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KEYS AND DISTRIBUTIONAL MAPS FOR NEBRASKA CYPERACEAE, PART 1:

BULBOSTYLIS, CYPERUS, DULICHIMUM, ELEOCHARIS,
ERIOPHORUM, FIMBRISTYLIS, FUIRENA, LIPOCARPHA, AND SCIRPUS

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ABSTRACT

Keys and distributional maps are provided for 9 genera and 43 species of Cyperaceae documented from Nebraska (excluding *Carex*). Two species—*Eleocharis elliptica* and *Fimbristylis vahlii*—are newly reported for the State, while seven species attributed to the State in the *Flora of the Great Plains* (Great Plains Flora Association, 1986)—*Eleocharis compressa*, *E. verrucosa*, *E. wolfii*, *E. xyridiformis*, *Scirpus georgianus*, *S. smithii*, and *S. torreyi*—are deleted based on re-identifications, lack of specimen evidence, or specimens of doubtful provenance in the State. Notes on local systematic problems within the family are also included.

† † †

With 115 species in ten genera in Nebraska, the sedge family (Cyperaceae) is the third largest family of vascular plants in the State. Its members are found in a wide variety of habitats from rocky, arid prairie to rich, shaded woodland but are primarily associated with wetland habitats, where they frequently are the most common constituents. All but one of our species (*Cyperus fuscus*, of very limited occurrence) are native to North America, and only yellow nutsedge (*Cyperus esculentus*) tends to be weedy.

Despite its size, this family is regarded as economically unimportant (e. g., Jones and Luchsinger, 1979), although *Carex filifolia* and *C. nebrascensis* are important for grazing animals (Hermann, 1970). Bulrushes (*Scirpus* spp.) and other Cyperaceae are important foods for waterfowl, muskrats and other marsh-dwelling wildlife. With the increased emphasis on identification, preservation, and restoration of wetland habitats among government agencies, many employees and consultants have been forced to become familiar with this large and often difficult family.

The first published report for Nebraska Cyperaceae was the long-outdated “On the sedges of Nebraska” by Bates (1914) which compiles distributional data for 103 species, varieties, and forms, but lacks keys. Kolstad (1966) covered our species of *Carex* in his doctoral dissertation (University of Kansas, Lawrence) and later (1971) wrote keys for Nebraska Cyperaceae and Juncaceae while at Kearney State College (the latter lists 108 species of Cyperaceae for Nebraska). Unfortunately, neither was published. The most recent published treatment of all Nebraska Cyperaceae is that in the *Flora of the Great Plains* (Great Plains Flora Association, 1986) (hereinafter referred to as the *Flora GP*). The keys in that treatment are rather spare, often rely on characters which are difficult to observe, and do not accommodate many atypical specimens such as glabrous forms of normally pubescent plants, which are often collected. Most beginning students and many professionals are often frustrated when trying to identify Nebraska Cyperaceae and either have to turn to one of a very few authorities on local Cyperaceae, or all too often avoid collecting the family altogether.

A resurgence in systematic research in the Cyperaceae (*Carex* in particular) and in floristic research in Nebraska since the 1980s has resulted in numerous changes to the sedge family treatment published in the *Flora GP*. This paper includes two species (*Eleocharis elliptica* and *Fimbristylis vahlii*) newly reported for the State, and seven species (*Eleocharis compressa*, *E. verrucosa*, *E. wolfii*, *E. xyridiformis*, *Scirpus smithii*, *S. georgianus*, and *S. torreyi*) that are deleted based on re-identifications, lack of specimen evidence, or specimens of doubtful provenance in the State. A paper by Rolfsmeier and Wilson, covering the genus *Carex* in Nebraska, is currently in press. Known

distributions of all species within Nebraska were last compiled nearly 20 years ago in the *Atlas of the Flora of the Great Plains* (Great Plains Flora Association, 1977) (referred to hereinafter as the *Atlas GP*), and many have changed considerably since, due both to recent field work and to correction of many erroneous records plotted in the *Atlas GP*.

The objectives of this paper are to provide "user-friendly" keys to the Cyperaceae of Nebraska and up-to-date distributional maps for all our species and to point out local systematic problems based on field observations.

METHODS

The keys appearing here are original, but borrow much of their organization from the excellent treatments of the family in Steyermark (1963) and Voss (1972). Many of the characters employed are taken from these sources and treatments by Gleason and Cronquist (1991), Kolstad (1986), Larson (1993), and other works cited in the body of the paper. Original characters based on field and herbarium observations of Nebraska plants are also incorporated, particularly vegetative and floral characters, which are often left out of many keys. Descriptions of species are limited to the key; more complete descriptions are available in the *Flora GP*.

The maps were compiled wholly from observations of specimens, rather than from literature reports. The primary sources of data were the herbaria of the University of Nebraska—Lincoln (NEB), University of Nebraska at Omaha (OMA), University of Nebraska at Kearney, Chadron State College (CSCN), and my own personal collections. Additional data have been included from the herbaria of the University of Kansas (KANU), the Rocky Mountain Herbarium in Laramie, Wyoming (RM), the University of South Dakota (SDU) and the South Dakota State University (SDC), Wayne State College, Doane College, Cedar Point Biological Station of the University of Nebraska—Lincoln, Crescent Lake National Wildlife Refuge, Nebraska Game and Parks Commission, and the personal collection of Robert Kaul at UNL, all (from Wayne State on) in Nebraska. All distributional data are maintained by the author in a computerized database and were mapped directly from that database using MapMaker™ software.

KEYS TO THE CYPERACEAE OF NEBRASKA

The Cyperaceae are most likely to be confused with two other monocot families, the rush family (Juncaceae) and the grass family (Poaceae), but they are distin-

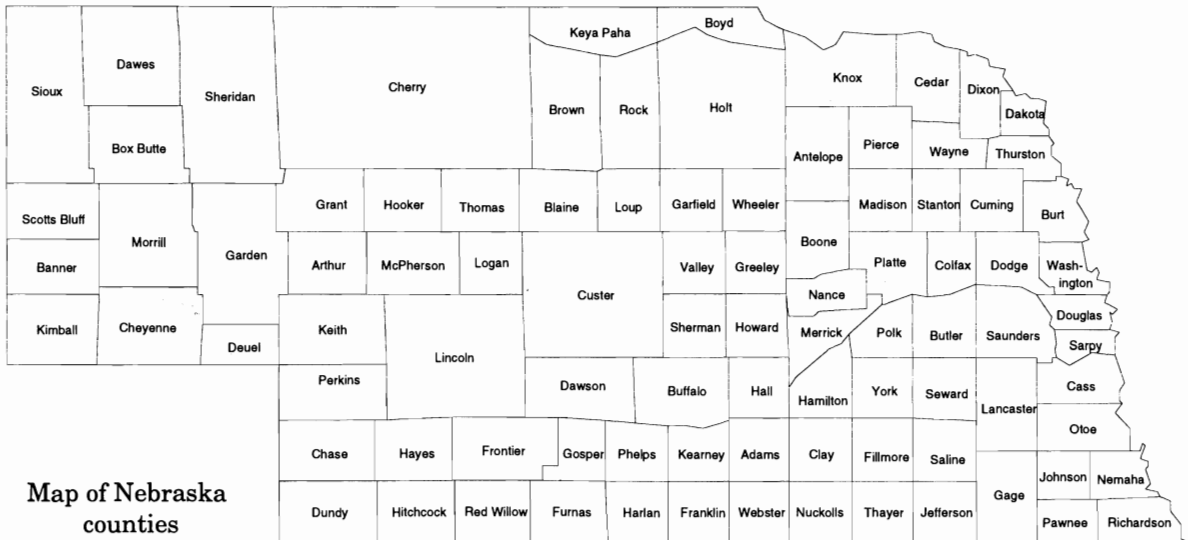
guishable by floral and vegetative characters. The rushes have flowers which are borne individually (though sometimes clustered in sparse to dense heads) each with a perianth of 6 similar scalelike tepals and sometimes 1 or 2 inconspicuous bracts at the base. The flowers of the Cyperaceae and grasses lack the conspicuous 6-parted perianth of the rushes and are always subtended by 1 or 2 scalelike structures which completely cover or enclose the flower. In the grasses, each flower lacks a perianth (tiny rudimentary perianth parts are often present) and is subtended by 2 unequal bracts called the lemma and palea, whereas a perianth of scales or bristles may be present in the Cyperaceae and each flower is subtended by a single fertile scale. Both families have flowers arranged in groups called spikelets with sterile scales at the base. The grasses have 2 such scales (called glumes) whereas the Cyperaceae have 0–3 sterile scales per spikelet. Additionally, in most genera of the Cyperaceae the inflorescence is subtended by leaflike bracts (stemlike in some *Scirpus*, absent in *Eleocharis*), which are not present in grasses.

Vegetatively the Cyperaceae have commonly been distinguished from grasses by their 3-sided stems and 3-ranked leaves, although this character is useful only for most species of *Carex*, *Cyperus*, and some *Scirpus*. Most grasses and rushes have leaf sheaths which are at least partially open on the ventral face whereas all our Cyperaceae have closed sheaths. Additionally the culms (aboveground stems) of most grasses are hollow and have swollen nodes, whereas they are solid and lack swollen nodes in the Cyperaceae (except for *Dulichium*).

