; **nd** terete or slightly compressed, proximal nd often slightly swollen, uppermost nd at or above  $(\frac{1}{3})\frac{1}{2}$  the clm length. **Shth** closed for  $\frac{1}{10}$ – $\frac{1}{5}$  their length, slightly compressed, glab or sparsely retrorsely scabrous, bases of bas shth glab, distal shth lengths 0.7–2.2 times bld lengths; **lig** (1)1.5–6 mm, smooth or sparsely to moderately scabrous, apc obtuse to acute, frequently lacerate, usu minutely ciliate; **bld** 1.5–8 mm wide, flat, usu several per clm, steeply ascending or spreading to 80°, often lax distally, apc narrowly prow-shaped. **Pan** (9)13–30(41) cm, lengths  $\frac{1}{3}$ – $\frac{1}{2}$  times widths at maturity, lax, eventually open, sparsely to moderately congested, with 25–100+ spklt; **nd** with 2–9 br; **br** 4–15 cm,  $\frac{3}{10}$ – $\frac{1}{2}$  the pan length, initially erect, eventually widely spreading to slightly reflexed, fairly straight, slender, angles densely scabrous. **Spklt** 3–5 mm, lengths 3–3.5 times widths, narrowly to broadly lanceolate, lat compressed; **flt** (1)2–5; **rchl intnd** mostly shorter than 1 mm, usu muriculate, smt smooth, rarely sparsely hispidulous. **Glm** subulate to lanceolate, distinctly keeled, keels smooth or sparsely scabrous; **lo glm** with lengths 6.4–10 times widths, 3-veined, long-tapered to a slender point; **cal** sparsely to moderately densely webbed, hairs  $(\frac{1}{2})\frac{2}{3}$ + the lm length; **lm** 2–3 mm, narrowly lanceolate to lanceolate, distinctly keeled, keels straight or gradually arched, usu abruptly inwardly arched at the jnt of the scarious apc, keels and mrgl veins short-villous, lat veins obscure, intercostal regions muriculate, glab, mrg distinctly inrolled, glab, apc obtuse or acute, usu partially bronze-colored, frequently incurved and blunt with a short, hyaline mrg; **pal keels** scabrous, intercostal regions glab; **anth** 1.3–1.8 mm.  $2n = 28, 30, 32, 35, 42, 56, 84$ .

*Poa palustris* is native to boreal regions of northern Eurasia and North America, and is widespread in cool-temperate and

boreal riparian and upland areas. *Poa palustris* is used for soil stabilization and waterfowl feed.

*Poa palustris* from drier woods and meadows tends to resemble *P. interior* (see next). The best features for recognizing it include its loose growth habit, more steeply ascending leaf blades, well-developed callus webs, narrowly hyaline lemma margins, and incurving lemma keels. It also has a tendency to branch above the base.

21. ***Poa interior* Rydb.** INTERIOR BLUEGRASS [p. 371, 501]

**Pl** per; green or less often glaucous; densely tufted, not stln, not rhz. **Bas brchg** all or mostly exvag. **Clm** 5–80 cm, usu slender, mostly erect or ascending, several to many arising together; **nd** terete or slightly compressed, (0)1–2(3) exerted, top nd usu at  $\frac{1}{3}$ – $\frac{3}{5}$  the clm length. **Shth** closed for  $\frac{1}{10}$ – $\frac{1}{5}$  their length, terete, bases of bas shth glab, distal shth lengths (0.6)0.88–1.64 times bld lengths; **lig** 0.5–1.5(3) mm, sparsely to densely scabrous, apc truncate to obtuse, ciliate; **bld** 0.8–3 mm wide, mostly flat, thin, soft, appressed or abruptly ascending to spreading, straight or somewhat lax, apc narrowly prow-shaped. **Pan** (1.5)3–15(17) cm, lengths generally 2.5–4 times widths at maturity, usu erect, lax in shade forms, narrowly lanceoloid to ovoid, sparsely to moderately congested; **nd** with 2–5 br; **br** 0.4–8(9) cm long,  $\frac{1}{4}$ – $\frac{1}{2}$  the pan length, ascending to widely spreading, fairly straight, slender to moderately stout, angled, angles moderately to densely scabrous. **Spklt** 3–6 mm, lengths 2–3 times widths, lanceolate to narrowly ovate, lat compressed, usu not glaucous; **flt** (1)2–3(5); **rchl intnd** usu shorter than 1 mm, smooth, muriculate, or scabrous, glab, hispidulous, or sparsely to densely puberulent, proximal intnd frequently curved. **Glm** lanceolate to broadly lanceolate, distinctly keeled, keels smooth or sparsely scabrous; **lo glm** 3-veined, long- or abruptly tapered to a slender point, lengths 4.5–6.3 times widths; **cal** usu webbed, infrequently glab in depauperate alpine specimens, webs usu scant, less than  $\frac{1}{2}$ ( $\frac{2}{3}$ ) the lm length, frequently minute; **lm** 2.4–4 mm, lanceolate, distinctly keeled, straight or gradually arched, not abruptly inwardly arched at the jnt with the scarious

apc, keels and mrgl veins short-villous, hairs extending  $\frac{2}{3}$ – $\frac{3}{4}$  the keel length, lat veins usu glab, rarely sparsely puberulent, obscure, intercostal regions smooth, smt weakly muriculate, glab, mrg not or slightly inrolled, glab, apc acute, usu partially bronze-colored; **pal keels** scabrous, intercostal regions glab; **anth** (1.1) 1.3–2.5 mm.  $2n = 28, 42, 56$ .

*Poa interior*, a native species, grows from Alaska to western Quebec and New York, south to Arizona and New Mexico. It is restricted to North America. It is fairly common from boreal forests to low alpine habitats of the Rocky Mountains. It grows in suberic to mesic habitats, such as mossy rocks and scree, usually in forests. It is usually tetraploid.

In alpine habitats, *Poa interior* is often quite short, and often sympatric with *P. glauca* (see next). It differs from *P. glauca* in having lemmas that are glabrous between the marginal veins and keels or, rarely, sparsely puberulent on the lateral veins. It usually also differs from *P. glauca* subsp. *rupicola* in having at least a few hairs on its calluses. It is sometimes difficult to distinguish from *P. palustris* (see previous), but differs in having lemmas with wider hyaline margins and straight or gradually arched keels, a densely tufted habit, and scanty webbed calluses.

## 22. *Poa glauca* Vahl [p. 371, 501]

**Pl** per; usu glaucous; densely tufted, not stln, not rhz. **Bas brchg** all or mostly exvag. **Clm** 5–40(80) cm, erect to spreading, straight, wiry, bases straight or slightly decumbent; **nd** terete or slightly compressed, usu 0–1 exserted, top nd at  $\frac{1}{10}$ – $\frac{1}{3}$  the clm length. **Shth** closed for  $\frac{1}{10}$ – $\frac{1}{2}$  their length, terete, bases of bas shth glab or sparsely minutely hairy, hairs 0.1–0.2 mm, distal shth lengths 1.1–4 times bld lengths; **lig** 1–4(5) mm, sparsely to densely scabrous, apc obtuse to acute, minutely ciliolate; **bld** 0.8–2.5 mm wide, flat or folded, thin, soft, appressed or abruptly ascending to spreading, straight, apc narrowly prow-shaped. **Pan** 1–10(20) cm, lengths 3–5 times widths at maturity, rarely racemelike with br of irregular length, erect, narrowly lanceoloid to ovoid, contracted to somewhat open, sparse, proximal intnd shorter than 1.5(4) cm; **nd** with 2–3(5) br; **br** erect, ascending or weakly spreading, fairly straight, short, stout, angled, angles moderately to densely scabrous, rarely only scabrous distally, glaucous; **ped** usu shorter than the spklt. **Spklt** 3–7(9) mm, lengths 2–3 times widths, lat compressed, rarely bulbiferous, usu glaucous; **flt** 2–5, rarely bulb-forming; **rchl intnd** to 1.2 mm, smooth, muriculate, or scabrous, glab or sparsely to densely hispidulous or puberulent. **Glm** subequal, narrowly to broadly lanceolate, distinctly keeled, keels smooth or sparsely scabrous, apc acute; **lo glm** 3-veined;

**up glm** 2–3.8(5.2) mm, lengths usu more than 4.1 times widths, distinctly shorter to subequal to the lowest lm; **cal** glab or webbed, webs from minute to more than  $\frac{1}{2}$  the lm length; **lm** 2.5–4 mm, lanceolate to broadly lanceolate, distinctly keeled, keels and mrgl veins short-villous, lat veins obscure, usu sparsely softly puberulent to short-villous, intercostal regions smooth, smt weakly muriculate, glab or puberulent, mrg glab, apc usu partially bronze-colored, obtuse or acute; **pal keels** scabrous, glab or softly puberulent at midlength, intercostal regions glab or softly puberulent; **anth** (1) 1.2–2.5 mm, mature sacs 0.2 mm wide, rarely aborted late in development.  $2n = 34, 42, 44, 47, 48, 49, 50, 56, 56, 57, 58, 60, 63, 64, 65, 70, 75, 78$ , ca. 100.

*Poa glauca* is a common, highly variable, circumboreal, boreal forest to alpine and high arctic species. It grows from Alaska to Greenland, south to California and New Mexico in the west, through Canada and the northeastern United States in the east, and at scattered locations in Patagonia. It generally favors dry habitats and tolerates disturbance well. It can be distinguished from *P. interior* (see previous) by its longer ligules, lower top culm node, and wider glumes and lemmas. It is often confused in herbaria with *P. abbreviata* subsp. *pattersonii* (p. 131), but differs in having primarily extravaginal branching and, usually, longer anthers. It is suspected to hybridize with *P. arctica* (p. 117) and *P. secunda* (p. 132). It is highly polyploid, and presumed to be highly apomictic.

1. Calluses usually webbed, sometimes glabrous; lemmas glabrous or hairy between the veins ..... subsp. *glauca*
1. Calluses glabrous; lemmas hairy between the veins ..... subsp. *rupicola*

## *Poa glauca* Vahl subsp. *glauca* GLAUCOUS BLUEGRASS [p. 371]

**Clm** 10–40(80) cm. **Pan** 3.5–10(20) cm. **Spklt** not bulbiferous; **flt** normal. **Cal** webbed or glab; **lm** usu with lat veins short-villous to softly puberulent, intercostal regions glab or short-villous to softly puberulent.  $2n = 34, 42, 44, 47, 48$ , ca. 49, 50, 56, 60, 63, 64, 65, 70, 75, 78.

*Poa glauca* subsp. *glauca* is the widespread and common subspecies in the Northern Hemisphere. It is also disjunct in South America. It does not grow in California, and is uncommon in the Great Basin and southern Rocky Mountains. It is highly variable and is often confused in herbaria with subsp. *rupicola*, but can sometimes be distinguished by its webbed calluses and lemmas that are glabrous between the veins. In the Rocky Mountains, *P. glauca* subsp. *glauca* often grows with subsp. *rupicola* and *P. interior* (see previous).

## *Poa glauca* subsp. *rupicola* (Nash) W.A. Weber TIMBERLINE BLUEGRASS [p. 371]

**Clm** to 5–15 cm. **Pan** 1–5 cm, usu narrowly lanceoloid. **Spklt** not bulbiferous; **flt** normal.

**Cal** glab; **lm** at least sparsely puberulent on the intercostal regions.  $2n = 48, 48-50, 56, 56-58$ , ca. 100.

*Poa glauca* subsp. *rupicola* is endemic to dry alpine areas of western North America. It is often confused in herbaria with

subsp. *glauca* and *P. interior* (see previous), but its calluses lack even a vestige of a web, and its lemmas have at least a few hairs between the lemma veins. It is often sympatric with both taxa outside of California.

### **Poa sect. Tichopoa** Asch. & Graebn:

**Pl** per; rhz, usu with solitary sht, smt loosely tufted. **Bas brchg** all or mostly exvag. **Clm** 15–60 cm, distinctly compressed; **nd** distinctly compressed. **Shth** closed for  $\frac{1}{10}-\frac{1}{5}$  their length, distinctly compressed; **lig** 1–3 mm, moderately to densely scabrous, mrg ciliolate, apc obtuse; **bld** 1.5–4 mm wide, flat, mrg scabrous, adx surfaces smooth or scabrous mainly over the veins, apc narrowly prow-shaped. **Pan** 2–10 cm, lengths usu 3–6 times widths, erect, linear to ovoid, mostly with 1–3 br per nd; **br** 0.5–3 cm, angled, angles scabrous. **Spklt** (2.3)3.5–7 mm, lat compressed, bisex, not bulbiferous; **flt** 3–7. **Cal** terete or slightly lat compressed, glab or pubescent, webbed; **lm** coriaceous-memb, usu finely muriculate, lat veins obscure, apc usu partially bronze-colored; **anth** 3, 1.3–1.8 mm.

*Poa* sect. *Tichopoa* has two species, both of which are native to Europe. They are similar to species of *Poa* sect. *Stenopoa*, differing in having strongly compressed culms and nodes, and in being rhizomatous. One of the species is found in the Intermountain Region.

