Introduction to Grasses, Sedges and Rushes

By Steve Eggers
June 2019

Sedges vs. Grasses vs. Rushes

- **Sedges:** Solid, triangular stems ***("sedges have edges")*** with some exceptions; leaves 3-ranked; fruit a nutlet subtended by a scale
- **Grasses:** Hollow (between the nodes), round stems; leaves 2-ranked; fruit a grain covered by two papery scales
- **Rushes:** Solid, round stems; leaves few; fruit a several to many-seeded capsule surrounded by 6 scale-like structures (tepals)

Minnesota Wildflowers

a field guide to the flora of Minnesota

https://www.minnesotawildflowers.info

Grasses: the Poaceae family

- Stems jointed, hollow, usually round in cross-section, branched or not
- Sheaths usually open in the front, though edges often overlap
- Leaves 2-ranked (on opposite sides of the stem)
- Flowers usually perfect (both male and female parts)
- Each floret wrapped in 2 bracts/scales
- One seed (grain) per flower

Browse all grasses or Search grasses

Rushes: the Juncaceae family

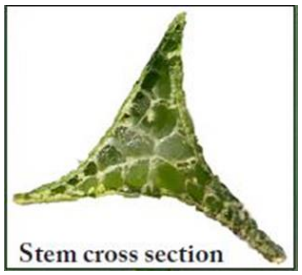
- Stems round or compressed in cross-section, not jointed or hollow, branched or not
- Leaves few, mostly basal, round or flat in cross-section
- Sheaths open in front, often auricled
- Flowers perfect, 3 or 6 stamens, 6 tepals
- Capsules with 3 or many seeds

Browse all rushes

Sedges: the Cyperaceae family

- Stems round or 3-sided in cross-section, not hollow or jointed, not usually branched
- Sheaths usually closed in the front
- Leaves usually 3-ranked (in 3 columns when viewed from the side of the stem)
- Flowers male or female or perfect, each subtended by a single scale/bract
- One seed (achene) per flower
- Achenes lens-shaped or 3-sided, may have bristles or hairs around the base

Stem Cross Sections



Stem cross section

Sedge Stem
(*Carex, Scirpus, Schoenoplectus*)

Softstem Bulrush
(*Schoenoplectus tabernaemontani*)

Bulrush or Spike-Rush Stem
(*Schoenoplectus, Eleocharis*)

Grass Stem
(Gramineae)

Illustrations from *Wetland Plants and Plant Communities of Minnesota and Wisconsin, Version 3.1* by Eggers and Reed (2014)

JUNCACEAE: RUSHES

- **Capsule:** fruit of rushes; contains three (*Luzula*) to dozens (*Juncus*) of seeds; in *Juncus* the seeds are tiny, barely visible with unaided eye
- **Tepals:** the six, star-like scales that surround the capsule (petals + sepals as both are similar)

Two genera in our area: *Juncus* (about 28 spp.) and *Luzula* (about 4 spp.)