Members of the Cyperaceae have a reputation (only partly deserved) as notoriously difficult to key to species. One of the major reasons is that many collected specimens are incomplete or immature. Whenever possible, underground parts should be collected, since presence of rhizomes is a frequently-used character to separate species of *Carex*, although the reliance on this character in the keys is kept to a minimum. More importantly, specimens should be collected once the achenes have matured (but before they have fallen from the plants). Achene morphology is particularly important in identification of *Eleocharis*, and the perigynium surrounding the achene is a primary taxonomic feature in *Carex*. Immature specimens are the primary reason most Cyperaceae are misidentified, although whenever possible floral and vegetative characters are included in the keys in case mature material is not available. Measurements indicate length unless otherwise stated, and geographic notations are for Nebraska only.

KEY TO THE GENERA

- 1. Culms (aboveground stems) naked, without evident leaves, but bladeless sheaths may be present at the base
 - 2. Inflorescence of a single spikelet at the tip of the culm*Eleocharis*
 - 2. Inflorescence of 2–many spikelets, or if 1, then appearing to arise below the tip of the culm*Scirpus*
- 1. Culms with evident leaves, at least at base
 - 3. Flowers unisexual, the pistillate flower and achene enclosed in saclike structure (perigynium)...(*Carex*)
 - 3. Flowers bisexual, with a pistil and 1–several stamens; perigynium not present
 - 4. Spikelets with flowers arranged in 2 opposite ranks, the spikelet flattened at maturity
 - 5. Spikelets borne in the axils of short, stiff leaves along the length of hollow, jointed culms; achenes subtended by bristles*Dulichium*
 - 5. Spikelets borne in a terminal inflorescence subtended by several leaflike bracts; culms solid, not jointed; leaves arising from the base; achenes not subtended by bristles*Cyperus*
 - 4. Spikelets with flowers spirally arranged in several ranks, the spikelet cylindrical or cone-shaped, not flattened
 - 6. Inflorescence appearing to arise laterally below the tip of the culm (actually subtended by an erect bract that appears to be a continuation of the culm)
 - 7. Plants very slender, mostly less than 10 cm tall, with culms less than 0.5 mm thick; bristles absent at base of achene, but a small, translucent scale often present*Lipocarpha*
 - 7. Plants taller or with thicker culms (usually both); bristles 1–numerous, but no translucent scale evident at base of achene
 - 8. Achene subtended by numerous silky bristles much longer than the scale; rare in Sandhills fens*Eriophorum*
 - 8. Achene subtended by 1–8 bristles, not silky in appearance, shorter than the scale; widespread*Scirpus*
 - 6. Inflorescence arising from the tip of the culm
 - 9. Achene subtended by 3 slender bristles alternating with 3 petal-shaped scales ..*Fuirena*
 - 9. Achene subtended by 0–numerous slender bristles, petal-shaped scales absent
 - 10. Achene subtended by 1–numerous slender bristles**go back to couplet 8**
 - 10. Bristles absent at base of achene
 - 11. Style not swollen at the base; culms stout (over 3 mm thick 1 cm below inflorescence) and 3-sided; leaf blades over 5 mm wide*Scirpus*
 - 11. Style swollen at or near the base; culms slender (1 mm or less thick at 1 cm below inflorescence) and rounded; leaf blades under 3 mm wide
 - 12. Swollen style base persistent on the achene as a distinct tubercle darker than the achene body and set off from it by a line*Bulbostylis*
 - 12. Swollen style base deciduous, not present on mature achene*Fimbristylis*



Map of Nebraska counties

BULBOSTYLIS Kunth

Annual herbs with narrow, linear basal leaves. Perianth lacking. Base of style swollen and persistent as a minute tubercle atop the achene.

Bulbostylis capillaris (L.) Clarke: Wet, sandy soil along rivers and ponds. Scattered and probably overlooked in c Nebraska, sparingly present in the Sandhills. This diminutive annual is very similar to the less-commonly collected *Fimbristylis autumnalis*, particularly in young

material. Flowering specimens of *Bulbostylis* can be distinguished by the pubescent fertile scales obtuse at the tip and by the bracts often with slender marginal hairs.

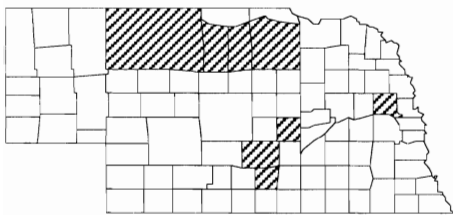
CYPERUS L. (FLATSEEDGE)

Annual or perennial herbs. Culms 3-angled. Spikelets distichous (borne in 2 ranks on opposite sides of the rachilla) in a terminal inflorescence.

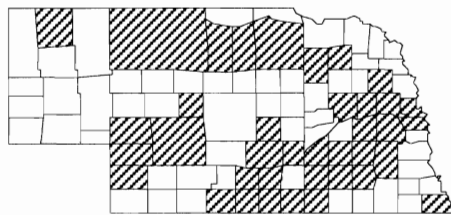
Botanists in the tropics often split *Cyperus* into several segregate genera. If these changes become more widely accepted, two of our species (*C. lupulinus* and *C. schweinitzii*) would be transferred to the genus *Mariscus*.

1. Tips of scales curved conspicuously outward; spikelets in dense hemispherical to nearly globose clusters; stamen 1; sweet-scented annuals
 2. Scales with a conspicuous outwardly-curved awn 0.5–1 mm, and 3–4 prominent nerves on each side; plants usually reddish at the base ***C. squarrosus***
 2. Scales with a narrow, outwardly-curved point, without a conspicuous awn, with 1 strong but often inconspicuous nerve on each side at the edge of the broad green midrib; plants usually greenish or straw-colored at the base ***C. acuminatus***
1. Tips of scales not conspicuously curved; spikelets in loose subglobose clusters or cylindrical spikes; stamens 2 or 3; annuals and perennials, not sweet-scented
 3. Styles 2, achenes lens-shaped (with 2 convex sides); scales usually at least partly purple-brown pigmented; spikelets in loose subglobose clusters
 4. Styles persistent and conspicuously exerted 2–4 mm beyond the tips of the scales at maturity, divided nearly to the base; scales with a narrow purple-brown marginal band along each side (usually widest at the tip), the center of each side not pigmented ***C. diandrus***
 4. Styles not persistent and usually exerted no more than 1 mm, united for ½ of their length from the base; scales pigmented (sometimes faintly) in the center of each side, especially toward the base (sometimes unpigmented) ***C. bipartitus***
 3. Styles 3, mature achenes clearly 3-sided; scales pale green or yellow to orange brown at maturity (except in the rare *C. fuscus*, which has dark purple-brown scales); spikelets variously arranged
 5. Scales dark purplish-brown (nearly black) at maturity; spikelets in loose subglobose clusters; rare plants of sandy soil along the Platte River ***C. fuscus***
 5. Scales lighter in color (pale straw-colored to orangish brown); spikelets not arranged in loose subglobose clusters (densely subglobose in *C. lupulinus*); widespread
 6. Spikelets closely arranged on the axis of the inflorescence and appearing to arise in clusters of several to many, at least the uppermost spikelets strongly ascending at maturity; perennials with a bulbous thickening at the base of the culm (below ground level); most often in well-drained uplands (occasionally in meadows and lawns)
 7. Bracts at the base of the inflorescence strongly ascending at maturity, the inflorescence usually arranged in loose clusters of 1–4 ascending spikelets; scales with a short mucronate tip at least 0.3–1.5 mm and with 4–6 distinct nerves on each side; culms usually scabrous below the bracts; achenes 2.2–2.6 mm; common in sandy soils ***C. schweinitzii***
 7. Bracts at the base of the inflorescence widely spreading to reflexed at maturity, the inflorescence usually of 1–several dense hemispheric to subglobose heads with many spikelets; scales narrowed to a point, occasionally with a very short mucronate tip less than 0.3 mm, and with 2 faint nerves on each side; culms glabrous below the bracts; achenes 1.2–2.2 mm; frequent in a variety of soils ***C. lupulinus***
 6. Spikelets pinnately arranged on the axis of the inflorescence, forming short-cylindrical spikes, most spikelets spreading at nearly a right angle to the axis when mature; annuals and perennials not bulbous-thickened at the base (usually with a cornlike thickening in *C.*