### 23. **Poa compressa** L. CANADA BLUEGRASS [p. 372, 501]

**Pl** per; usu with solitary sht, smt loosely tufted, extensively rhz. **Clm** 15–60 cm, wiry, bases usu geniculate, strongly compressed; **nd** strongly compressed, some proximal nd usu exerted. **Shth** closed for  $\frac{1}{10}-\frac{1}{5}$  their length, distinctly compressed, bases of bas shth glab; **lig** 1–3 mm, moderately to densely scabrous, ciliolate, apc obtuse; **bld** 1.5–4 mm wide, flat, cauline bld subequal. **Pan** 2–10 cm, generally  $\frac{1}{6}-\frac{1}{3}$  as wide as long, erect, linear, lanceoloid to ovoid, often interrupted, sparse to congested, with 15–80 spklt and mostly with 1–3 br per nd; **br** 0.5–3 cm, erect to ascending, or infrequently spreading, angles densely scabrous, at least in part, with

1–15 spklt. **Spklt** (2.3)3.5–7 mm, lat compressed; **flt** 3–7; **rchl intnd** usu shorter than 1 mm, smooth to muriculate. **Glm** distinctly keeled; **lo glm** 3-veined; **cal** usu webbed, smt glab; **lm** 2.3–3.5 mm, lanceolate, distinctly keeled, keels and mrgl veins short-villous, intercostal regions glab, lat veins obscure, mrg glab, apc acute; **pal** scabrous over the keels; **anth** 1.3–1.8 mm.  $2n = 35, 42, 49, 50, 56, 84$ .

*Poa compressa* is common in much of North America. It is sometimes considered to be native, but this seems doubtful. In North America, it is often seeded for soil stabilization, and has frequently escaped. It grows mainly in riparian areas, wet meadows, and disturbed ground. Its distinctly compressed nodes and culms, exerted lower culm nodes, rhizomatous growth habit, and scabrous panicle branches make it easily identifiable.

### **Poa sect. Abbreviatae** Nannf. ex Tzvelev

**Pl** per; densely tufted, not stln, not rhz. **Bas brchg** mainly invag. **Clm** usu shorter than 25(30) cm, slender, terete; **nd** terete. **Lvs** mostly bas; **shth** closed for  $\frac{1}{10}-\frac{1}{4}(\frac{1}{3})$  their length, terete; **lig** 0.4–5.5 mm, milky white to hyaline, smooth or scabrous, apc truncate to acute, glab; **bld** 0.5–2 mm wide, flat, folded, or involute, thin to moderately thick, soft or moderately firm, apc narrowly prow-shaped. **Pan** 1–7 cm, erect, usu contracted, smt open; **nd** with 1–3 br; **br** 0.5–1.5(5) cm, usu erect to steeply ascending, smt ascending to spreading, sulcate to angled, smooth or the angles sparsely to densely scabrous. **Spklt** 3–7 mm, lat compressed, rarely bulbiferous; **flt** 2–5, usu bisex, smt with vestigial anth or anth that abort late in the growing season, rarely bulb-forming; **rchl intnd** usu glab, infrequently sparsely hispidulous. **Glm** usu subequal to or slightly longer than the adjacent lm, distinctly keeled, keels smooth or sparsely scabrous; **lo glm** (1)3-veined; **cal** terete or slightly lat compressed, glab or dorsally webbed; **lm** 2–5.8 mm, lanceolate to broadly lanceolate, distinctly keeled, thin, glab or the keels and mrgl veins softly puberulent to long-villous, intercostal regions glab or softly puberulent to short-villous, obscurely 5-veined; **pal** keels scabrous, glab or softly puberulent to short-villous at midlength; **anth** 3, 0.2–1.3(1.8) mm, rarely vestigial (0.1–0.2 mm) or aborted late in development.

*Poa* sect. *Abbreviatae* includes five North American species, three of which grow in the Intermountain Region. The species are principally high alpine to high arctic.

24. *Poa lettermanii* Vasey LETTERMAN'S  
BLUEGRASS [p. 372, 501]

**Pl** per; not glaucous; densely tufted, not stln, not rhz. **Bas brchg** all or mainly invag. **Clm** 1–12 cm, slender. **Shth** closed for  $\frac{1}{6}$ – $\frac{1}{4}$  their length, terete; **lig** 1–3 mm, milky white to hyaline, smooth; **bld** 0.5–2 mm wide, flat or folded, or slightly inrolled, thin, without papillae (at 100×), apc narrowly prow-shaped. **Pan** 1–3 cm, erect, contracted, usu exserted from the shth; **br** to 1.5 cm, erect to steeply ascending, slender, sulcate or angled, smooth or the angles sparsely scabrous; **ped** shorter than the spklt. **Spklt** 3–4 mm, lat compressed, green or anthocyanic; **flt** 2–3; **rchl intnd** shorter than 1 mm, smooth. **Glm** usu equaling or exceeding the lowest lm, smt also equaling or exceeding the up flt, lanceolate to broadly lanceolate, distinctly keeled, keels smooth; **lo glm** 3-veined; **cal** glab; **lm** 2.5–3 mm, lanceolate, distinctly keeled, thin, usu glab, keels and mrgl veins rarely sparsely puberulent proximally, apc acute; **pal keels** scabrous; **anth** 0.2–0.8 mm.  $2n = 14$ .

*Poa lettermanii* grows on rocky slopes of the highest peaks and ridges in the alpine zone, from northern British Columbia to western Alberta and south to California and Colorado, usually in the shelter of rocks or on mesic to wet, frost-scarred slopes. It is one of only three known diploid *Poa* species native to the Western Hemisphere. Its glabrous calluses and lemmas usually distinguish it from *P. abbreviata* (see next); it also differs in having flat or folded leaf blades, and shorter spikelets with glumes that are longer than the adjacent florets.

25. *Poa abbreviata* R. Br. [p. 373, 501]

**Pl** per; not or scarcely glaucous; densely tufted, not stln, not rhz. **Bas brchg** all or mainly invag. **Clm** 5–15(20) cm, slender, lfless above the bas tuft. **Shth** closed for  $\frac{1}{10}$ – $\frac{1}{4}$  their length, terete; **lig** 0.4–5.5 mm, milky white to hyaline, smooth or scabrous, apc truncate to acute; **bld** 0.8–1.5(2) mm wide, involute, moderately thick, soft, apc narrowly prow-shaped. **Pan** 1.5–5 cm, erect, lanceoloid to ovoid, contracted, congested; **nd** with 1–3 br; **br** to 1.5 cm, erect, slender, terete, sulcate or angled, smooth or the angles sparsely scabrous; **ped** usu shorter than the spklt. **Spklt** 4–6.5 mm, lat compressed, rarely bulbiferous, frequently strongly anthocyanic; **flt** 2–5, rarely bulb-forming; **rchl intnd** usu shorter than 1 mm, smooth or scabrous. **Glm** subequal to slightly longer than the adjacent lm, lanceolate to broadly lanceolate, distinctly keeled, keels smooth; **lo glm** (1)3-veined, lat veins often faint and short; **up glm** exceeding or exceeded by the up flt; **cal** glab or webbed; **lm** 3–4.6 mm, lanceolate to broadly

lanceolate, distinctly keeled, thin, keels and mrgl veins usu short- to long-villous, hairs extending along  $\frac{3}{4}$ – $\frac{5}{6}$  of the keel, infrequently glab, intercostal regions glab or softly puberulent to short-villous, apc acute; **pal keels** scabrous, often short-villous to softly puberulent at midlength, smt glab; **anth** 0.2–1.2(1.8) mm.  $2n = 42$ .

*Poa abbreviata* is an alpine and circumarctic species which has two subspecies in the western cordilleras, and one in the high arctic. It grows mainly on frost scars and mesic rocky slopes, usually on open ground. In rare cases where the lemmas and calluses of *P. abbreviata* are glabrous, it can be confused with *P. lettermanii* (p. see previous), but that species has shorter spikelets and glumes that are longer than the adjacent florets.

1. Lemmas glabrous; calluses webbed . . . . . subsp. *marshii*
1. Lemmas usually with hairs over the veins; calluses glabrous or webbed, rarely both the lemmas and calluses glabrous . . . . . subsp. *pattersonii*

*Poa abbreviata* subsp. *marshii* Soreng MARSH'S  
BLUEGRASS [p. 373]

**Lig** 1–3 mm, smooth, apc obtuse to acute. **Spklt** not bulbiferous; **flt** normal. **Cal** webbed; **lm** lanceolate, glab; **pal keels** glab; **anth** 0.6–1.2 mm.  $2n =$  unknown.

*Poa abbreviata* subsp. *marshii* is rather uncommon. It is known from scattered alpine peaks across the interior western United States: from the White Mountains of California, the Schell Creek Range of Nevada, the southern Rockies of Idaho, the Little Belt Mountains of Montana, and the Big Horn Mountains of Wyoming, mostly where subsp. *pattersonii* is absent.

*Poa abbreviata* subsp. *pattersonii* (Vasey) Á.

Löve, D. Löve & B.M. Kapoor PATTERSON'S  
BLUEGRASS [p. 373]

**Lig** 0.8–5.5 mm, smooth or scabrous, apc obtuse to acute. **Spklt** rarely bulbiferous; **flt** rarely bulb-forming. **Cal** usu webbed, rarely glab; **lm** long-villous along  $\frac{3}{4}$  of the keel and the mrgl veins, rarely glab, but then the cal also glab, intercostal regions glab or softly puberulent; **anth** 0.6–1.2(1.8) mm, rarely vestigial.  $2n = 42$ .

*Poa abbreviata* subsp. *pattersonii* is an alpine taxon that extends from the Brooks Range, Alaska, to the Sierra Nevada, California, where it is rare, and through the Rocky Mountains to southern Colorado. It also grows in the Russian Far East. It is often confused in herbaria with *P. glauca* (p. 129), but differs in having predominantly intravaginal branching, an abundance of vegetative shoots, and usually shorter anthers.

26. *Poa keckii* Soreng KECK'S BLUEGRASS  
[p. 373, 501]

**Pl** per; not glaucous; densely tufted, not stln, not rhz. **Bas brchg** all or mainly invag. **Clm** 2–10(18) cm, erect to spreading; **nd** terete, none exserted. **Shth** closed for  $\frac{1}{10}$ – $\frac{1}{5}$  their length, terete, smooth, glab, bases of bas shth glab, distal shth lengths

1.5–7 times bld lengths; **col** smooth, glab; **lig** 1–3 mm, milky white, smooth or sparsely scabrous, apc obtuse to acute, lig of up innovation lvs shorter than 3 mm; **innovation bld** similar to the cauline bld; **cauline bld** 1–3.5(4.5) cm long, 0.9–1.8 mm wide, folded, moderately thick, soft, smooth, glab, adx surfaces infrequently sparsely scabrous, usu with papillae on the long cells (at 100×), apc narrowly prow-shaped, flag lf bld folded, 1–1.8 mm wide, abx surfaces with 7–15 closely spaced, slightly protruding ribs. **Pan** 1–4(6) cm, erect, ovoid to lanceoloid, contracted, congested, with 9–40 spklt; **nd** with 1–3 br; **br** 0.5–1.5 cm, erect, fairly straight, sulcate or angled, angles sparsely to densely scabrous, with 1–7 spklt; **ped** shorter than the spklt. **Spklt** 3.5–6 mm long, lengths to

3.5(3.8) times widths, lanceolate, lat compressed, fairly strongly anthocyanic, not glaucous; **flt** 2–3; **rchl intnd** terete, to 1.5 mm, smooth, smt sparsely hispidulous. **Glm** lanceolate, smooth, distinctly keeled, keels sparsely scabrous; **lo glm** shorter than to equaling the lowest lm, 3-veined; **up glm** frequently exceeding the lowest lm, exceeded by the up lm; **cal** glab; **lm** 3–4.9 mm, lanceolate, distinctly keeled, thin, smooth or finely scabrous, glab or the keels and mrgl veins sparsely puberulent proximally, lat veins obscure, mrg glab, apc acute; **pal** keels scabrous; **anth** 0.6–1.3(1.8) mm.  $2n$  = unknown.

*Poa keckii* is endemic to high alpine frost scars and ledges, usually on open ground, in the Sierra Nevada and adjacent Sweetwater and White mountains of California.

### *Poa* sect. *Secundae* V.L. Marsh ex Soreng

**Pl** per; usu densely, infrequently loosely, tufted, rarely weakly rhz or stln. **Bas brchg** mixed invag and exvag to completely invag. **Clm** 10–120 cm, capillary to stout, terete or weakly compressed; **nd** terete. **Shth** closed for  $\frac{1}{10}$ – $\frac{1}{3}$  their length, terete, smooth or scabrous, distal shth usu longer than their bld; **lig** 0.5–7(10) mm, smooth or scabrous, apc truncate to acuminate; **bld** 0.4–3(5) mm wide, flat, folded, or involute, thin to moderately thick, soft and soon withering or moderately firm and persisting, smooth or scabrous mainly over the veins and mrg, apc narrowly prow-shaped. **Pan** 2–25(30) cm, erect or somewhat lax, narrowly lanceoloid to ovoid, usu contracted, smt open and pyramidal, sparse to congested, with 7–100(120) spklt; **nd** with 1–4(7) br; **br** 0.5–15 cm, erect to spreading, terete, sulcate or angled, smooth or the angles sparsely to densely scabrous, smt scabrous between the angles. **Spklt** (4) 4.5–10 mm, lengths 3–5 times widths, terete to weakly lat compressed or distinctly compressed, smt bulbiferous; **flt** (2) 3–5(10), usu normal and bisex, smt bulb-forming. **Glm** lanceolate to broadly lanceolate, shorter than to subequal to the adjacent lm, keels indistinct to distinct, smooth or scabrous; **lo glm** 3-veined; **cal** terete or slightly dorsally compressed, glab or with a crown of hairs, hairs to 2 mm; **lm** 3–7 mm, narrowly lanceolate to lanceolate or slightly oblanceolate, weakly to distinctly keeled, glab or the keels and mrgl veins and smt the lat veins with hairs, obscure, intercostal regions glab or with hairs; **anth** 3, 1.2–3.5 mm, smt aborted late in development.

*Poa* sect. *Secundae* includes ten species, nine of which grow in North America. All the species tend to grow in arid areas, sometimes on wetlands within such areas. They are primarily cespitose, but hybridization with members of *Poa* sect. *Poa* results in the formation of rhizomatous plants. Typically, members of sect. *Secundae* have sheaths that are closed for  $\frac{1}{10}$ – $\frac{1}{4}$  their length, contracted panicles, and anthers that are 1.2–3.5 mm long.

