

Schoenoplectus californicus (C. A. Meyer) Soják, CALIFORNIA BULRUSH, GIANT BULRUSH, TULE. Aquatic perennial herb, emergent, green-stemmed, clonal, in dense, mostly monospecific patches, rhizomatous, fibrous-rooted, unbranched from base, erect to ascending, 150–400 cm tall; shoots with conspicuous photosynthetic stems and 3–4 sheathing basal leaves, glabrous; rhizomes horizontal, mostly 80–120 mm depth, to 20 mm diameter, blackened, fibrous, covered with purplish red or reddish brown acute scales, the scales with short hairs and punctured by blackish nodal adventitious roots, flesh white or yellow. **Stems:** rounded 3-angled, \pm triangular in \times -section with convex sides and rounded angles, 8–18 mm diameter at the widest part just above ground level (150–200 mm above rhizome), long-tapered from the widest part to tip, tough, dull bluish green, finely striped having fibrous strips alternating with parallel strips of stomates; surface layer \pm tough, with whitish, spongy and airy internal tissue (aerenchyma). **Leaves:** alternate tristichous, each mainly a sheath and nearly bladeless; sheath closed, 170–380 mm long (increasing from the oldest to the youngest leaf), rupturing as stem expands leaving persistent fibers pinnately branched from a vertical vein on side of stem opposite middle of sheath, buried of outer sheath deep purple, green on other exposed surfaces and membranous on unruptured margin above midpoint; ligule membranous and continuous with sheath margins, rounded or slightly acute, 0.4–0.5 mm long; blade opposite stem angle, appressed, acute-triangular, 0.4–3 mm long, light green. **Inflorescence:** panicle of spikelets, terminal but appearing lateral due to an erect, stemlike bract, with 10–15 ascending to arching principal branches, principal branches of varying lengths, 10–80 (–210) mm long, with 3+ orders of branching, successive branches progressively shorter, ultimate branchlet bearing 1 terminal spikelet often with 2–4 spikelets sessile or on very short ultimate branches forming a condensed cluster; inflorescent bract subtending panicle erect, narrowly triangular, (10–)17–50(–80) mm long, bluish green like stem, striped and with brown-membranous, often short-scabrous margins, upper groove grayish; bract subtending branch sheathlike, tannish, often ciliate, paired with prophyll in axis, as long as bract, faintly 2-veined and 2-lobed; branchlet axes hemi-cylindric, 0.5–2 mm diameter, tough but flexible, sometimes slightly expanded below head, bright green, entire to scabrous on margin, glabrous; peduncle of spikelet 0.5–12 mm long (longer if with only 1 spikelet). **Spikelet:** narrowly ovoid, 4–5 \times 2–3 mm increasing to 12 mm long in fruit, with ca. 22–42 flowers, flowers and bracts helically alternate, bracts overlapping; bract subtending spikelet and bractlet subtending flower ovate to obovate, 2–2.7(–3) mm long, 1-veined, short-ciliate and membranous on margins, tannish with orange or reddish markings above midpoint, notched 0.1–0.2 mm at tip, with awn in notch or on back just below tip, the awn narrowly triangular, 0.2–0.6 mm long, sparsely scabrous. **Flower:** protogynous; **perianth** of 2–4 linear flat bristles, (1.2–)1.4–2.1 mm long, colorless, short-papillate on margins, persistent around developing fruit and becoming \leq fruit; **stamens** 3, free, exserted; filaments \pm linear and flat, 1.1–2.3 mm long increasing to 2.8 mm in fruit, whitish, on bractlet side of ovary; anthers basifixed, dithecal, linear, ca. 0.9–1.3 mm long, light yellow but orange-brown and pubescent at sterile acute tip, longitudinally dehiscent; pollen light yellow **pistil** 1, 3.7–4 mm long; ovary superior, hemi-obovoid to half top-shaped (flat on 1 side), 1–1.5 \times 0.5–1 mm, green, 1-chambered with 1 ovule; style flat, 2.5–3 mm long, 2-branched from 1/3–2/3, the branches exserted and stigmatic. **Fruit:** achene, obovate to circular in outline, 1.8–2.2 \times 1.2–1.4 mm, dark gray-brown to dark

brown, flattish to slightly convex on 1 face and convex on other face, acute to slightly tapered at base, slightly constricted at obtuse to broadly acute tip. Late May–early August.

Native. Emergent aquatic perennial herb most commonly observed where it forms a tall, dense border around a lake, pond, or depression with standing water at least during springtime, but also known in certain springs. *Schoenoplectus californicus*, formerly treated as a species of *Scirpus*, resembles the closely related common tule (*Schoenoplectus acutus* var. *occidentalis*) but has very short leaf blades, much smaller spikelets, and flowers with fewer, flat bristles (perianth segments). Sterile hybrids between the two species are known but have not yet been identified in range.

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