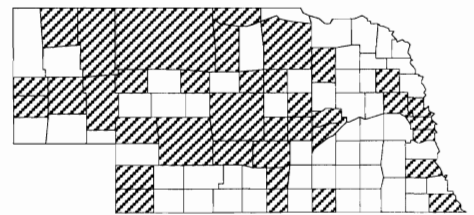
- strigosus*); most often in moist ground and wetlands, sometimes in disturbed ground and lawns
- 8. Scales 1–1.5 mm, golden-brown to copper-colored when mature; achenes ivory to pale tan and smooth and shiny at maturity, 0.6–0.8 mm *C. erythrorhizos*
 - 8. Scales 1.7–4.5 mm, golden-yellow to reddish-brown; achenes tan to brown and minutely cellular-roughened under magnification, 1.1–2.3 mm
 - 9. Scales 3–4.5 mm, with yellowish-golden sides; achenes less than ½ the length of the scales; perennials with a thickened cormlike base (plants will often flower the first year before this structure has formed)..... *C. strigosus*
 - 9. Scales 1.7–2.7 mm, usually tinged with reddish or brown; achenes more than ½ the length of the scales; annuals or perennials with slender rhizomes
 - 10. Perennials with numerous scaly rhizomes scarcely thicker than the roots, but distinguishable from them by the presence of non-overlapping scales (rhizomes ultimately producing edible tubers at the tips); rachilla of the spikelets remaining intact and dropping from the plant as a single unit at maturity; scales pale yellowish-brown to pale brown or straw-colored (paler than the following); mature anthers 0.8–1.5 mm; a weed of disturbed ground and moist places *C. esculentus*
 - 10. Fibrous-rooted annuals; rachilla of the spikelets readily breaking between the achenes into segments consisting of a single achene and scale; scales yellowish-brown to brown or reddish-brown; anthers 0.2–0.6 mm; moist places
 - 11. Scales yellowish-brown to brown, not overlapping on the same side of the spikelet, the tip of one scale not reaching the base of the scale directly above it; achenes narrowly cylindrical, 1.7–2.0 mm; uncommon in the Sandhills *C. engelmannii*
 - 11. Scales reddish-brown to brown, the tip of each one overlapping with the base of the scale immediately above on the same side; achenes obovoid-short cylindrical, 1.0–1.4 mm; common, widespread *C. odoratus*



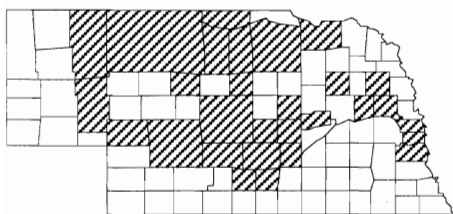
Bulbostylis capillaris



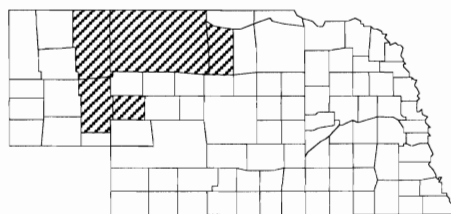
Cyperus acuminatus



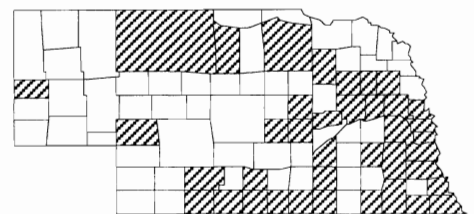
Cyperus bipartitus



Cyperus diandrus



Cyperus engelmannii



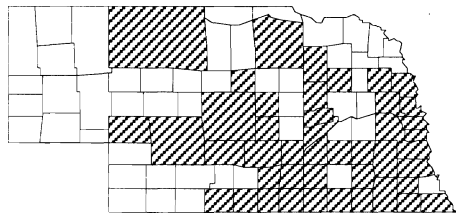
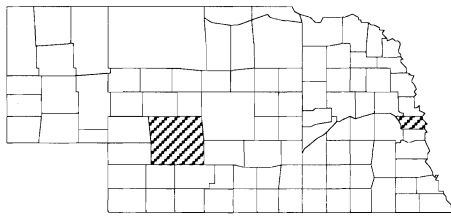
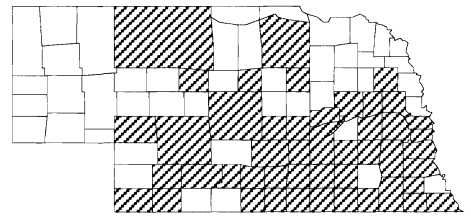
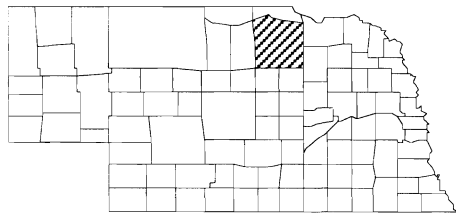
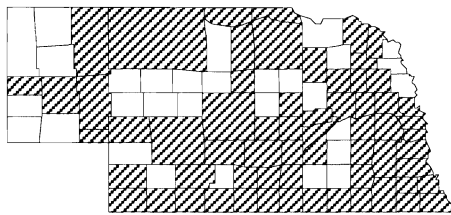
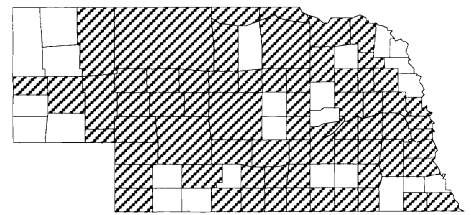
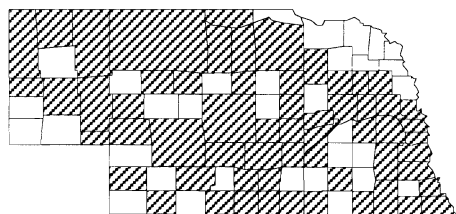
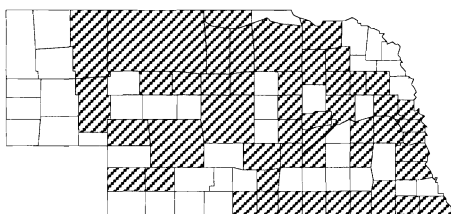
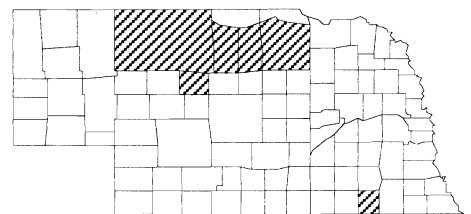
Cyperus erythrorhizos

Cyperus acuminatus Torr. & Hook. ex Torr.: Sandy or muddy margins of ponds and streams, frequently in playas and other temporarily wet areas. Statewide but less common in w, and never exceptionally abundant. Dried specimens of this and *C. aristatus* frequently have a pleasant sweet odor described as similar to that of dried sweetclover (*Melilotus* sp.).

Cyperus bipartitus Torr., brook flatsedge [*C. rivularis* Kunth]: Wet, sandy shores and margins of rivers and ponds. Widespread in appropriate habitats throughout. Occasionally forming mats of threadlike culms of which

many are sterile, resembling *Eleocharis acicularis*; usually some fertile culms present in these populations, though they frequently bear only a single spikelet.

Cyperus diandrus Torr.: Wet, sandy shores and banks, frequently along rivers. Widespread in Nebraska along the Platte, Loup, and Elkhorn rivers and elsewhere in the Sandhills, less common westward. Frequently growing with *C. bipartitus*, which it resembles, but distinguishable by the “shaggy” appearance of its spikelets, due to the long-exserted styles, and the coloration of the scales.

*Cyperus esculentus**Cyperus fuscus**Cyperus lupulinus lupulinus**Cyperus lupulinus macilentus**Cyperus odoratus**Cyperus schweinitzii**Cyperus squarrosus**Cyperus strigosus**Dulichium arundinaceum*

Cyperus engelmannii Steud.: Sandy shores of lakes in the Sandhills. Apparently uncommon, though perhaps overlooked. Resembles an aberrant form of the much more common *C. odoratus* and is distinguished from it by its non-overlapping scales which often point outward toward the tip and slightly expose the rachilla, giving the spikelets a jagged, zig-zag appearance, especially in dry material. Some authors have lumped this species with *C. odoratus*, though it is maintained here because of its geographic integrity within the State. For a discussion of this problem, see Mears and Libby, 1995.

Cyperus erythrorhizos Muhl., red-rooted flatsedge: Muddy or sandy shores and stream margins. Widespread but not particularly common in the e portion, uncommon westward and apparently rare in the Panhandle. Often collected immature and superficially resembling *C. odoratus*, with which it often grows, but distinguishable by its shorter scales, even when young. Mature specimens are easily recognized by the rich copper-colored scales which are very densely grouped on the rachilla.

Cyperus esculentus L., yellow nutsedge: Moist, often muddy shores, ditches, banks; more often a weed of roadsides, waste ground and yards. Common in the e $\frac{2}{3}$, rare to absent in the w $\frac{1}{3}$. Most easily distinguished by the slender, scaly rhizomes among the roots. If the underground parts are not collected it may be confused with *C. odoratus*, which is quite similar. It can be distinguished from that species by the larger anthers, pale brown to straw-colored scales, and spikelets noticeably separated on the rachis (those in *C. odoratus* are densely crowded).

Cyperus fuscus L. A rare sedge known only from two widely separated locations along the Platte River (In Lincoln and Douglas counties) but to be expected at intervening

locations.

Cyperus lupulinus (Spreng.) Marcks [*C. filiculmis*, in part]: Dry ground in upland prairie and open woods, often where sandy. Generally restricted to sandy meadows westward. Occasionally in lawns. Two subspecies are present in the State:

1. Scales 2.5–3.5 mm, loosely covering and surpassing the achene; spikelets densely to loosely clustered, with 6–22 flowers. The common subspeciessubsp. ***lupulinus***

1. Scales 1.8–2.5 mm, fitting firmly over and scarcely longer than the achene; spikelets densely clustered, with 3–7 flowers. Rare ..subsp. ***macilentus***

Subspecies *lupulinus* is the common subspecies in Nebraska, found throughout the range of the species, while subsp. *macilentus* (Fern.) Marcks was collected only once from Ewing, Holt County in 1897. In e Nebraska, subsp. *lupulinus* is frequently found with *C. schweinitzii*, and intermediates are generally common. Reports of *C. houghtonii* in the *Atlas GP* (a species reportedly derived from hybridization between subsp. *macilentus* and *C. schweinitzii*) are probably based on these apparent hybrids. These plants will likely key to *C. schweinitzii*; see comments under that species.