#### 27. *Poa secunda* J. Presl SECUND BLUEGRASS [p. 374, 501]

**Pl** per; frequently anthocyanic, smt glaucous; densely tufted, bas lf tufts 2–20+ cm, usu narrowly based, rarely with rhz. **Bas brchg** invag and exvag. **Clm** (10) 15–120 cm, slender to stout, erect or the bases slightly decumbent, terete or weakly compressed; **nd** terete, 0–2 exerted. **Shth** closed for  $\frac{1}{10}$ – $\frac{1}{4}$  their length, terete, smooth or scabrous, glab, bases of bas shth glab, distal shth lengths (0.95) 1.5–7(15) times bld lengths; **col** smooth or scabrous, glab; **lig** 0.5–6(10) mm, smooth or scabrous, truncate to acuminate, lig of innovation lvs similar to those of the cauline lvs or shorter and truncate; **innovation bld** similar

to the cauline bld; **cauline bld** gradually rdcd in length upwards or the mid bld longest, 0.4–3(5) mm wide, flat, folded, or involute, thin, soft, and soon withering to thick, firm, and persisting, smooth or scabrous mainly over the veins, glab, apc narrowly prow-shaped, flag lf bld 0.8–10(17) cm. **Pan** 2–25(30) cm, erect or somewhat lax, narrowly lanceoloid to ovoid, usu contracted, more or less open at anthesis, infrequently remaining open at maturity, green or anthocyanic, smt glaucous, usu moderately congested, with 10–100+ spklt; **nd** usu with 1–3 br; **br** (0.5) 1–8(10) cm, usu erect or ascending, infrequently spreading at maturity, terete to weakly angled, usu sparsely to densely scabrous on and between

the angles, with (1)2–20(60+) **spklt** in the distal  $\frac{1}{2}$ – $\frac{2}{3}$ . **Spklt** (4)5–10 mm, lengths (3.8)4–5 times widths, usu narrowly lanceolate, subterete to weakly lat compressed, drab, green or strongly anthocyanic, smt glaucous; **flt** (2)3–5(10); **rchl** **intnd** usu 1–2 mm, terete or slightly dorsally compressed, smooth or muriculate to scabrous. **Glm** broadly lanceolate, keels indistinct; **lo glm** 3-veined; **cal** glab or with a crown of hairs, hairs 0.1–0.5(2) mm, crisp or slightly sinuous; **lm** 3.5–6 mm, lanceolate to narrowly lanceolate or slightly oblanceolate, usu weakly keeled, glab or the keels and mrgl veins softly puberulent to short-villous, intercostal regions smooth or scabrous, glab, short-villous, crisply puberulent or softly puberulent over the bas  $\frac{2}{3}$ , hairs usu 0.1–0.5 mm, hairs of the keels and veins frequently similar in length to those between the veins, usu not or only slightly denser and extending further towards the apc, lat veins obscure, mrg strongly inrolled below, broadly scarious above, glab, apc obtuse to broadly acute, blunt, or pointed; **pal** **keels** scabrous, glab or softly puberulent to short-villous at midlength; **anth** 1.5–3 mm.  $2n = 42, 44+f, ca. 48, 56, ca. 62, 63, ca. 66, ca. 68, 70, ca. 72, ca. 74, 78, ca. 80, 81, 82, ca. 83, 84-86, ca. 87, ca. 88, ca. 90, ca. 91, 93, ca. 94, ca. 97, ca. 98, ca. 99, 100, 104, 105-106$ .

*Poa secunda* is one of the major spring forage species of temperate western North America. It is very common in high deserts, mountain grasslands, saline wetlands, meadows, dry forests, and on lower alpine slopes, primarily from the Yukon Territory east to Manitoba and south to Baja California, Mexico.

*Poa secunda* is highly variable. There are two subspecies that overlap almost completely in terms of morphology, but differ ecologically and cytologically.

*Poa secunda* is known or suspected to hybridize with several other species, including *P. arctica* (p. 117), *P. arida* (see next), *P. glauca* (p. 129), and *P. pratensis* (p. 116). Apomixis is facultative but common.

1. Lemmas usually glabrous, the keels and marginal veins infrequently sparsely puberulent at the base; basal branching mainly extravaginal; leaves slightly lax to firm, remaining intact through the growing season; ligules of the innovations to 2 mm long ..... subsp. *juncifolia*
1. Lemmas sparsely to densely puberulent or short-villous on the basal  $\frac{2}{3}$ ; basal branching mixed intra- or extravaginal or mainly intravaginal; leaves usually lax, withering with age; ligules of the innovations usually longer than 2 mm ... subsp. *secunda*

***Poa secunda* subsp. *juncifolia*** (Scribn.) Soreng  
ALKALI BLUEGRASS, BIG BLUEGRASS, NEVADA  
BLUEGRASS [p. 374]

**Bas lf tufts** usu medium to robust, infrequently tiny. **Bas brchg** mainly exvag. **Clm** 30–120 cm. **Lig** of clm lvs 0.5–6 mm, those of the innovations

0.5–2 mm, scabrous, apc truncate to obtuse; **bld** 1–3(5) mm, moderately thick to thick, slightly lax to firm, tending to hold their form and persist. **Pan** (4)10–25(30) cm, narrowly lanceoloid, contracted, congested; **br** erect, scabrous. **Spklt** (4)7–10 mm, lengths 4–5 times widths, narrowly lanceolate, subterete; **cal** glab; **lm** sparsely to moderately scabridulous to scabrous, usu glab, keels and mrgl veins infrequently crisply puberulent on the bas  $\frac{1}{4}$ , hairs usu shorter than 0.2 mm; **pal** glab.  $2n = 42, 56, 60, 61, 62, 63, 64, ca. 65, ca. 66, 70, 78, 84, ca. 97$ .

*Poa secunda* subsp. *juncifolia* is usually more robust than subsp. *secunda*, and generally inhabits moister and sometimes saline habitats. It comprises two fairly distinct variants: a robust upland variant that is frequently used for revegetation (*P. ampla* Merr., Big Bluegrass) that grows in deep, rich, montane soils; and a riparian and wet meadow variant (*P. juncifolia* Scribn., Alkali Bluegrass). Apart from generally having glabrous lemmas, short ligules on the vegetative shoots, and leaf blades that hold their form better than those of subsp. *secunda*, subsp. *juncifolia* differs anatomically in the predominance of sinuous-walled, rectangular long cells in the blade epidermis. Smooth-walled, fusiform long cells are predominant in *P. secunda* subsp. *secunda*. Plants with glabrous lemmas and long ligules on the vegetative shoots have been called *P. nevadensis* Vasey ex Scribn.; they are intermediate between the subspecies. Chromosome numbers for *P. secunda* subsp. *juncifolia* center on  $2n = 63$ , indicating a high degree of apomixis.

***Poa secunda* J. Presl subsp. *secunda* PACIFIC**

BLUEGRASS, PINE BLUEGRASS, SANDBERG

BLUEGRASS, CANBY BLUEGRASS [p. 374]

**Bas lf tufts** usu tiny to medium, less often robust. **Bas brchg** mixed invag and exvag or mainly invag. **Clm** (10) 15–100 cm, slender to middling. **Lig** of clm lvs 2–6(10) mm, those of the innovations mostly 2–6 mm, smooth or scabrous, obtuse to acuminate; **bld** 0.4–3 mm, usu thin, lax, and soon withering, smt moderately thick, moderately firm, and somewhat persistent. **Pan** 2–15(20) cm, usu narrowly lanceoloid to ovoid, contracted at maturity and congested, or occ pyramidal, open at maturity, and sparse; **br** erect or ascending, infrequently widely spreading at maturity. **Spklt** (4)5–8 mm; **cal** glab or pubescent; **lm** with keels and mrgl veins long-villous, crisply puberulent, or softly puberulent over the bas  $\frac{2}{3}$ , intercostal regions usu at least sparsely crisply or softly puberulent, hairs usu shorter than 0.5 mm; **pal** **keels** short-villous to softly puberulent at midlength, intercostal regions often softly puberulent.  $2n = 42, 44+f, ca. 48, 56, ca. 62, 63, ca. 66, ca. 68, 70, ca. 72, ca. 74, ca. 78, ca. 80, 81, 82, ca. 83, 84, ca. 86, ca. 87, ca. 88, ca. 90, ca. 91, 93, ca. 94, ca. 98, ca. 99, 100, 104, 105-106$ .

*Poa secunda* subsp. *secunda* comprises several forms or ecotypes which intergrade morphologically and overlap geographically. Its chromosome numbers are centered on  $2n = 84$ . It generally grows in more xeric habitats than subsp. *juncifolia*; it is also common in alpine habitats. Some of the major variants, and the names that have been applied to them, are: scabrous plants, primarily from west of the Cascade/Sierra Nevada axis (*P. scabrella* (Thurb.) Benth. ex Vasey, Pine Bluegrass); smoother, large plants extending eastward (*P. canbyi* (Scribn.) Howell, Canby Bluegrass); tiny, early-spring-flowering plants of stony and mossy ground (*P. sandbergii* Vasey, Sandberg Bluegrass); and slender, sparse plants, generally of mesic shady habitats, with panicles that remain open (*P. gracillima* Vasey, Pacific Bluegrass). Alpine plants have been called *P. incurva* Scribn. & T.A. Williams.

28. ***Poa stenantha* Trin. NARROW-FLOWERED BLUEGRASS** [p. 374, 502]

**Pl** per; glaucous or not; densely to loosely tufted, not stln, not rhz. **Bas brchg** mostly exvag, some invag. **Clm** 20–60(100) cm, bases decumbent or smt erect, terete, with 1–2 exserted nd. **Shth** closed for  $\frac{1}{10}$ – $\frac{1}{5}$ ( $\frac{1}{4}$ ) their length, terete, bases of bas shth glab; **lig** 2–5 mm, milky white, smooth or sparsely scabrous, acute to acuminate; **innovation bld** similar in texture and shape to the cauline bld; **cauline bld** not greatly rdcd upwards, 1.5–4(5) mm wide, flat or folded, thin, lax, smooth or sparsely scabrous, apc narrowly prow-shaped. **Pan** 5–18(25) cm, lax, loosely contracted to open, sparse, with 20–65 spklt and usu 2(7) br per nd; **br** 3–15 cm, ascending to spreading, angled, angles finely to coarsely, sparsely to fairly densely scabrous, infrequently smooth, with 3–10(15) spklt in the distal  $\frac{1}{2}$ . **Spklt** 6–10 mm, lengths 3–3.6 times widths, lanceolate to narrowly ovate, lat compressed, smt bulbiferous, drab, often slightly glaucous; **flt** 3–4(7), normal or bulb-forming; **rchl intnd** 1.2–2 mm, slightly dorsally compressed, smooth or sparsely muriculate. **Glm** subequal, lanceolate to broadly lanceolate, dull, frequently glaucous, obtuse to acute; **lo glm** 3-veined; **up glm** (3.7)4.1–6.5 mm; **cal** usu crowned with 0.2–2 mm hairs, smt glab; **lm** 4–6 mm, lanceolate, distinctly compressed, distinctly keeled, keels, mrgl veins, and smt the lat veins short- to long-villous, hairs extending for  $\frac{3}{4}$  of the keel, intercostal regions glab, sparsely puberulent or hispidulous proximally, usu sparsely to moderately densely scabrous distally, hairs distinctly shorter than those of the keel and veins, mrg weakly inrolled, broadly scarious, glab, apc acute; **pal keels** scabrous, often softly puberulent at midlength, intercostal regions glab or puberulent; **anth** 1.2–2 mm, smt aborted late in development or undeveloped.  $2n = 42$ , [81, 84, 86?].

*Poa stenantha* grows in coastal meadows and on cliffs in subarctic and boreal forests; it is less common in moist, more southern subalpine and low alpine meadows and thickets. Its range extends from western Alaska to the northern Cascades and Rocky Mountains and, as a disjunct, to Patagonia.

***Poa stenantha* Trin. var. *stenantha* [p. 374]**

**Spklt** not bulbiferous; **flt** normal. **Anth** 1.2–2 mm.

*Poa stenantha* var. *stenantha* can be difficult to separate from *P. secunda* subsp. *secunda* (p. 133). Its main distinguishing features are its strongly keeled lemmas with glabrous intercostal regions, and, when present, callus hairs longer than 0.2 mm. Plants with large panicles and glabrous calluses have been called *P. macroclada* Rydb. Such plants grow infrequently in the U.S. Rocky Mountain portion of the species' range. They intergrade with the more compact typical form.