FLOWER STRUCTURE: RUSHES

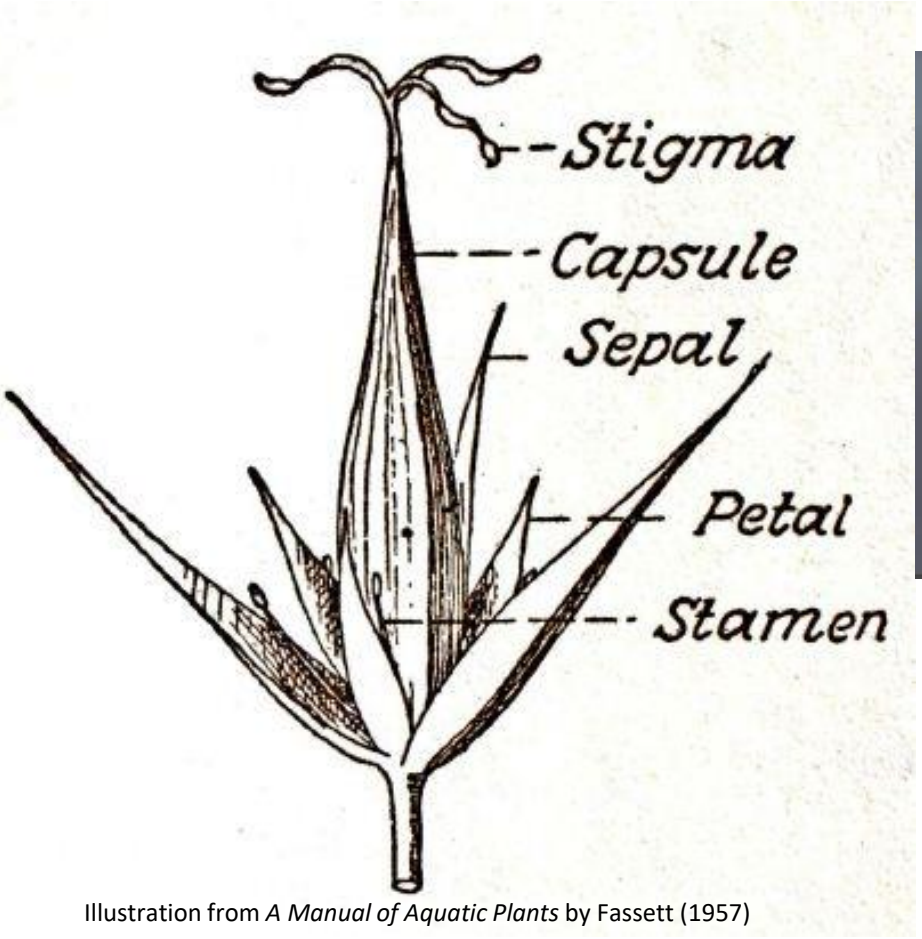
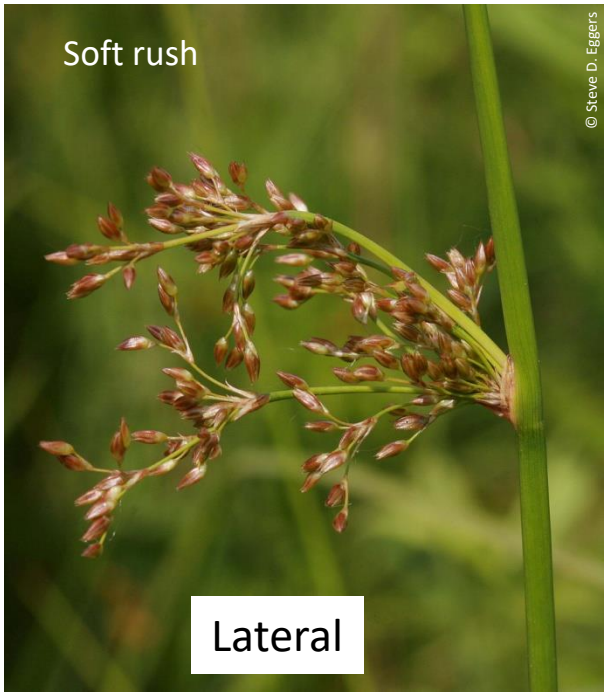


Illustration from *A Manual of Aquatic Plants* by Fassett (1957)

Photographs by Katy Chayka, www.minnesotawildflowers.info

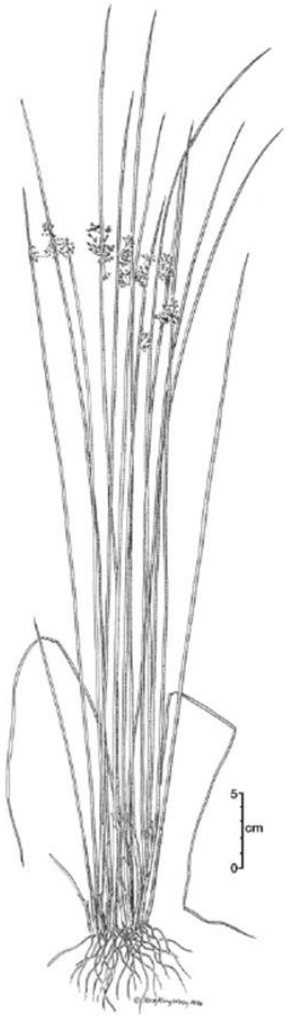
RUSHES

- Two major breaks in the keys for *Juncus*:
  -- Is inflorescence terminal or lateral?
  -- Do leaves have hard cross-partitions?