Cyperus odoratus L. [*C. ferruginescens* Boeck.]: Wet sandy and muddy soil, shores, riverbanks, marshes. Probably our most common, widespread species, though rare to absent in the Sandhills and the w $\frac{1}{2}$ of the Panhandle. Most likely to be confused with *C. engelmannii*, *C. erythrorhizos*, or *C. esculentus*; see comments under those species.

Cyperus schweinitzii Torr.: Sandy soils in upland prairie or along rivers. Statewide and common in the w and c

parts, uncommon in the s-e and apparently also the w ½ of the Panhandle. This species commonly grows with *C. lupulinus* subsp. *lupulinus* and intermediates are not uncommon. These plants often resemble *C. schweinitzii*, but have fewer inflorescence branches, leafy bracts that are more broadly spreading, and culms that are slightly scabrous. They are frequently found with the parent species, and although seed set is lower in the hybrids, backcrossing appears to result in a continuum of intermediates in some populations (Marcks, 1974), particularly in the e ½.

Cyperus squarrosus L. [*C. aristatus* Rottb.]: Usually sandy, but sometimes muddy soil of banks, shores, and moist depressions, infrequently in disturbed prairie and wet lawns. Statewide, often quite common. Sometimes found growing with *C. acuminatus* and distinguishable from it, even when immature, by the reddish coloration at the base of the plant.

Cyperus strigosus L.: Wet ground in marshes and along margins of ponds. Widespread, though uncommon to absent in the Panhandle. Our largest species, it is generally not confused with other flatsedges when mature.

DULICHIMUM Rich. ex Pers.

Rhizomatous perennial. Culms hollow, terete to obtusely 3-angled. Spikelets distichous (borne in 2 ranks on opposite sides of the rachilla), axillary.

Dulichium arundinaceum (L.) Britt. Marshes and fens.
In n Sandhills and Jefferson County.

ELEOCHARIS R. Br. (SPIKERUSH, SPIKESEDGE)

Tufted annuals or rhizomatous perennials. Culms naked, though bladeless sheaths present at base. Inflorescence a terminal spikelet subtended by 0–3 sterile scales but no leaflike bracts. Achene with an apical caplike tubercle (in most species).

1. Some culms arched over and rooting at the tips; plants of s-w *E. rostellata*
1. Culms erect or ascending, never rooting at the tips
 2. Styles 3-branched, achenes with 3 sides or 3-angled (rarely 2-sided)
 3. Tubercle of achene poorly differentiated, appearing as a beaklike continuation of the achene body (though often differently colored than the body), not set off at the base by a line or constriction
 4. Tubercle of achene broadly deltoid, set off from the body by an inconspicuous line or constriction (often not apparent on immature achenes); annuals forming conspicuous tufts; widespread species of muddy, drying sites *E. ovata*
 4. Tubercle of achene beaklike and confluent with the achene body (best observed in fully mature achenes), without a line or constriction at the base; perennials with rhizomes or stolons; of limited distribution in Nebraska
 5. Culms short and slender, 1–3 dm tall and < 1 mm wide, not flattened; spikes short (4–8 mm), usually with < 10 flowers, and without a sterile scale at the base; rarely collected from fens in the n Sandhills *E. quinqueflora*
 5. Culms taller and broad, 4–10 dm tall and 1–2 mm wide, somewhat flattened at least below the spike; spikes longer (8–13 mm), with mostly 10–20 flowers and subtended by a sterile scale. Infrequently collected, though locally abundant in the Republican River drainage in s-w *E. rostellata*
 3. Tubercle of achene well differentiated, set off from the body of the achene by a line or a conspicuous constriction and appearing as a distinct apical cap
 6. Culms very slender and threadlike, 0.1–0.4 mm wide; plants often forming matlike colonies; achenes white to pale gray, with conspicuous longitudinal ridges and numerous, minute, parallel cross-bars *E. acicularis*
 6. Culms broader, 0.5–2 mm wide; plants sometimes tufted, but not forming matlike colonies; achenes straw-colored to golden yellow or olive to dark brown, smooth to roughened and without longitudinal ribs or cross-bars
 7. Tufted fibrous-rooted annuals (rarely with inconspicuous rhizomes among the tufted roots); achenes smooth and 2-sided (although styles 3-branched), straw-colored to olive or dark brown, tubercles broad-based, ⅓ as broad as the achene body or broader, and short, flattened, and scarcely constricted at the base; frequently on shores or other temporarily wet sites *E. ovata*
 7. Strongly rhizomatous perennials with scattered to loosely-clustered culms; achenes reticulate-roughened and 3-sided, golden-yellow to brown, tubercles not-broad-based,

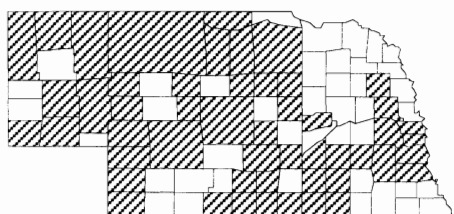
- flattened to deltoid and set off from the achene body by a conspicuous constriction; typically in wet meadows and seeps, sometimes in upland prairie*E. elliptica*
2. Styles 2-branched, achenes with 2 sides or 2-angled
 8. Tufted fibrous-rooted annuals (rarely with inconspicuous rhizomes); achenes 0.5–1.5 (1.7) mm (including tubercle); anthers 0.3–0.8 mm; shores and temporarily wet sites
 9. Mature achene dark purplish to black, tubercle minute; rare*E. atropurpurea*
 9. Mature achene pale yellow to olive or brown, tubercle conspicuous, broad, and flattened; frequent*E. ovata*
 8. Rhizomatous perennials; achenes 1.5–2.8 mm (including tubercle); anthers (1) 1.3–2.5 mm. Marshes and other wet areas including temporarily wet sites
 10. Spikelet with a single sterile scale at the base, completely encircling the culm or nearly so; scales at least halfway up the spikelet obtuse or rounded to slightly acute at the tip; culms 0.5–1.5 mm wide (when pressed)*E. erythropoda*
 10. Spikelet commonly with 2 or 3 sterile scales at the base (some culms may have only 1), the lowermost usually not encircling the culm; scales at the middle of the spikelet acute to acuminate (rarely obtuse) at the tip; culms 0.5–5 mm wide (when pressed)*E. palustris*

Eleocharis acicularis (L.) R. & S., hairgrass: Sandy to muddy shores of ponds and moist depressions, often forming dense mats. Common statewide. *Eleocharis parvula* (R. & S.) Link ex Bluff & Fingerh. has been reported from all the states bordering Nebraska with the exception of Wyoming. It resembles a diminutive *E. acicularis* but has a beaklike tubercle not constricted at the base, and will probably key to *E. quinqueflora*. It is often reported from wet saline or alkaline sites, and could show up in the appropriate habitat statewide. *Eleocharis wolfii* (Gray) Patt. was reported for Nebraska in the *Atlas GP* and may be separated from *E. acicularis* by its flattened culms 1–2 mm wide and scales about 3 mm long as opposed to 2 mm in *E. acicularis*. The specimens which

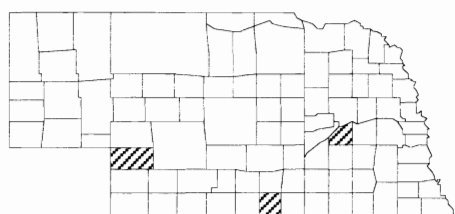
were the bases of these reports are indistinguishable from *E. acicularis* except for the presence of a few slightly flattened culms in a few specimens. It appears that *E. wolfii* is very rare in the Great Plains, if present at all.

Eleocharis atropurpurea (Retz.) Kunth: Sandy to muddy shores, playas, and other drying sites. Collected fewer than 6 times from widely scattered localities. This species was last collected in 1972 from a pond in Polk County. Previous collections were made by William Tolstead in 1941. This tiny, inconspicuous species looks like a dwarf *E. ovata*, and should be sought particularly in playa and rain basin habitats in s Nebraska.