**Named intersectional hybrids**

29. ***Poa arida* Vasey PLAINS BLUEGRASS** [p. 375, 502]

**Pl** per; glaucous or not; densely to loosely tufted or the clm solitary, rhz. **Bas brchg** invag and exvag. **Clm** 15–80 cm, erect or the bases decumbent, terete or weakly compressed; **nd** terete, 0–1 exserted. **Shth** closed for  $\frac{1}{10}$ – $\frac{1}{5}$ ( $\frac{1}{4}$ ) their length, terete, smooth or sparsely scabrous, glab, bases of bas shth glab, distal shth lengths (1.2)1.5–9(20) times bld lengths; **lig** (1)1.5–4(5) mm, smooth or sparsely to moderately scabrous, apc obtuse to acute; **bld** strongly to gradually rdcd in length distally, 1.5–5 mm wide, flat and moderately thin to folded and moderately thick and firm, abx surfaces smooth, adx surfaces smooth or sparsely to moderately scabrous, primarily over the veins, apc narrowly prow-shaped, flag lf bld (0.4)1–7(10) cm. **Pan** (2.5)4–12(18) cm, erect, usu narrowly lanceoloid, contracted, smt interrupted, infrequently loosely contracted, usu congested, with 25–100 spklt; **nd** with 1–5 br; **br** 1–9 cm, erect to infrequently ascending, rarely spreading, terete to weakly angled, smooth or the angles sparsely to moderately scabrous, with 3–24 spklt. **Spklt** 3.2–7 mm, lengths to 3.5(3.8) times widths, lat compressed; **flt** 2–7; **rchl intnd** smooth, smt sparsely puberulent. **Glm** lanceolate, distinctly keeled, smooth or sparsely scabrous; **lo glm** 3-veined; **cal** usu glab, infrequently webbed, hairs to  $\frac{1}{4}$  the lm length; **lm** 2.5–4.5 mm, lanceolate to narrowly lanceolate, distinctly to weakly keeled, keels and mrgl veins short- to long-villous, lat veins moderately prominent, glab or puberulent, intercostal regions usu glab, infrequently hairy, hairs to 0.3 mm, mrg glab, apc acute or blunt; **pal keels** scabrous, glab or



short-villous at midlength, intercostal regions usu glab, smt puberulent to short-villous; **anth** 1.3–2.2 mm.  $2n = 56, 56+I, 56-58, 63, 64, 70, 76, 84$ , ca. 90, 95+5, 100, 103.

*Poa arida* grows mainly on the eastern slope of the Rocky Mountains and in the northern Great Plains, primarily in riparian habitats of varying salinity or alkalinity. It is spreading eastward along heavily salted highway corridors. Reports of its occurrence west of the Continental Divide and in southwestern Texas are mostly attributable to misidentifications of *P. arctica* subsp. *aperta* (p. 118), *P. arctica* subsp. *grayana* (p. 119), and rhizomatous specimens of *P. fendleriana* (p. 122). Its presence in the Intermountain Region requires confirmation. *Poa arida* may reflect past hybridization between *P. secunda* (p. 132) and a species of *Poa* sect. *Poa*.

30. *Poa xlimosa* Scribn. & T.A. Williams  
[p. 375, 502]

**Pl** per; densely to loosely tufted or the clm solitary, shortly rhz. **Clm** 20–80 cm, erect or the bases decumbent. **Shth** usu closed for about  $\frac{1}{2}$  their length; **lig** 1–4 mm, smooth or sparsely

scabrous, apc obtuse to acute; **innovation bld** 0.5–2 mm wide; **cauline bld** 0.5–5 mm wide, flat, folded, abx surfaces smooth or scabrous, apc narrowly prow-shaped. **Pan** 5–15 cm, erect, usu contracted, smt interrupted; **br** shorter than 4 cm, erect, angles somewhat scabrous. **Spklt** 4–7 mm, weakly lat compressed; **flt** 2–5; **rchl intnd** smooth. **Lo glm** 3-veined; **cal** glab or webbed, hairs to  $\frac{1}{4}$  the lm length; **lm** 2.5–4.5 mm, narrowly lanceolate, distinctly to weakly keeled, glab throughout or the keels and mrgl veins sparsely long-villous, apc acute; **pal keels** scabrous; **anth** aborted late in development or 1.3–2.2 mm.  $2n = 64$ .

*Poa xlimosa* grows at scattered locations in western North America. It prefers wet to moist, often saline or alkaline meadows, primarily in the sagebrush zone. It is probably a hybrid between *P. pratensis* (p. 116) and *P. secunda* subsp. *juncifolia* (p. 133). Vigorous artificial hybrids with this parentage resemble *P. xlimosa*.

8.11 TORREYCHLOA G.L. Church

Jerrold I. Davis

**Pl** per; rhz. **Clm** 18–145 cm, usu erect, smt decumbent and rooting at the lo nd; **intnd** hollow. **Shth** open to the base; **aur** absent; **lig memb**; **bld** flat. **Infl tml pan**; **br** scabrous, usu densely scabrid distally; **ped** less than 0.5 mm thick. **Spklt** pedlt, lat compressed to terete, with 2–8 flt; **dis** above the glm and beneath the flt. **Glm** unequal, shorter than the lowest lm, rounded to weakly keeled, memb, veins obscure to prominent, unawned; **lo glm** 1(3)-veined; **up glm** 1(3)(5)-veined; **cal** blunt, glab; **lm memb**, rounded to weakly keeled, smt pubescent, particularly proximally, prominently (5)7–9-veined, veins more or less parallel, veins and interveins usu scabridulous, particularly distally, lat veins usu rdcd or absent, apc scabridulous and entire to serrate-erose, unawned; **pal** subequal to the lm, 2-veined; **lod** 2, free, glab, entire or toothed; **anth** usu 3; **ov** usu hairy, smt glab. **Car** shorter than the lm, concealed at maturity, oblong, flattened dorsally, falling free; **hila** oblong, about  $\frac{1}{3}$  the length of the car.  $x = 7$ . Named for John Torrey (1796–1873), an American botanist.

*Torreyochloa* grows in cold, wet, non-saline environments. It includes the two North American species treated below, plus two additional taxa in northeastern Asia (Koyama & Kawano 1964). Although similar to *Glyceria* and *Puccinellia*, *Torreyochloa* is not closely related to either (Church 1952; Soreng et al. 1990). It is distinguished from *Glyceria* by its open leaf sheaths, and from *Puccinellia* by the 7–9 (occasionally 5) prominent, rather than faint, lemma veins.

1. Mature inflorescences linear to narrowly elliptic, 0.3–1 cm wide, 5.5–19 times as long as wide; widest cauline blades 3.4–7.2 mm wide ..... 1. *T. erecta*
1. Mature inflorescences conic, ovoid, or obovoid, 1–14 cm wide, 1–7.5 times as long as wide; widest cauline blades 3.6–18 mm wide. .... 2. *T. pallida*

1. *Torreyochloa erecta* (Hitc.) G.L. Church  
SPIKED FALSE MANNAGRASS [p. 376, 502]

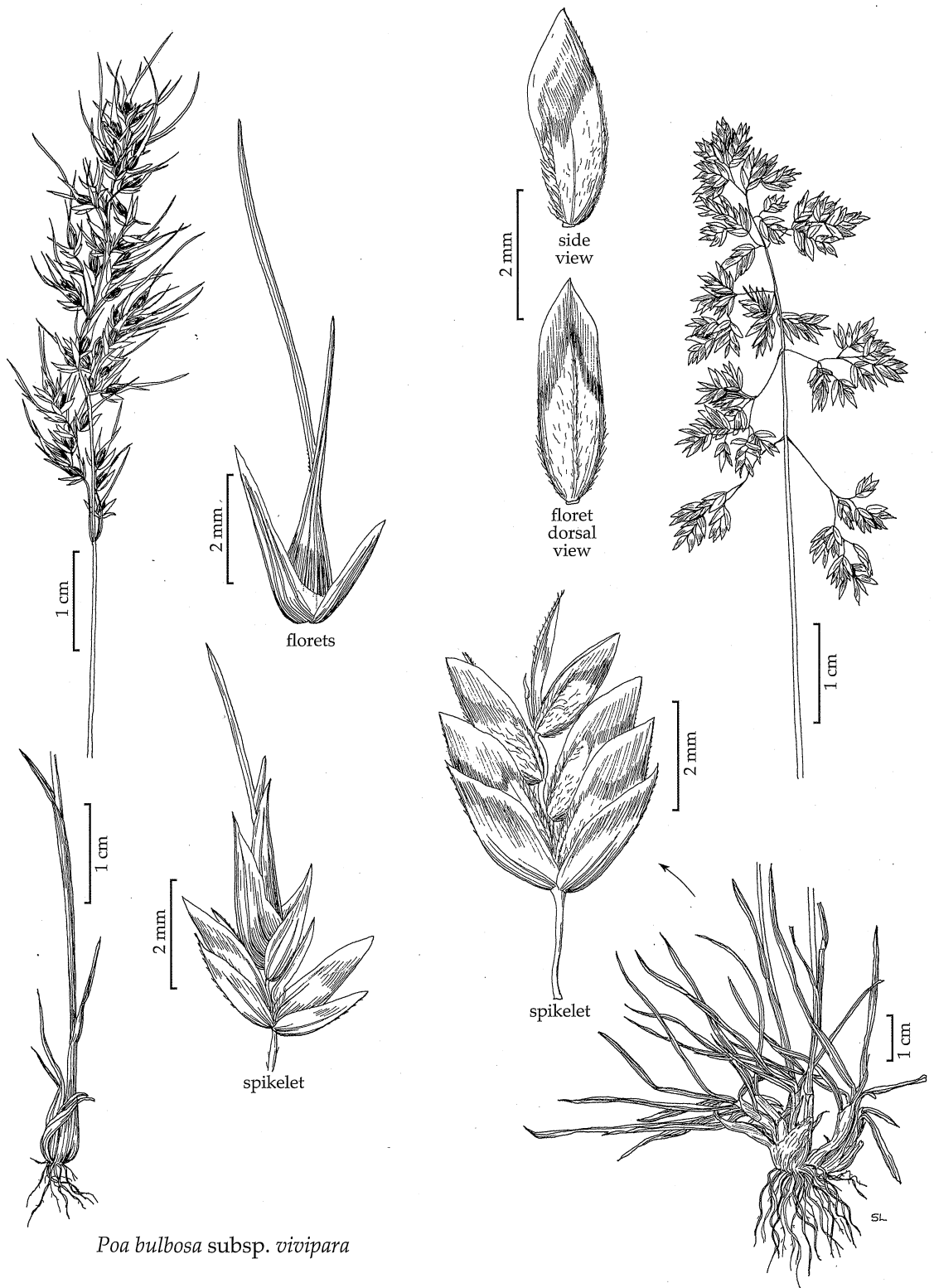
**Clm** 20–62 cm tall, 1–1.4 mm thick, usu erect. **Lig** of larger cauline lvs 2.6–6.5 mm, truncate or rounded to acute; **widest cauline bld** 3.4–6(7.2) mm wide. **Pan** 5.5–11 cm long, 0.3–1 cm wide, (5.5)6–19 times as long as wide, linear to narrowly elliptic at maturity; **lowermost br** stiff to flexuous, reflexed to erect at maturity. **Spklt** 4.2–6.4 mm, with 4–7 flt. **Lo glm** 0.8–1.6 mm; **up glm** 1–2.1 mm; **lm** 2.3–3.1 mm, obtuse to acute; **anth** 0.6–0.8 mm.  $2n = 14$ .

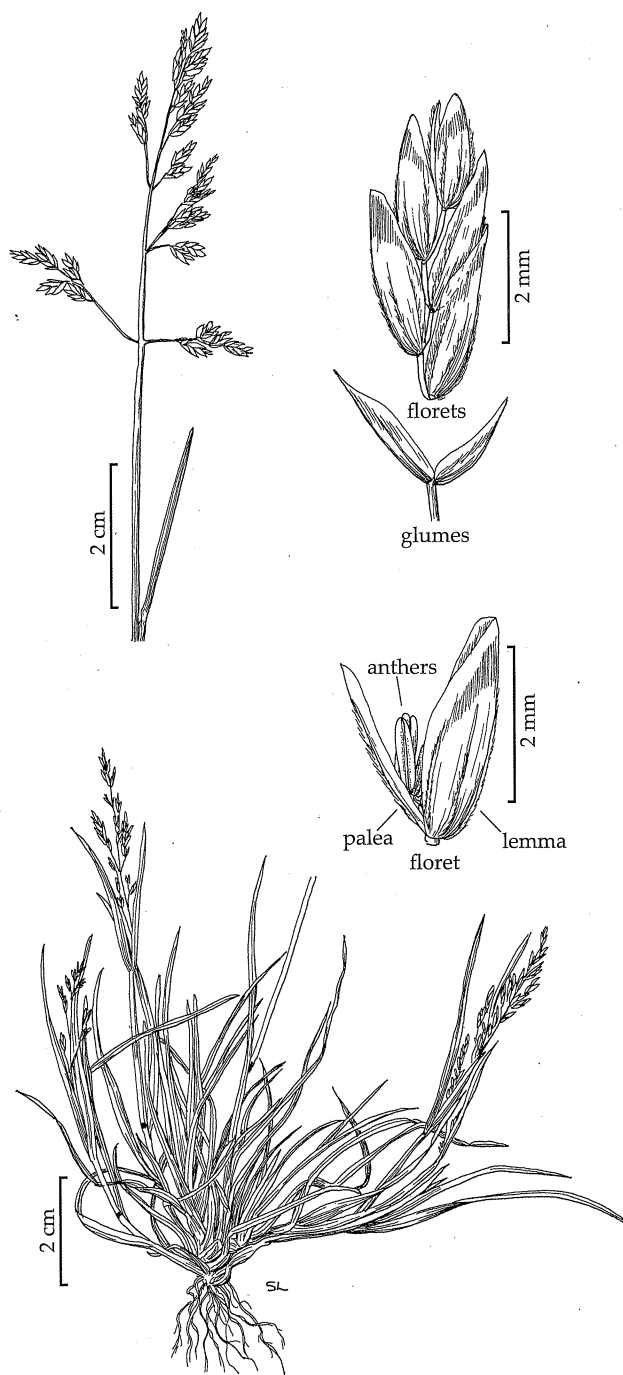
*Torreyochloa erecta* grows at elevations above 2000 m, in the margins of subalpine and alpine lakes and streams of the Sierra Nevada and Cascade ranges.