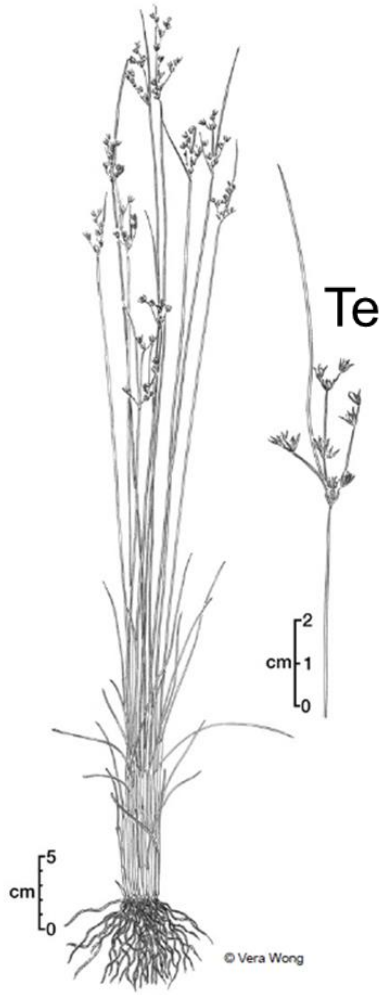
Inflorescence Types of Rushes

Lateral



Soft Rush
(*Juncus effusus*)

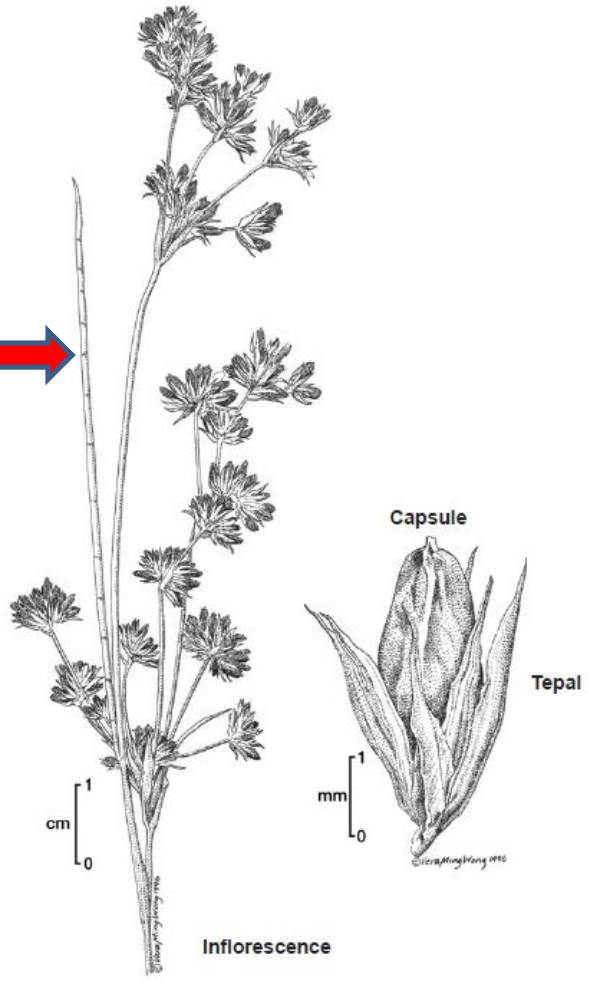
Terminal



Dudley's Rush
(*Juncus dudleyi*)

Leaves With or Without Hard Cross-Partitions?

Cross-Partitions



Canada Rush
(*Juncus canadensis*)

Seeds of *Juncus*: Elongated tails? White or Dark Ends?