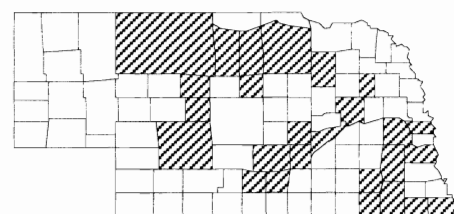
Eleocharis elliptica Kunth [*E. tenuis* (Willd.) Schultes var. *borealis* (Svenson) Gleason, *E. compressa* Sulliv. of Ne-



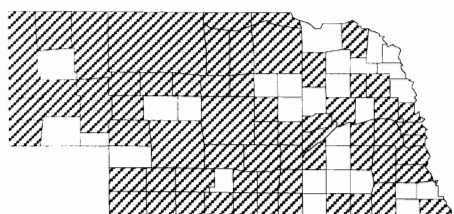
Eleocharis acicularis



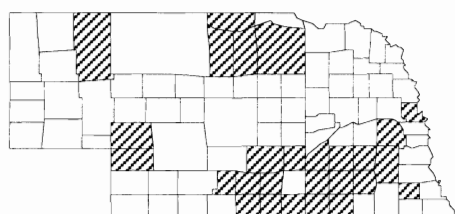
Eleocharis atropurpurea



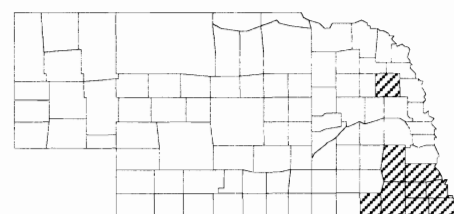
Eleocharis elliptica



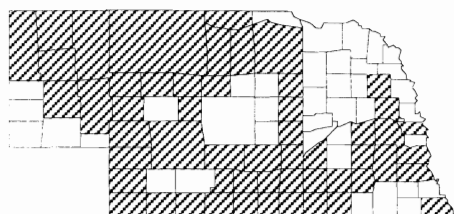
Eleocharis erythropoda



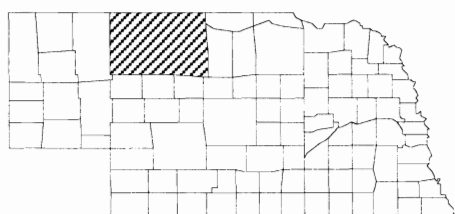
Eleocharis ovata engelmannii



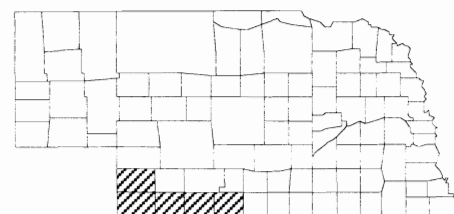
Eleocharis ovata obtusa



Eleocharis palustris



Eleocharis quinqueflora



Eleocharis rostellata

braska reports] Low prairie, marshy ground, sometimes in upland prairie. Widespread, though less common westward. Apparently never common with us. For many years, our specimens of this variable and apparently poorly understood entity were known as *E. compressa*, a species whose taxonomic disposition over the years has been anything but certain. Svenson (1957) distinguished that species on the basis of its flattened culms and whitened, bifid acuminate scale tips, characters best developed in plants from the e and s-e portion of its range. Specimens from Ohio and Tennessee are easily identified by broad, distinctly-flattened culms and pale brown, deeply bifid scales, and are usually found growing on limestone. Our plants have wiry culms slightly flattened at best, and dark purple-brown, slightly bifid scales which fit Svenson's description of *E. compressa* more closely than that of *E. elliptica*, with which, he states, *E. compressa* intergrades along the edge of its range. In fact, with the exception of these acuminate, bifid scale tips, our plants are indistinguishable from typical *E. elliptica*, and a few collections I have seen from the Sandhills lack the acuminate scale tips altogether. In several more recent works such as Drapalik and Mohlenbrock (1960), Voss (1972), and Gleason and Cronquist (1991), the shape and number of vascular bundles in the culms (9–14 in *E. compressa*, 4–8 in *E. elliptica*) is considered the primary diagnostic feature rather than shape of the scales. Hence the name *E. compressa* is here reserved for the flat-stemmed eastern plants, whereas our material is considered *E. elliptica*. This problem might be resolved in the forthcoming *Flora of North America*. In our area, *E. elliptica* is most likely to be confused with *E. erythropoda* or a small *E. palustris*. It is easily distinguished from both species even when immature if the underground parts are collected. *E. elliptica* has stout rhizomes with strongly overlapping scales, whereas *E. erythropoda* and *E. palustris* have slender stolon-like rhizomes with distinctly separated scales. When extremely mature, the golden achenes often stay attached to the plant even after the scales have fallen. Reports of *E. verrucosa* (Svens.) Harms (as *E. tenuis* var. *verrucosa*) in the *Atlas GP* were probably based on *E. elliptica*. *E. verrucosa* is a s-e species which could possibly show up in the s-e corner, and is distinguished from *E. elliptica* by its slender, capillary culms and achenes with irregular, wartlike bumps on the surface.

Eleocharis erythropoda Steud.: Wet areas, marshes, low prairie, seepages and along streams. Likely our most common species. *E. erythropoda* is a member of the notoriously difficult *E. palustris* complex. In recent years, most manuals have treated our North American representatives as either a complex of wildly intergradient species or as one broad, unwieldy entity. I agree with Mohlenbrock and Drapalik (1960) that it is best to recognize *E. erythropoda* as a separate species on the basis of a relatively stable combination of a single sterile scale at the base of the spike and reddish-purplish brown scales (when not infected with smut) with rounded tips. Cronquist et al. (1977) commented that there are no clear ecogeographic correlations between segregate species, although at least in Nebraska, *E. erythropoda* appears most commonly in sites that are not subject to widely

fluctuating water levels, while the others are often common in playas, rain basins, irrigation ditches and other frequently-inundated sites to the exclusion of *E. erythropoda*. It may be wise to recognize this species as a variety of *E. palustris*.

Eleocharis ovata (Roth) R. & S. [*E. obtusa* (Willd.) Schultes]: Often in muddy soil in drying sites, lake margins, wet ditches. Common in s-e and s-c Nebraska, scattered n and w. The name *E. ovata* has priority over *E. obtusa* as used in the *Flora GP*. Two relatively distinct varieties are present in Nebraska:

1. Tubercle depressed-deltoid, mostly less than $\frac{1}{4}$ as long as the achene body; perianth bristles usually absent (be careful not to mistake the bristles for the filaments, which sometimes persist), when present shorter than the achene (including tubercle); spikelet oblong-cylindrical to ovate, scales usually pale brown var. ***engelmannii***
1. Tubercle deltoid, $\frac{1}{3}$ – $\frac{1}{2}$ as long as achene body; perianth bristles usually longer than achene (including tubercle) or rarely absent; spikelet ovate to oblong, scales usually reddish-brown var. ***obtusa***

Variety *engelmannii* (Steud.) Britt. [*E. obtusa* var. *ovata* (Roth) Drapalik & Mohlenbrock, of Great Plains reports] is common in drying sites, rain basins, playas. State-wide, but most commonly collected from s-c, rare to absent in the Sandhills and Panhandle. Occasional specimens may have some achenes with tubercles resembling those of var. *obtusa*. Var. *obtusa* (Willd.) Kükenth. ex Skottsb. is occasional along shores, streams, drying sites, primarily in the e $\frac{1}{2}$, most commonly collected s and e of Lincoln. Intermediates with var. *engelmannii* are occasionally collected in the Lincoln area. Typical var. *ovata* is found to the n and e of Nebraska.

Eleocharis palustris (L.) R. & S. [*E. macrostachya* Britt., *E. smallii* Britt., *E. xyridiformis* Fern. & Brackett, of Nebraska reports]: Wet places, marshes, lake margins, playas and wet ditches. Common throughout except in the e $\frac{1}{2}$. As here treated, *E. palustris* consists primarily of two species recognized in the *Flora GP*: *E. macrostachya* and *E. smallii*, which are supposedly the principal w and e phase of *E. palustris* in North America. The characters used to separate the two are extremely variable, and occur in all combinations. Traditionally, plants having narrow, firm, wiry culms, spikes with acute tips, and acuminate fertile scales have been called *E. smallii*, while plants with broad, soft, often flattened culms, spikes with acuminate tips, and fertile scales ovate to acute at the tip have been segregated as *E. macrostachya* (Fernald and Brackett, 1929; Svenson, 1957; and Steyermark, 1963). In our area, plants referable to *E. macrostachya* vary greatly in culm width and spike characters and appear to intergrade completely with *E. smallii*, while those referable to *E. smallii* sometimes appear to approach *E. erythropoda*. Likewise, scale shape does not correlate with either culm width or spike shape in most specimens. Gilly (1946) and Mohlenbrock and Drapalik (1960) reported similar intergradation in Iowa and Illinois respectively. Efforts to clarify the situation in the Great Plains have unfortunately added to the confusion. Harms (1968) recognized *E. macrostachya* and *E. smallii* as separate species based on chromosomal data but he

did not reliably correlate cytological differences to morphology. His key separates *E. macrostachya* from *E. smallii* on the basis of sharply oblique tips and prominent V-shaped sinuses at the tips of the bladeless leaf sheaths. All material I have seen from Nebraska has leaf sheaths truncate to slightly oblique with shallow, obscure sinuses and should therefore key to *E. macrostachya*. Furthermore, he described *E. smallii* as having soft culms, and *E. macrostachya* with firm culms, opposite the traditional treatment (although Svenson (1957) allowed for these exceptions in his key). Treatments of this complex by Great Plains botanists since 1968 (Kolstad, 1986; Larson, 1993) have tended to follow Harms. There appears to be no geographical nor even populational integrity between these purportedly vicariant species in Nebraska. Another member of the *E. palustris* complex, *E. xyridiformis*, has added to the confusion. Harms (1968) reported this species as widespread in the Great Plains and separable from other members of the complex by its flattened stems. This condition, however, is very common in *E. macrostachya*. In fact, the description of *E. xyridiformis* in the *Flora GP* virtually matches Steyermark's concept of *E. macrostachya* in Missouri. In Fernald & Brackett's (1929) original description of *E. xyridiformis* it is considered to have only a single scale at the base of the spike, rather than the two described in the *Flora GP*. Furthermore they considered it a s-w species found only as far n as Kansas, and warned against confusing it with flat-stemmed forms of *E. mamillata* (later called *E. macrostachya*). It appears our reports of *E.*

xyridiformis in Nebraska represent a distinctive and widespread race of *E. macrostachya* which Bates (1914) recognized as *E. palustris* f. *compressa*. In light of the confusion, it seems wisest to combine our reports of *E. macrostachya*, *E. smallii*, and *E. xyridiformis* into a single, broadly-defined species until further studies can straighten out the situation.