2. *Torreyochloa pallida* (Torr.) G.L. Church  
[p. 376, 502]

**Clm** 18–145 cm tall, 0.6–4.8 mm thick, erect to decumbent, smt matted. **Lig** of larger cauline lvs 2–9 mm, truncate or acute to attenuate; **widest cauline bld** 1.5–18 mm wide. **Pan** (3)5–25 cm long, (1)1.8–16 cm wide, 1–5.75(7.5) times as long as wide, narrowly to widely conic, ovoid, or obovoid at maturity; **lowermost br** stiff to



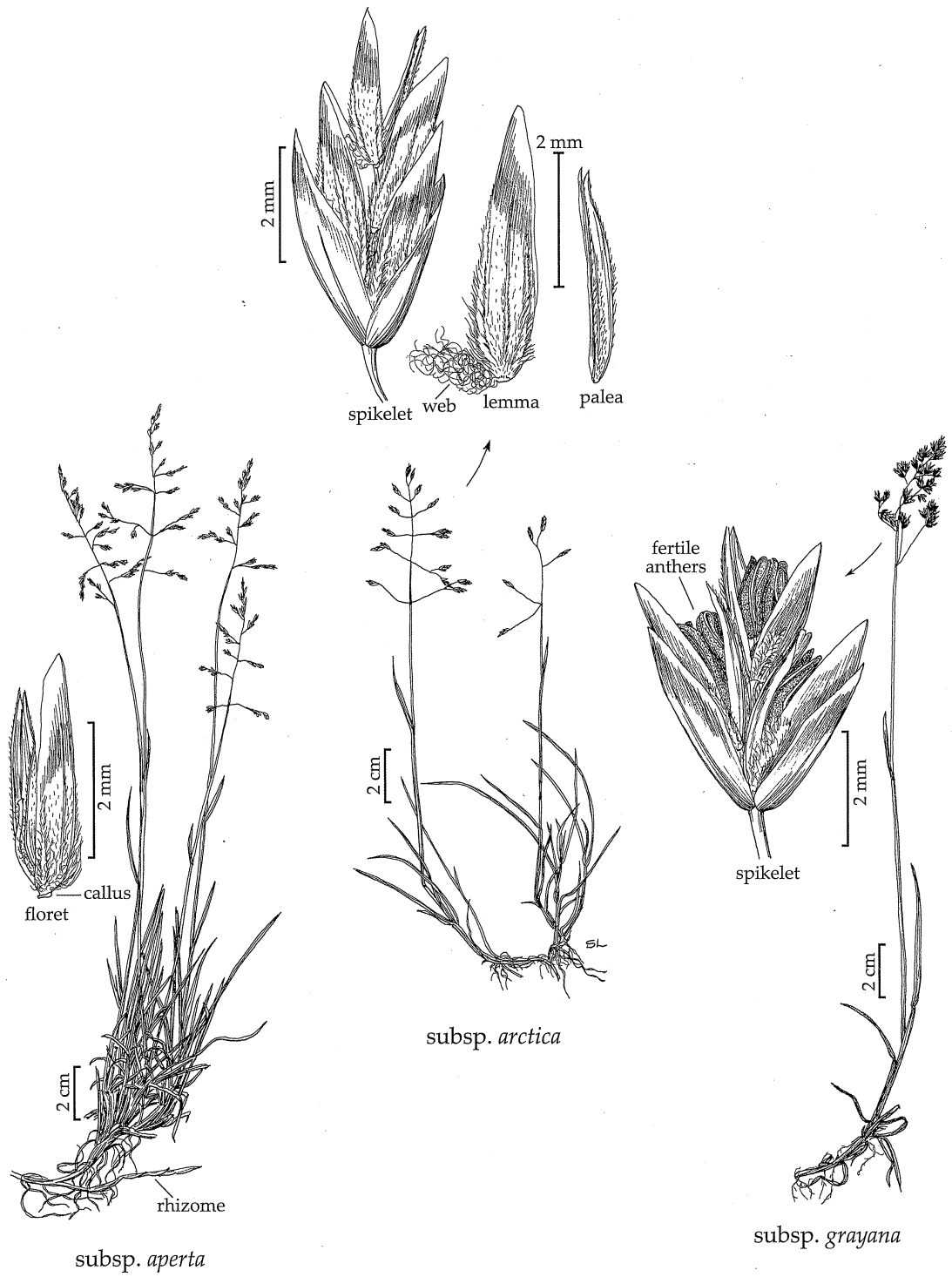




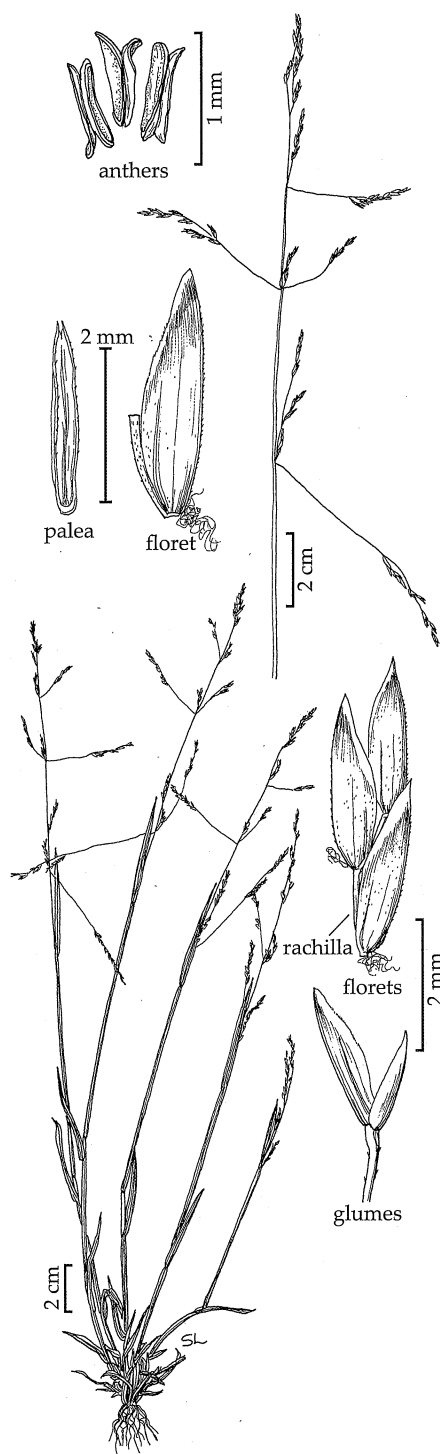
*Poa annua*



*Poa pratensis*



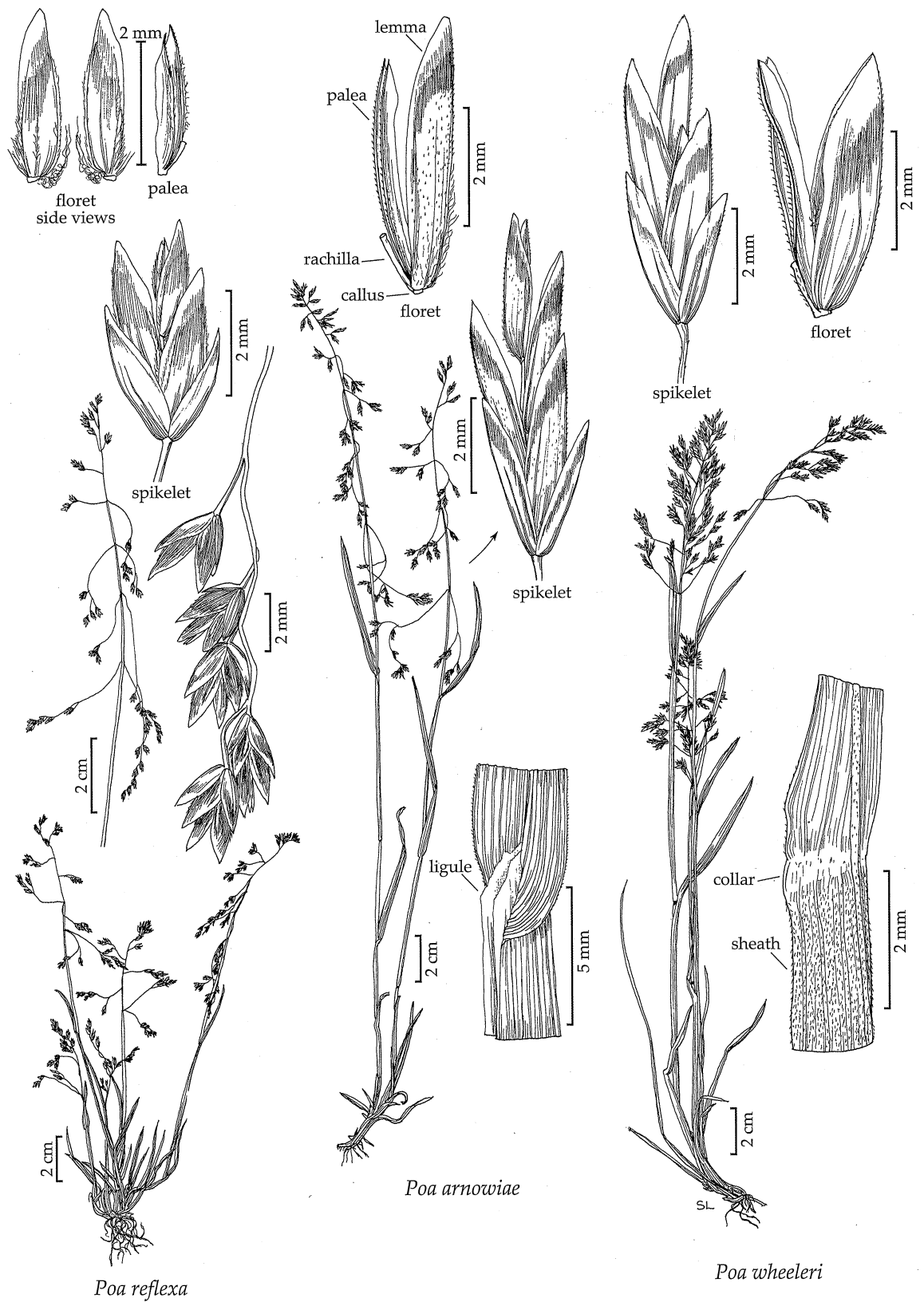
*Poa arctica*

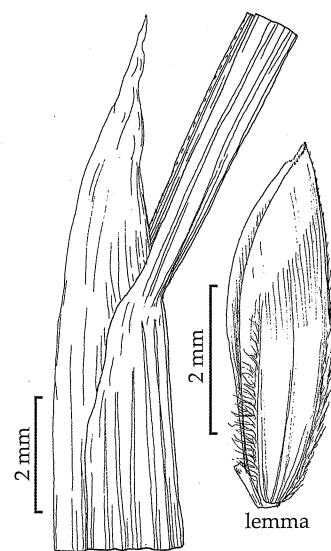
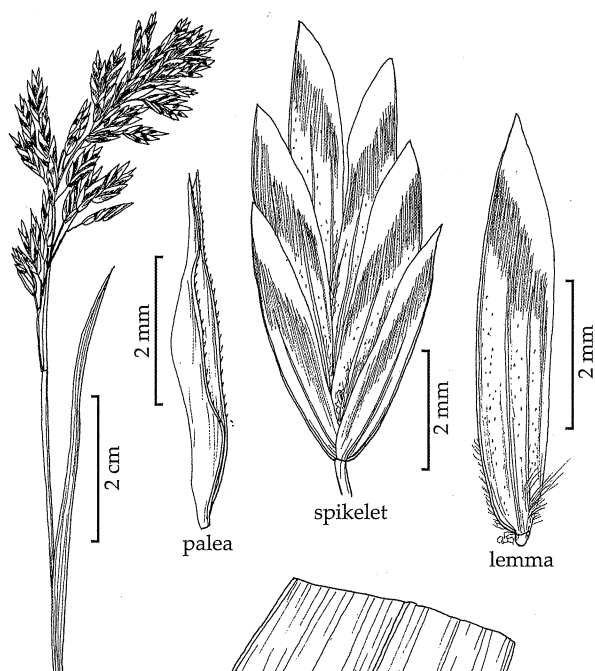


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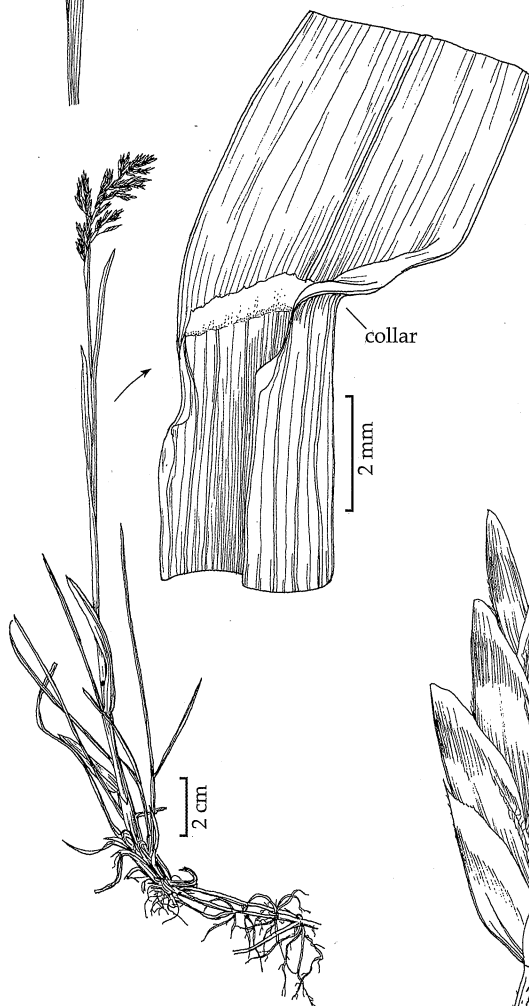