Juncus dudleyi
Whitened ends, but lacking elongated tails

Juncus vaseyi
Elongated, whitened tails

Juncus torreyi
Dark ends, lacking tails

Photography: www.minnesotawildflowers.info

POACEAE: GRASSES

- **Floret:** the highly reduced flower of grasses
- **Spikelet:** a small spike with reduced flowers on a central axis
- **Pedicel:** the stalk of the spikelet
- **Glumes:** the sterile, scale-like leaves at the base of a grass spikelet
- **Lemmas:** the lowermost, scale-like leaves at the base of a grass floret
- **Ligule:** in grasses, a papery, hairy or membrane-like extension at the summit of a leaf sheath

GRASS SPIKELET/FLORETS

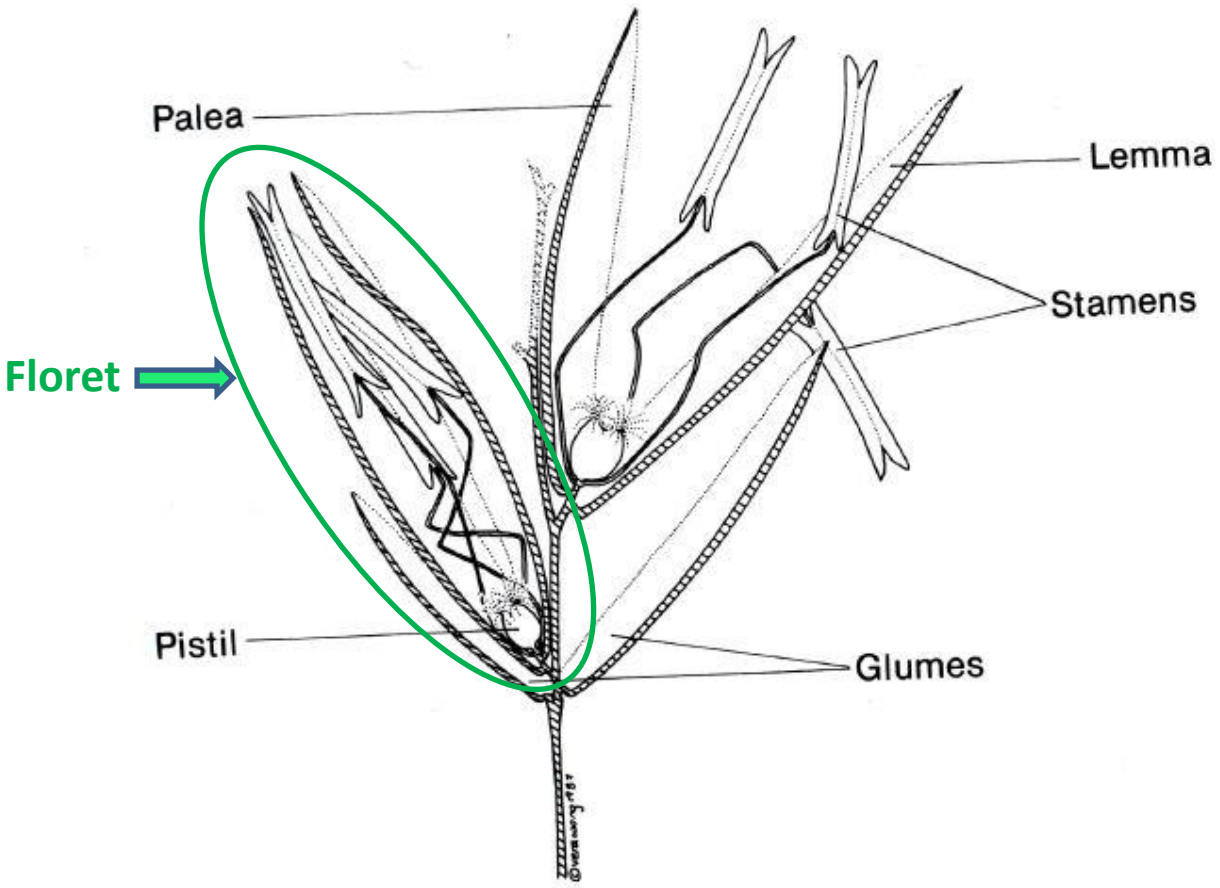
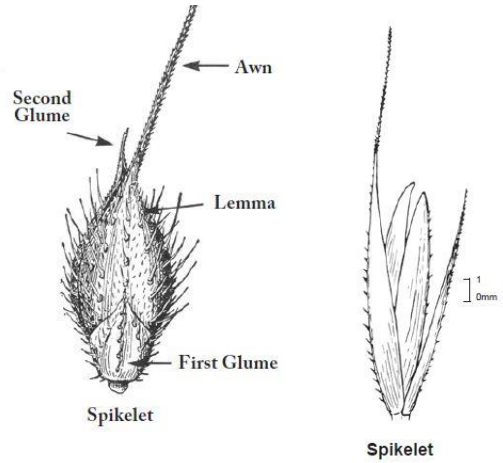