Eleocharis quinqueflora (Hartman) Schwartz [*E. pauciflora* (Lightf.) Link.]: Wet, sandy, often boggy ground. Apparently restricted to fens in the Sandhills. Collected twice from Cherry County, in 1973 and 1982. It may be common in Sandhills fens but is very easy to overlook, appearing somewhat similar to a depauperate *E. erythropoda* but with long scales, giving the spikes a "jagged" appearance. *E. parvula* may key here. See note under *E. acicularis*.

Eleocharis rostellata (Torr.) Torr.: Wet meadows, streambanks, marshy ground and seeps. Locally common in the Republican River drainage in s-w, possibly elsewhere. This spikesedge was collected along the Frenchman River in Chase County in 1992. All previous collections were made by William Tolstead in 1941. This plant is probably not uncommon, but it is easily overlooked. Fertile culms look like robust *E. palustris*, but the presence of arching sterile culms with roots at the tip give it away. The ones I saw were rooting just under the surface of the water, but they may also root in soil, forming loops which may catch the feet of unwary collectors.

ERIOPHORUM L. (COTTON-GRASS)

Perennial herbs. Perianth of numerous silky or cottony bristles, much exerted from the fertile scale at maturity.

1. Leaves 1–2 mm wide, triangular-channeled for their entire length; inflorescence subtended by a single, erect, slender bract shorter than the umbel, so that the inflorescence appears to arise from the side of the stem *E. gracile*
1. Leaves 2–6 mm wide, triangular-channeled only in the upper ½; inflorescence subtended by 2 or more bracts of which at least one is as long as the umbel (the bracts may break off in age), which appears to arise from the tip of the stem *E. angustifolium*

Eriophorum angustifolium Honck. [*E. polystachion* L., *nomen ambiguum*], thin-scale cotton-grass: Sandhill fens. Known from Cherry and Grant counties.

Eriophorum gracile Koch, slender cotton-grass: Sandhill fens. Known from Cherry, Grant, and Thomas counties. Both species are often found in the same fen.

FIMBRISTYLIS Vahl

Annual or perennial herbs. Perianth absent. Styles basally thickened and deciduous at maturity.

1. Style 3-parted; achene 3-sided; fibrous-rooted annuals with reddish- to golden-brown scales
 2. Scales pubescent at least near the base, the tips rounded to obtuse, sometimes with a slight mucronate tip; achenes sharply triangular in cross section, with conspicuous cross-ridges and a small but distinct bumplike tubercle at its tip which is darker than the achene body; bracts with tufts of long slender hairs at the tip of the expanded sheathlike portion near the base **go to *Bulbostylis***
 2. Scales glabrous, acuminate at the tip with a short, often slightly outcurved awn; achenes rounded in cross section with faint longitudinal ribs and transverse cross-bars, lacking a tubercle; bracts glabrous to scabrous, without long slender hairs along the margins ***F. autumnalis***

- 1. Style 2-parted; achene 2-sided; plants either perennial, or annual with greenish-white scales
- 3. Spikelets borne singly on pedicels; tall (2-10 dm) slender perennials with culms solitary or a few together from a bulbous-thickened base or rhizomes; scales pale to dark brown ***F. puberula***
- 3. Spikelets borne in clusters at the end of pedicels; short (0.1-1.5 dm) annuals with culms usually in small tufts; scales pale green to greenish-white ***F. vahlii***

Fimbristylis autumnalis (L.) R. & S.: Wet, sandy shores of ponds and rivers. Collected only three times from widely separated localities in the e ½.

Fimbristylis puberula (Michx.) Vahl: Moist, lowland prairie and meadows. Most commonly collected from the Platte River Valley, but nearly statewide. Two varieties in Nebraska:

- 1. Base of culm with a bulblike thickening often clothed by the fibrous remains of old leaf sheaths, arising from a thick rhizome; longest bract below inflorescence usually shorter than inflorescence; scales ciliate. Uncommonly collected, known from scattered sites in e ½ var. ***puberula***

- 1. Base of culm without a bulblike thickening (rarely present), arising from numerous slender rhizomes; longest bract usually shorter than the inflorescence; scales glabrous. Widespread var. ***interior***

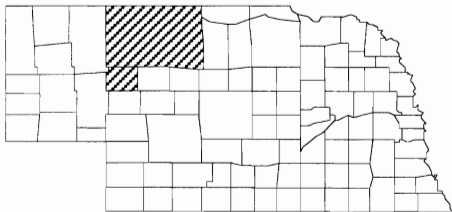
Variety *interior* (Britt.) Kral is widespread, found throughout the range of the species. Var. *puberula* is uncommon, collected from a few widely scattered sites in e. More robust than the preceding.

Fimbristylis vahlii (Lam.) Link: Wet, sandy shores. Known from a single collection from Hitchcock County in 1992. Extremely inconspicuous, probably introduced sporadically in the State.

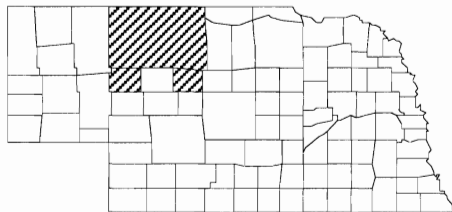
UIRENA Rottb. (UMBRELLA-GRASS)

Annual herbs (ours). Perianth of 3 petal-shaped scales alternating with 3 bristles.

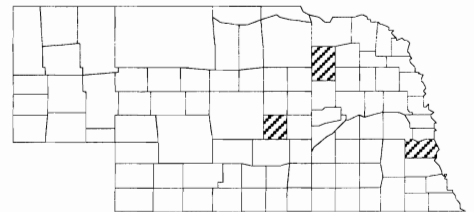
Fuirena simplex Vahl: Moist, sandy soil. Occasional mostly in the Platte River Valley from c Nebraska eastward. Our plants are annuals and are assignable to var. *aristulata* (Torr.) Kral.



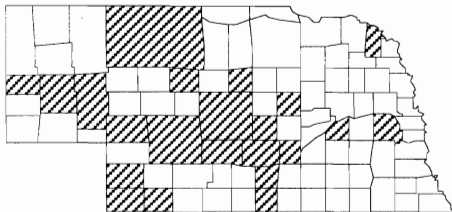
Eriophorum angustifolium



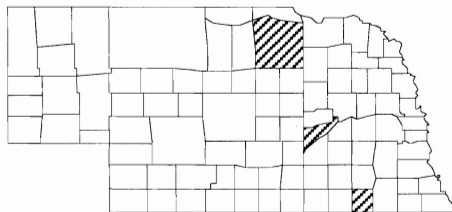
Eriophorum gracile



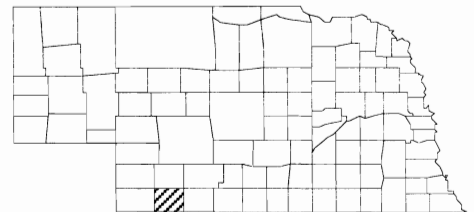
Fimbristylis autumnalis



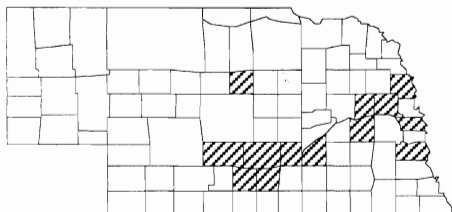
Fimbristylis puberula interior



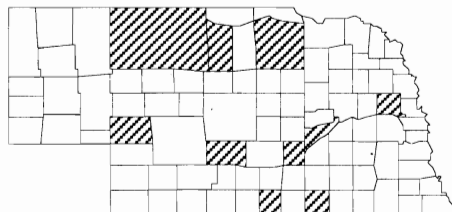
Fimbristylis puberula puberula



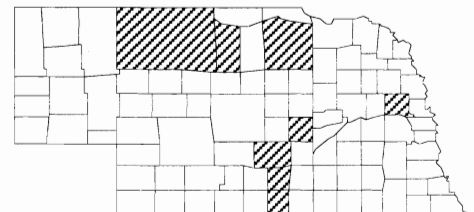
Fimbristylis vahlii



Fuirena simplex



Lipocarpha aristulata



Lipocarpha drummondii

LIPOCARPHA R. Br. (including *HEMICARPHA* Nees & Arn.)

Tufted annuals. Leaves few and slender. Inflorescence appearing to arise laterally from culm. A single inconspicuous scale-like bract opposite the fertile scale, or lacking.