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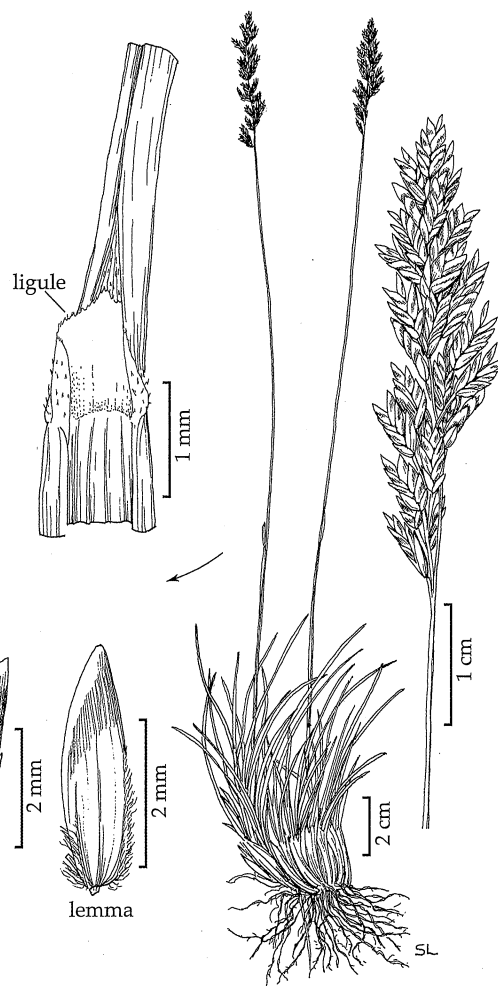




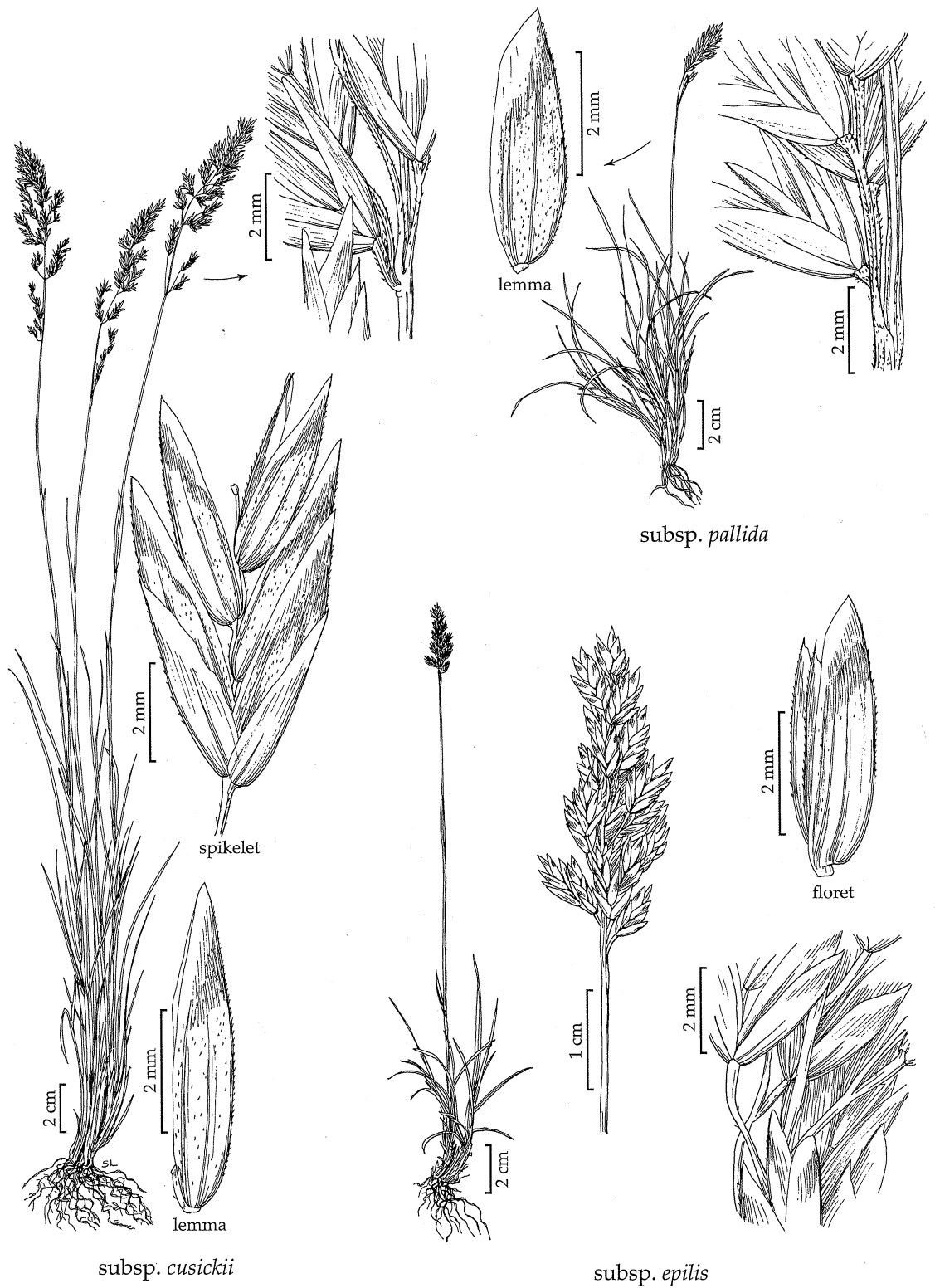
*Poa fendleriana* subsp. *longiligula*



*Poa chambersii*

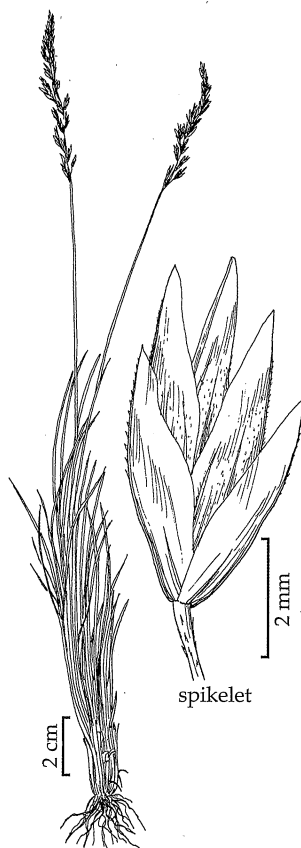
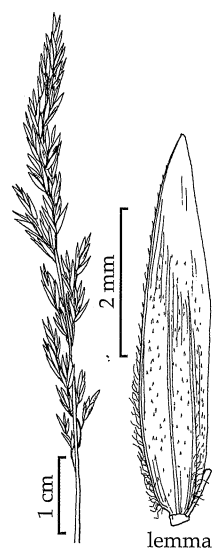


*Poa fendleriana* subsp. *fendleriana*

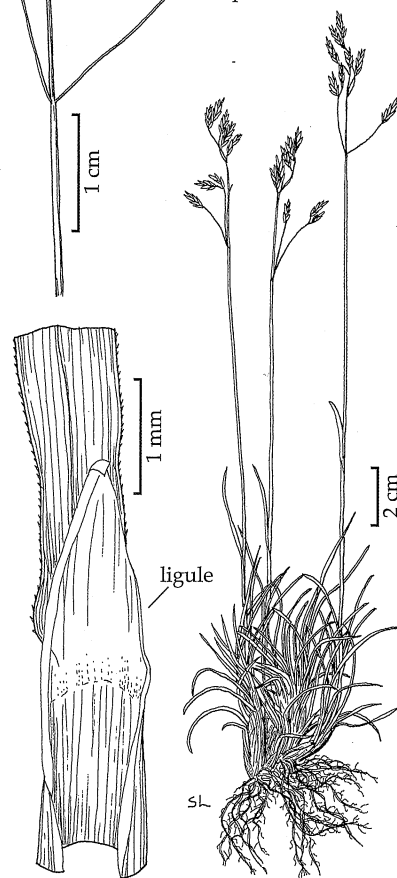
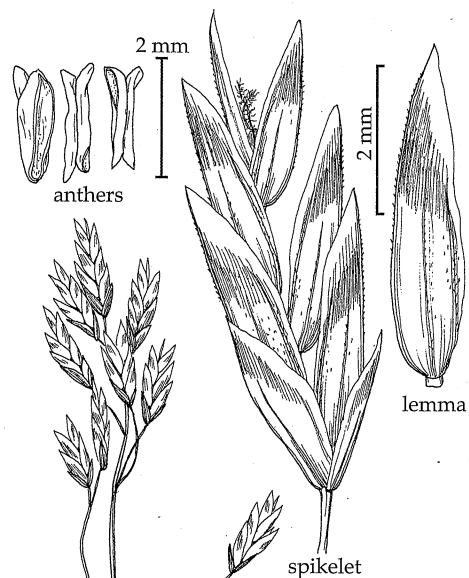


*Poa cusickii*





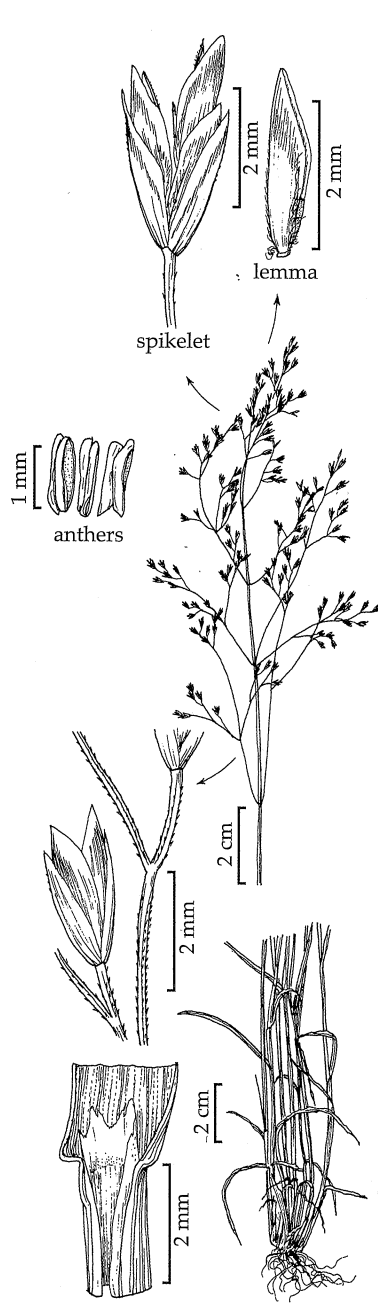
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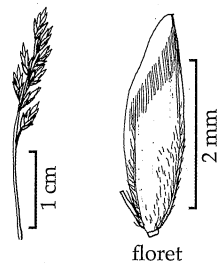
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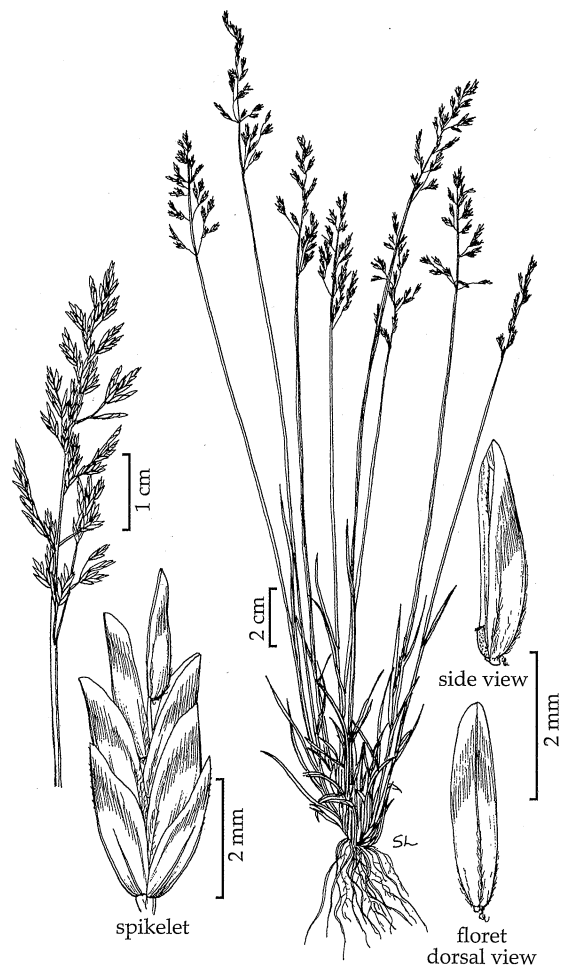




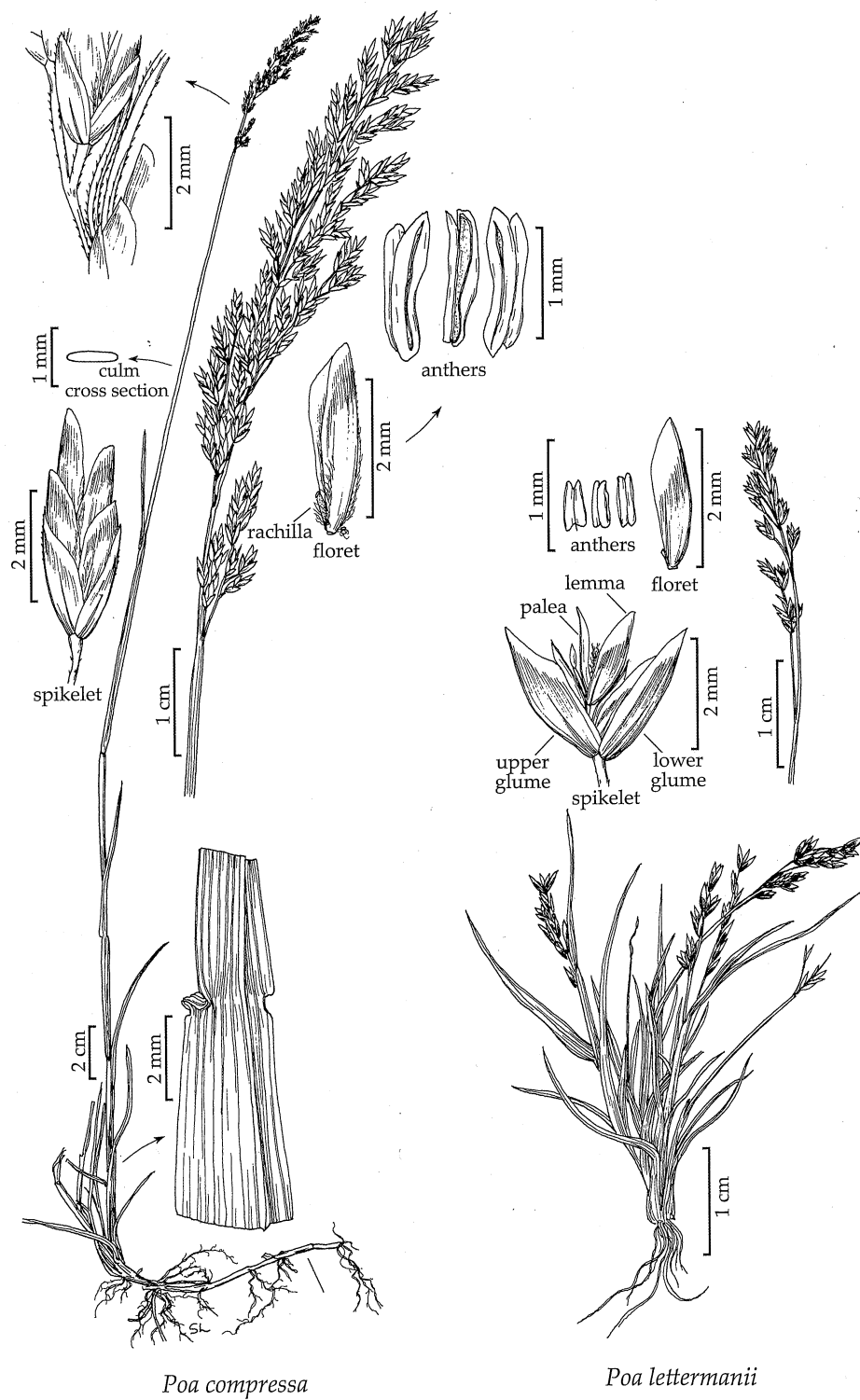
*Poa interior*



*Poa glauca* subsp. *rupicola*

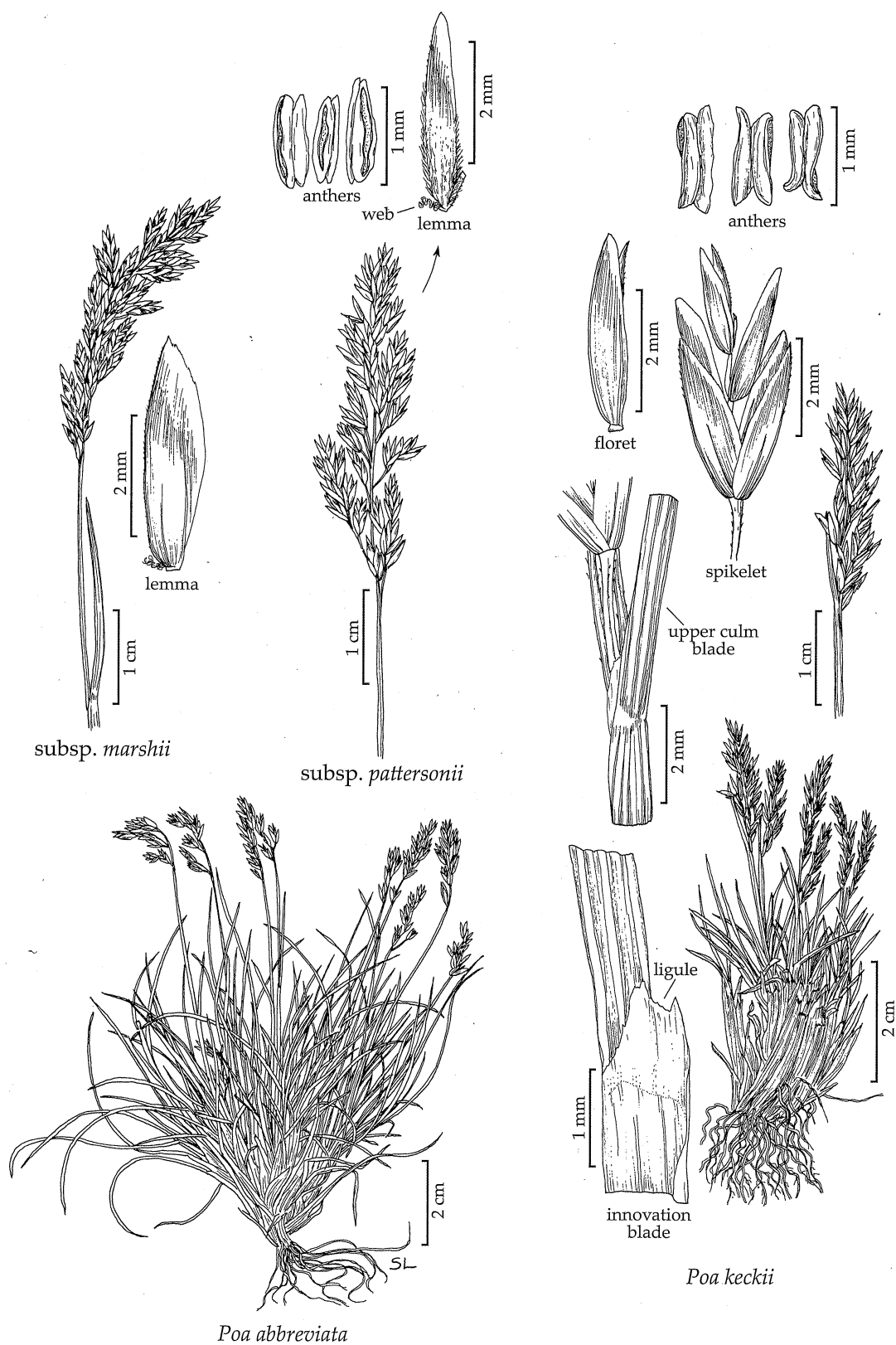


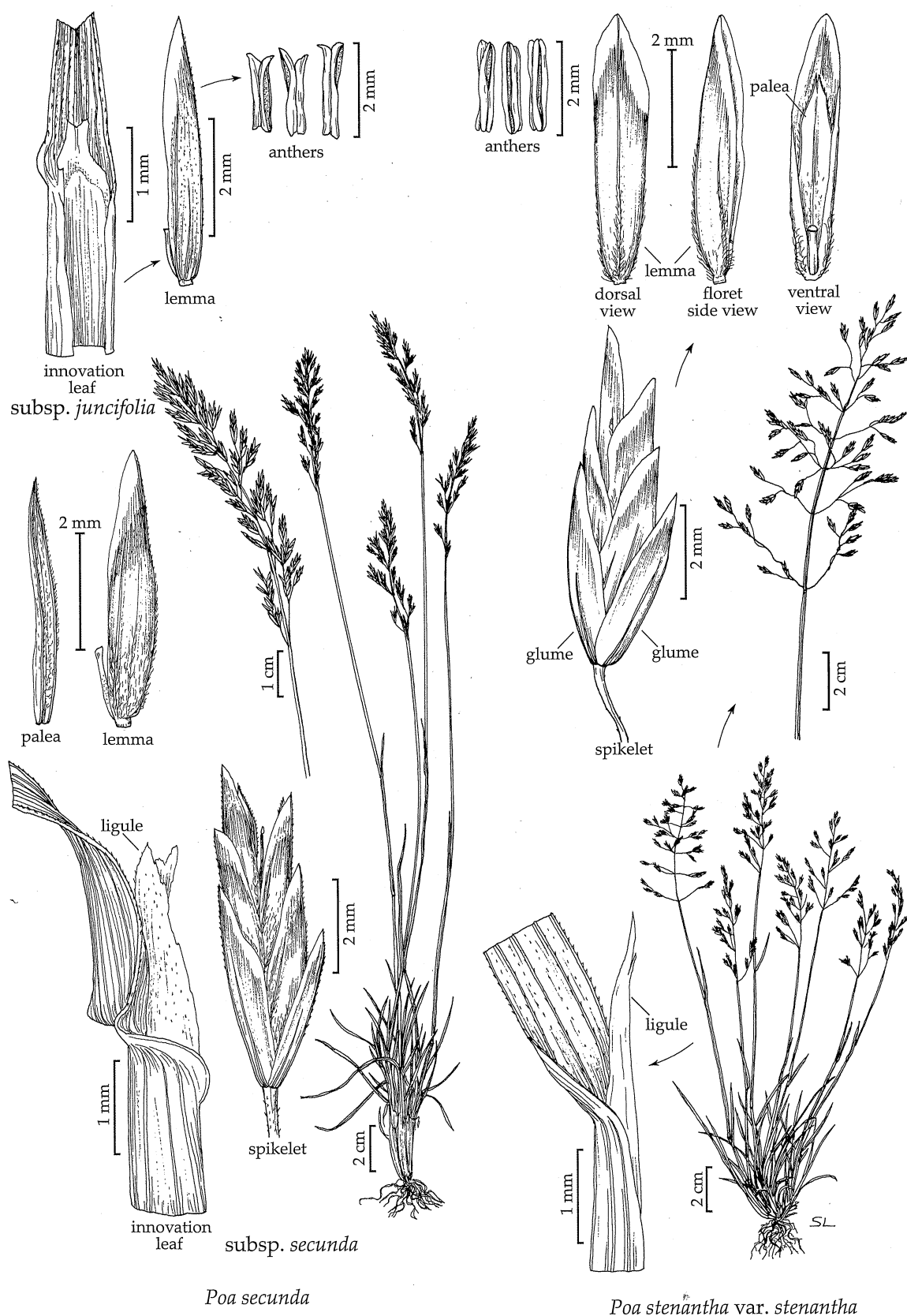
*Poa glauca* subsp. *glauca*



*Poa compressa*

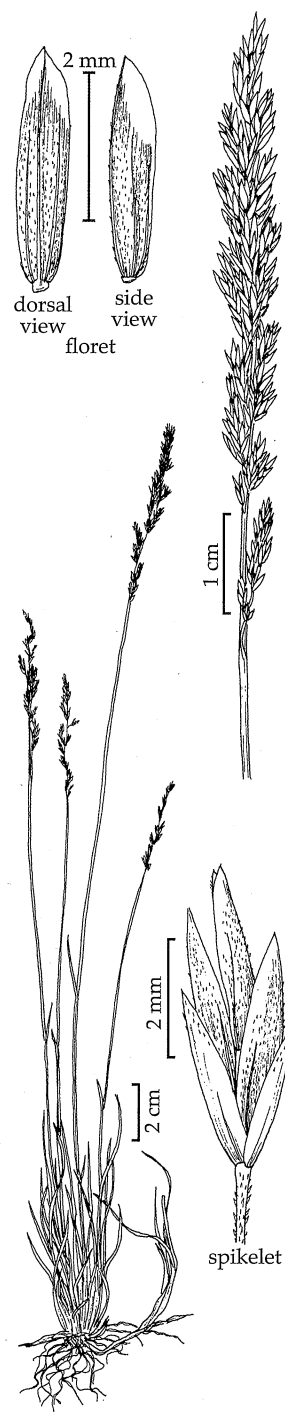
*Poa lettermanii*





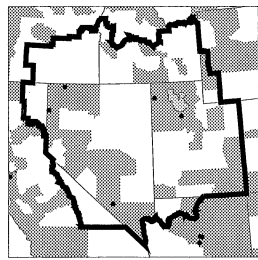


*Poa arida*

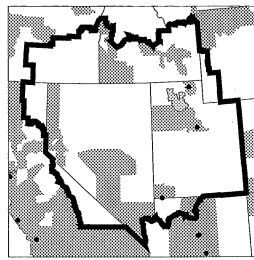


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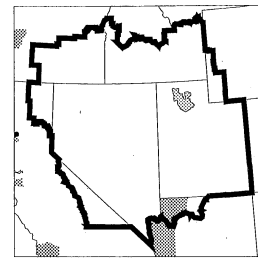




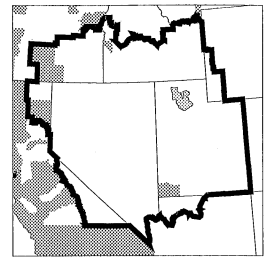
*Lolium perenne*  
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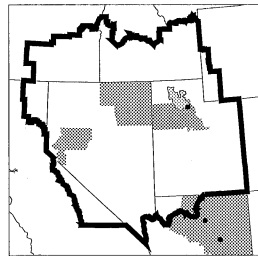
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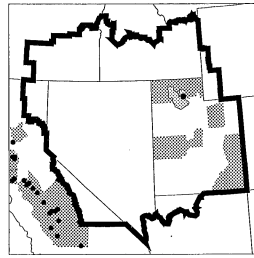
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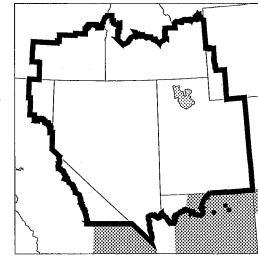
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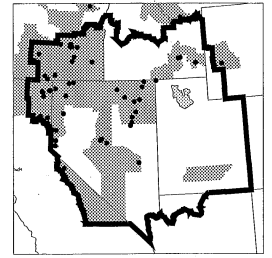
*Puccinellia fasciculata*  
8.06.1