1. Achene subtended by a thin membranous, usually translucent scale-like structure on the side opposite the scale, this inner scale as long as to longer than the achene and often partly enclosing it at the top.
 2. Awns of scales at middle of spikelets clearly awned, $\frac{1}{2}$ to fully as long as the body of the scale; inner scale unpigmented and lacking veins; mature achenes dark reddish-brown to nearly black *L. aristulata*
 2. Awns of scales at middle of spikelets inconspicuous (< 0.2 mm long), though a few scales at the base of the spikelet may be long-awned; inner scale sometimes brownish pigmented and usually with 3–5 veins visible under 20× magnification; mature achenes pale yellowish-brown to tan or light gray *L. drummondii*
1. Inner scale less than $\frac{1}{2}$ as long as achene, often very inconspicuous or lacking *L. micrantha*

Lipocarpus aristulata (Coville) G. C. Tucker [*Hemicarpus drummondii* Nees, in part (of Great Plains reports)]: Wet, sandy shores in c part. Occasionally found growing with the next species. Most of our specimens were mapped as *Hemicarpus drummondii* in *Atlas GP*.

Lipocarpus drummondii (Nees) G. C. Tucker [*Hemicarpus drummondii* Nees]: Wet, sandy shores in c part. Some authors have questioned whether this species is distinct

from *L. micrantha*, though it has been more commonly confused with *L. aristulata* in Great Plains herbaria. It may be wise to recognize all our species as varieties under *L. micrantha* (cf. Friedland, 1941).

Lipocarpus micrantha (Vahl) G. C. Tucker [*Hemicarpus micrantha* (Vahl) Pax]: Wet, sandy shores of the Missouri, Elkhorn, and lower Platte rivers (w to Fremont) in e Nebraska.

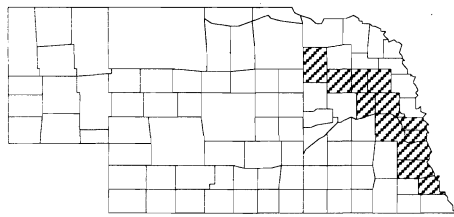
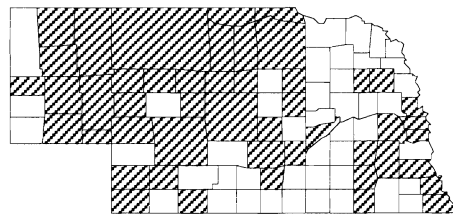
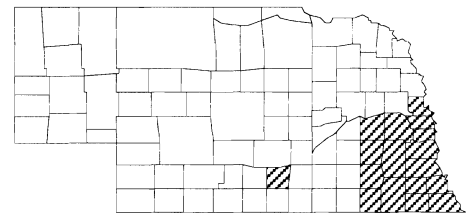
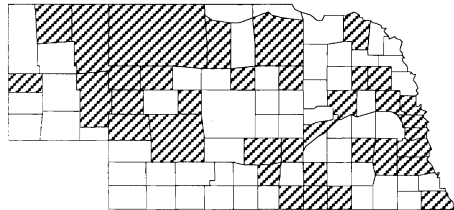
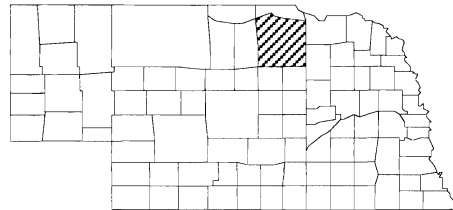
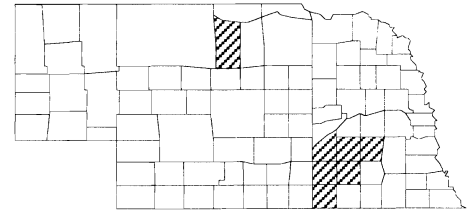
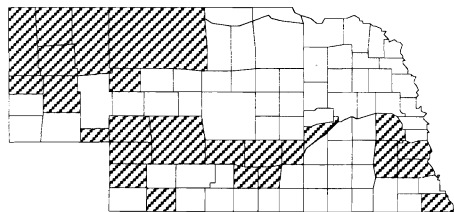
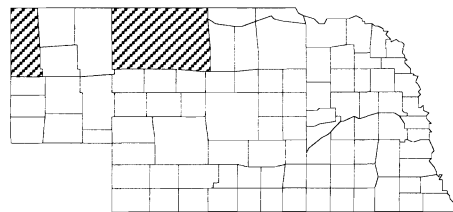
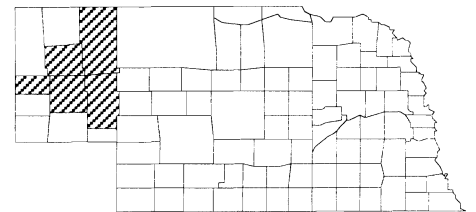
SCIRPUS L. (BULRUSH)

Annual or perennial herbs. Culms triangular or rounded, leaves present or reduced to bladeless sheaths. Perianth of bristles (rarely absent).

As traditionally treated, the genus *Scirpus* is evidently a paraphyletic group and will probably be split into several natural segregate genera in the forthcoming *Flora of North America*. Our plants will be placed in three genera: *Amphiscirpus*, *Schoenoplectus*, and *Scirpus*. The traditional, broad concept of *Scirpus* is maintained here until the criteria for recognizing these genera appear in print. Synonyms are provided in the text.

1. Inflorescence appearing to arise from the side of the stem, with a single erect to slightly spreading bract appearing to be a continuation of the culm (other smaller bracts may also be present at the base of the inflorescence)
 2. Inflorescence subtended by 1 or 2 small leaflike bracts in addition to the erect bract; flowers and achenes not subtended by bristles, though a single tiny scale may be present; minute annuals of wet, sandy habitats **go to *Lipocarpus***
 2. Inflorescence not subtended by leaflike bracts (scalelike bracts resembling the scales of the spikelets may be present); flowers and achenes subtended by bristles; annuals and perennials
 3. Spikelets distinctly pedicelled in a branching inflorescence (which is sometimes very compact in *S. acutus*); culms terete (round in cross section), tall and stout, usually over 1 m tall and 5–20 mm broad at the base
 4. Most pedicels with only a single spikelet; scales whitish to pale straw-colored; styles 3-branched and mature achenes triangular in cross-section and subtended by 2–4 bristles of irregular length, some shorter than the achene; infrequently collected, though not rare *S. heterochaetus*
 4. Most pedicels with 2–8 spikelets (if only 1, then the scales reddish- to golden-brown); styles 2-branched and mature achenes 2-sided in cross-section and subtended by 6 bristles as long as or longer than the achene; common
 5. Most pedicels with 2 spikelets (occasionally 1, rarely 3) in an open, lax, usually drooping inflorescence; spikelets ovoid (about twice as long as wide) to short-cylindrical, with scales golden- to reddish brown, contrasting prominently with the green midrib, the tips usually entire; culms pale blue-green and easily compressed when fresh, with several large air chambers visible when cut transversely *S. validus*
 5. Most pedicels with 3–8 (or more) spikelets (rarely some with 1 or 2) in a condensed, stiff,

- often ascending inflorescence; spikelets ovoid to cylindrical (at least 2.5 × longer than wide) with dull, whitish to pale brown scales (orange-brown in possible hybrids with *S. validus*), with scattered reddish vertical bars and flecks, not prominently contrasting with the midrib, frequently split on either side of the midrib at the tip and appearing bilobed; culms dark olive green and firm when fresh, with many small air chambers giving the stem a spongy appearance when cut transversely*S. acutus*
3. Spikelets not pedicelled (rarely one may have a short pedicel) and appearing to be clustered directly from the culm (or bract); culms triangular or flattened, if terete, then slender (less than 5 mm thick) and under 1 m tall
 6. Fibrous-rooted annuals with soft, slender, tufted culms; achenes strongly cross-ridged. Rare plants of drying sites
 7. Style 2-branched; achenes 2-sided*S. hallii*
 7. Style 3-branched; achenes 3-sided*S. saximontanus*
 6. Rhizomatous perennials with firm, wiry culms arising singly or in small tufts.; achenes smooth to minutely reticulate
 8. Culms sharply triangular; scales light brown to reddish brown and divided along either side of a short awnlike tip at least 0.5 mm; spikelets ovoid to lance-ovoid. Common, widespread in a variety of wet habitats*S. pungens*
 8. Culms terete to flattened and slightly twisted; scales dark glossy brown and acute to obtuse and undivided at the tip; spikelets often more elongate than in the preceding. Uncommon, restricted to alkaline wetlands in the Panhandle*S. nevadensis*
 1. Inflorescence clearly arising from the tip of the stem, subtended by 2–several similar, spreading to reflexed leaflike bracts
 9. Bristles absent at base of ovary and achene, and bracts at base of inflorescence less than 1.5 mm wide .
.....**go to *Fimbristylis***
 9. Bristles present at base of ovary and achene, or if absent, bracts at base of inflorescence more than 1.5 mm wide
 10. Culms sharply triangular; spikelets large, 10–50 mm long and 5–12 mm thick; achenes 2.5–5 mm; scales somewhat puberulent; rhizomes with cormlike thickenings
 11. Styles 2-parted; achenes 2-sided, 3–4 mm with 2–6 poorly-developed deciduous bristles shorter than the achenes and obscurely barbed; bracts at base of inflorescence 1 or 2 (rarely 3) and leaf sheaths truncate to shallowly U-shaped at the summit; inflorescence compact and congested. Typically in saline and alkaline soils*S. maritimus*
 11. Styles 3-parted; achenes 3-sided, 4–5 mm with 6 persistent bristles at least as long as the achene and distinctly barbed; bracts at base of inflorescence 3–5 and leaf sheaths rounded or convex at the summit; inflorescence more open. Typically in freshwater sites ...*S. fluviatilis*
 10. Culms obtusely 3-sided; spikelets smaller, 2–10 mm long and 1–4 mm thick; achenes 0.7–1.5 mm; scales glabrous; rhizomes without cormlike thickenings
 12. Spikelets borne singly or in clusters of 2–5 on each pedicel; bristles crinkled and curled at maturity, longer than the achene, and without barbs or with a few poorly-developed upwardly-pointing ones (don't confuse the bristles with the filaments, which may persist for a while); plants forming dense clumps, not rhizomatous. Infrequently collected at scattered locations in the e ½*S. pendulus*
 12. Spikelets borne in dense, rounded clusters of 5–25 or more spikelets at the tips of the pedicels (rarely as few as 3); bristles (sometimes absent) straight or with 1 or 2 slight kinks, at most slightly longer than the achene, and with conspicuous downward-pointing barbs; culms arising singly or a few together from strong rhizomes
 13. Styles 2-parted; achenes 2-sided; sheaths of basal leaves usually red-tinged. Rare in extreme n-w and Cherry County*S. microcarpus*
 13. Styles 3-parted; achenes 3-sided; leaf sheaths all green. More common and widespread
 14. Spikelets densely arranged in large globelike clusters 9–15 mm in diameter; scales blackish on the sides with a distinct short awn 0.4 mm or more. Occasional to common statewide*S. pallidus*
 14. Spikelets loosely arranged in small clusters 3–7 mm in diameter; scales dark green to brownish on the sides and acute with a short (0.1–0.2 mm) tip. Frequent in the e ½, rarely westward*S. atrovirens*

*Lipocarpa micrantha**Scirpus acutus**Scirpus atrovirens**Scirpus fluviatilis**Scirpus hallii**Scirpus heterochaetus**Scirpus maritimus**Scirpus microcarpus**Scirpus nevadensis*

Scirpus acutus Muhl. ex Bigelow [*Schoenoplectus acutus* (Muhl. ex Bigelow) Löve & Löve], hardstem bulrush: Marshes, and ponds. Common statewide, less so in the e and s. Sometimes considered indistinct from *S. validus*, the two species are rarely confused in our area. Galen Smith has labelled some specimens at NEB hybrids. Many of these resemble *S. acutus* in overall appearance but have reddish-brown scales. The hybrids are not mapped.

Scirpus atrovirens Willd., dark-green bulrush [*S. georgianus* Harper, of Nebraska reports]: Marshes, streambanks, wet meadows. Occasional to frequent in the e $\frac{1}{2}$, rarely scattered w to c. Plants are occasionally found which have achenes without bristles or with up to 3 poorly-developed ones. These have been collected sporadically in the Blue River drainage and at Minden and were mapped as var. *georgianus* (Harper) Fern. in the *Atlas GP*. Schuyler (1967) separates this variety from the typical variety in that it lacks cross-partitions between the veins of the sheaths, in addition to the lack of bristles. All our specimens identified as var. *georgianus* (including some seen by Schuyler) have these partitions and are only reliably separated from var. *atrovirens* by the lack of bristles. Although the bristle character seems to be consistent within a population, the range of var. *georgianus* given in the *Flora GP* is within that of var. *atrovirens*, and I have chosen not to recognize this variety in Nebraska until some consensus as to the taxonomic value of bristle number in *Scirpus* is reached.

Scirpus fluviatilis (Torr.) Gray [*Schoenoplectus fluviatilis* (Torr.) M. T. Strong], river bulrush: Marshes, shores. Occasional to frequent statewide, except s-w and s $\frac{1}{2}$ of Panhandle.

Scirpus hallii Gray: Sandy, drying sites. Collected twice from along U. S. 281 s of O'Neill in 1941 and 1971. All

reports of this species for Nebraska in the *Atlas GP* with the exception of that for Holt County are *S. saximontanus*. This species will probably be transferred to the genus *Schoenoplectus* in *Flora of North America*, but no combination has yet been published in that genus.

Scirpus heterochaetus Chase [*Schoenoplectus heterochaetus* (Chase) Sojak]: Rain basins, lake margins. Collected at several localities in the rain basins of s-c Nebraska (where it is locally common) and twice in the n Sandhills. Doubtlessly more common than our collections indicate. This species is widespread throughout South Dakota and should be sought across n Nebraska and elsewhere. It is probably overlooked because of its resemblance to two more common bulrushes. In shallow water it usually has very narrow, firm dark olive-green stems and resembles *S. acutus*. In deeper water the stems are thicker and soft, and with its drooping inflorescence it resembles *S. validus*. A survey of several rain basins in s-c Nebraska in 1994 revealed *S. heterochaetus* to be occasional to common at each site, while *S. acutus* and *S. validus* were absent.

Scirpus maritimus L. [*Schoenoplectus maritimus* (L.) Lye]: Riverbanks, sandbars, saline and alkaline meadows. Occasional in w $\frac{1}{3}$ and eastward in the Platte and Missouri River valleys and in the e saline marshes.

Scirpus microcarpus Presl: Low areas along streams. Collected a few times in the Hat Creek basin in Sioux County and once from Cherry County.

Scirpus nevadensis S. Wats. [*Amphiscirpus nevadensis* (S. Wats.) Oteng-Yeboah]: Shores and basins in strongly alkaline soils. Locally common in the Sandhills and the n Platte River floodplain in the Panhandle. The report of *S. smithii* from Sheridan County in the *Atlas GP* is based on a sheet of *S. nevadensis* at KANU. This species is often

abundant in the appropriate habitat, but has rarely been collected, possibly due to its resemblance to the ubiquitous *S. pungens*.

Scirpus pallidus (Britt.) Fern. [*S. atrovirens* Willd. var. *pallidus* Britt.]: Marshes, pond margins, in similar habitats to *S. atrovirens*. Occasional to common statewide, though much less common where its range overlaps with *S. atrovirens*. Obviously related to and in our area morphologically distinct from *S. atrovirens*, even in mixed populations.

Scirpus pendulus Muhl.: Marshes, wet meadows, rarely on uplands. Not common anywhere in the State, but most likely encountered in the s-e. Within the last 15 years this bulrush has been collected from widely scattered locations to the w and n-w of s-e Nebraska.

Scirpus pungens Vahl [*S. americanus* Pers., misapplied, *Schoenoplectus pungens* (Vahl) Palla]: Marshes, wet ditches, moist meadows, tolerant of alkali. Statewide, probably our commonest species. *S. torreyi* Olney was reported from Dodge County in the *Atlas GP* based on two misidentified sheets of *S. pungens* at NEB.

Scirpus saximontanus Fern. [*Schoenoplectus saximontanus* (Fern.) Raynal]: Shores, drying sites. Most collections from the rain basins of s-c, but also from the s-w playas and the Sandhills. Cronquist (1991) considers this species a variety of *S. supinus* (along with *S. hallii*), since style number and achene shape seem to be the only characters separating the two. Our few collections suggest that *S. saximontanus* is more frequent in heavier soils. Most of our collections were made by William Tolstead in 1941 and our most recent collection was made in 1944 prior to its discovery in Dawes County in 1995.

Scirpus validus Vahl, [*Schoenoplectus tabernaemontani* (Gmel.) Palla] softstem bulrush: Marshes, lake margins. Found in similar habitats as *S. acutus* but more frequent in mucky soils. Statewide and common, except less so in the Sandhills. Some authors submerge our material into Eurasian *S. tabernaemontani*, and our plants will probably be recognized as a subspecies under *Schoenoplectus tabernaemontani* in *Flora of North America*. There is, however, some question as to whether the epithet

"*validus*" applies to North American material. Nonetheless I have decided to maintain our plants under the traditional name (*Scirpus validus*) until this issue is resolved. This species forms apparent hybrids with *S. acutus* (see note under that species), some of which may resemble *S. validus* but with longer, narrower spikes and more congested inflorescences.

ACKNOWLEDGMENTS

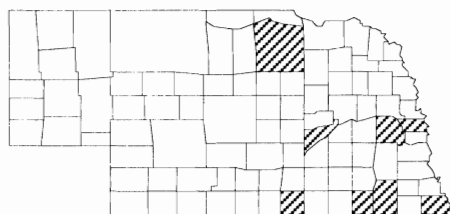
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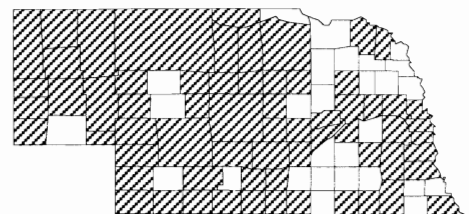
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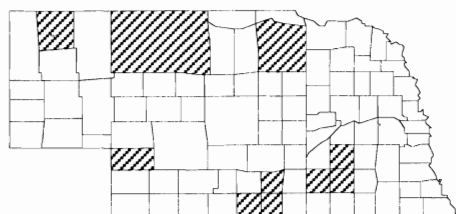
Scirpus pallidus



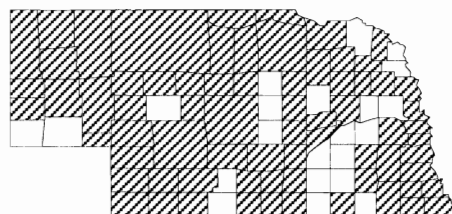
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