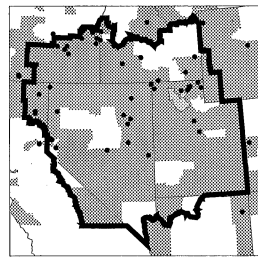
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8.06.2



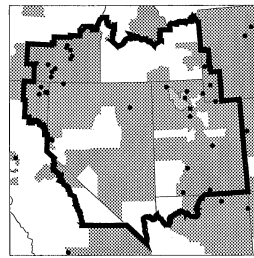
*Puccinellia parishii\**  
8.06.3



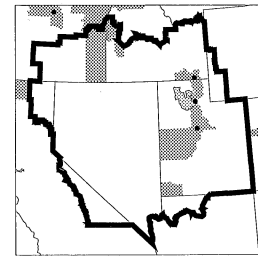
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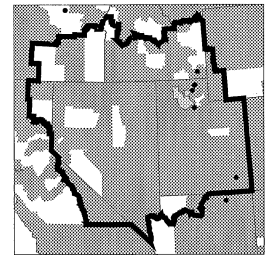
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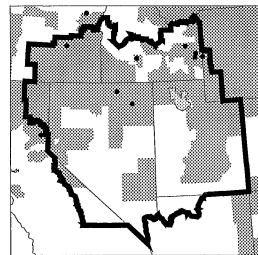
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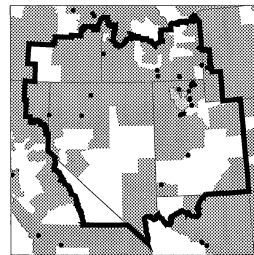
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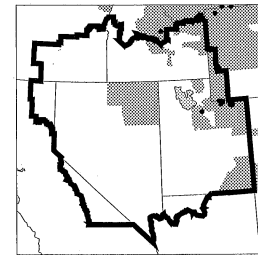
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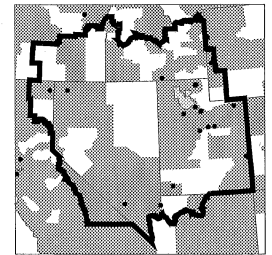
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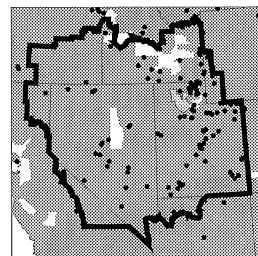
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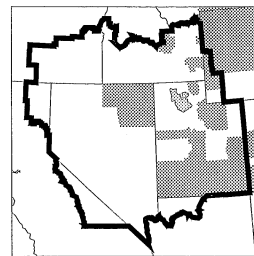
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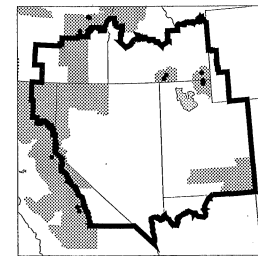
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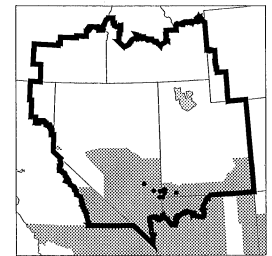
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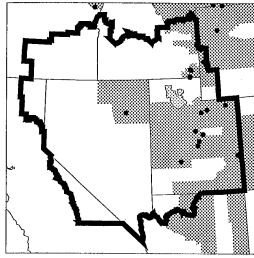
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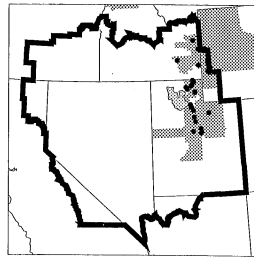
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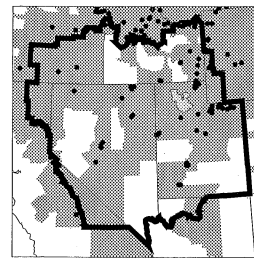
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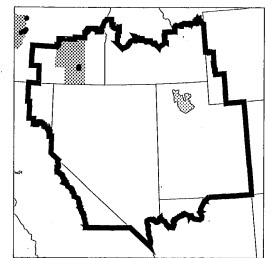
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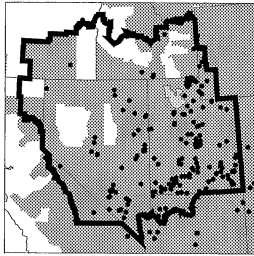
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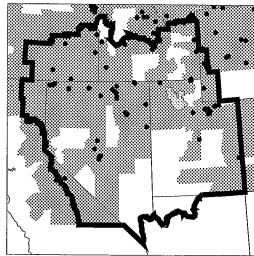
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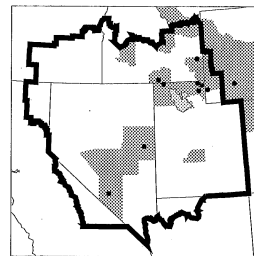
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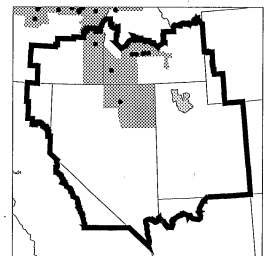
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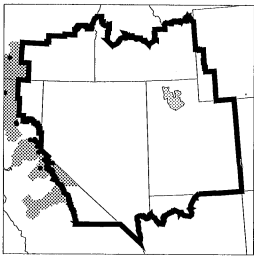
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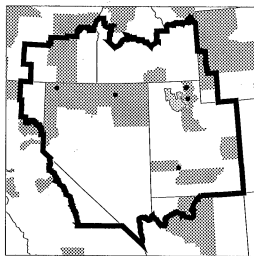
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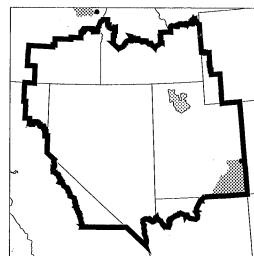
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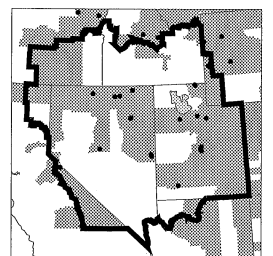
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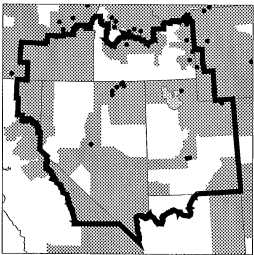
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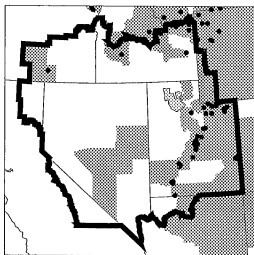
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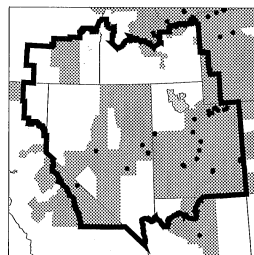
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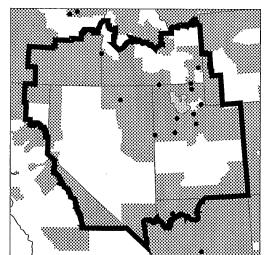
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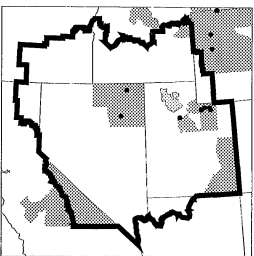
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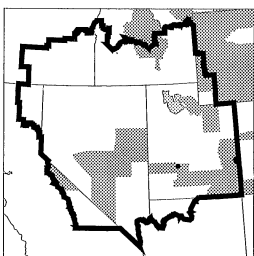
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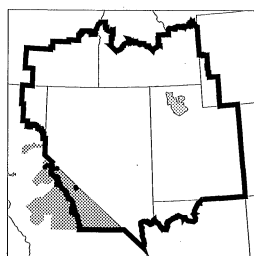
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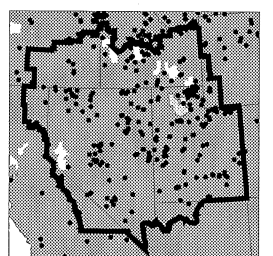
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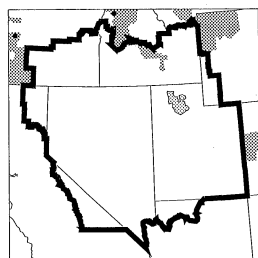
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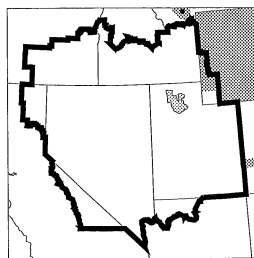
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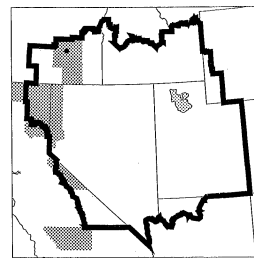
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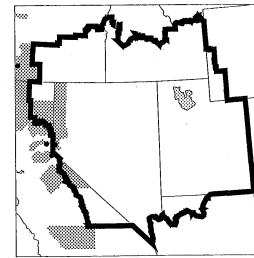
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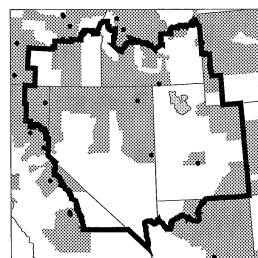
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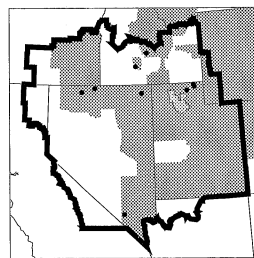
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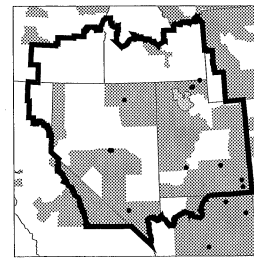
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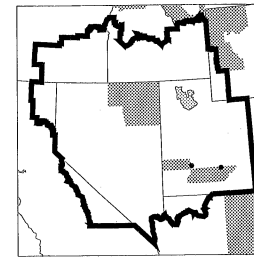
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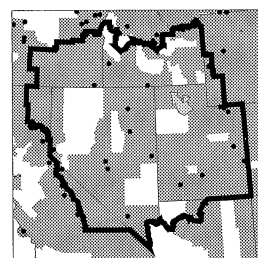
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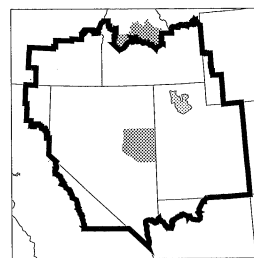
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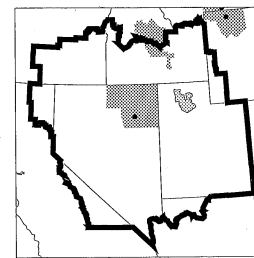
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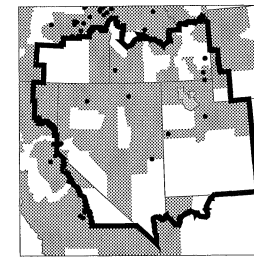
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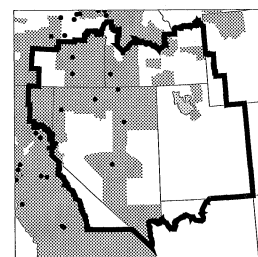
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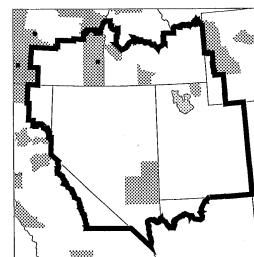
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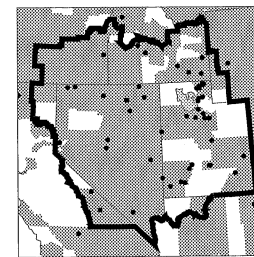
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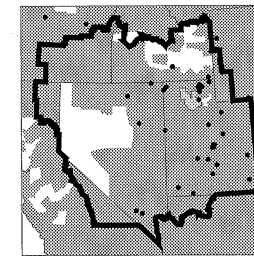
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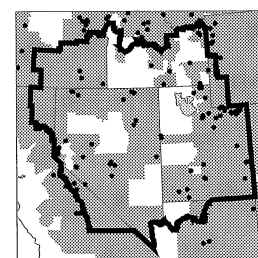
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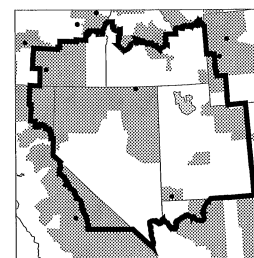
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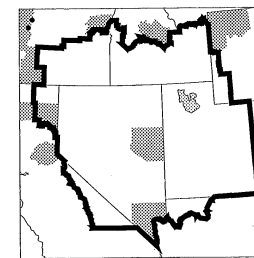
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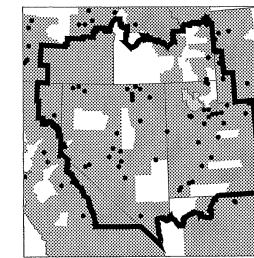
*Agrostis scabra*  
8.15.4



*Agrostis idahoensis*  
8.15.5



*Agrostis oregonensis*  
8.15.6



*Agrostis exarata*  
8.15.7

# *Grasses of the Intermountain Region*

*Edited by* Laurel K. Anderton and Mary E. Barkworth

*Illustrated by* Cindy Talbot Roché, Linda Ann Vorobik, Sandy Long,  
Annaliese Miller, Bee F. Gunn, and Christine Roberts

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Logan, Utah 84322

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