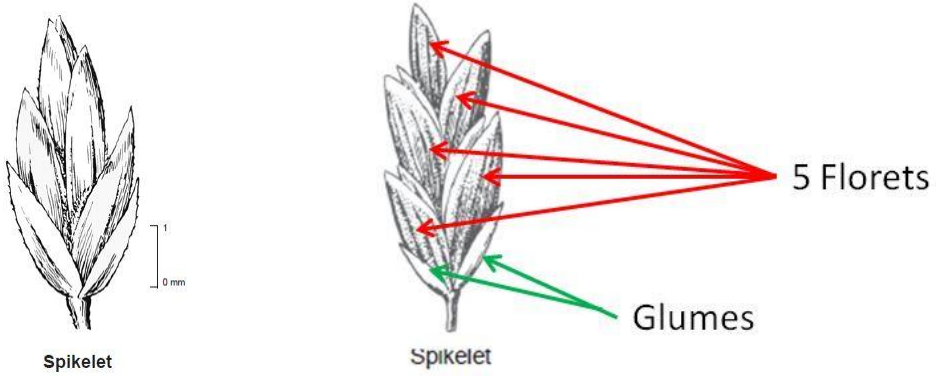
Illustration from *Wetland Plants and Plant Communities of Minnesota and Wisconsin, Version 3.1* by Eggers and Reed (2014)

BOTANICAL TERMS: GRASSES

- One-flowered spikelets

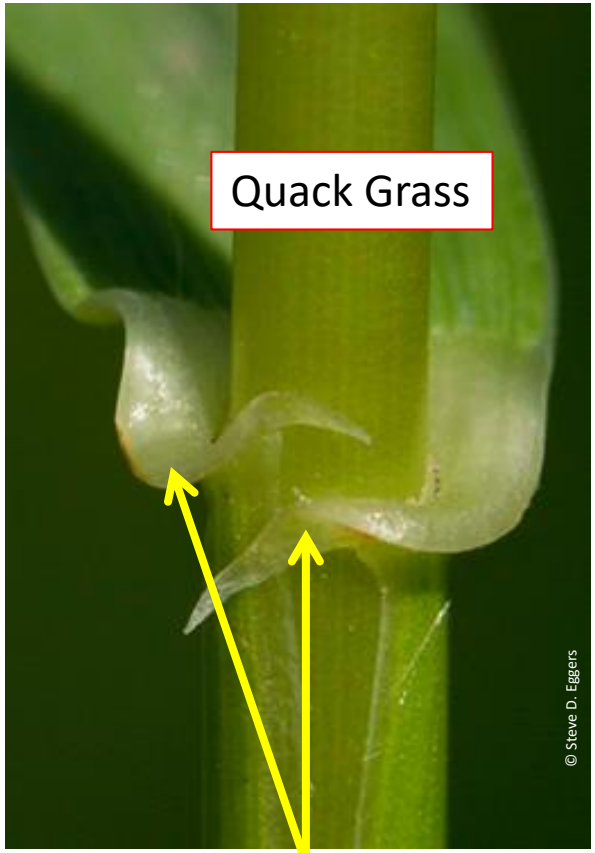


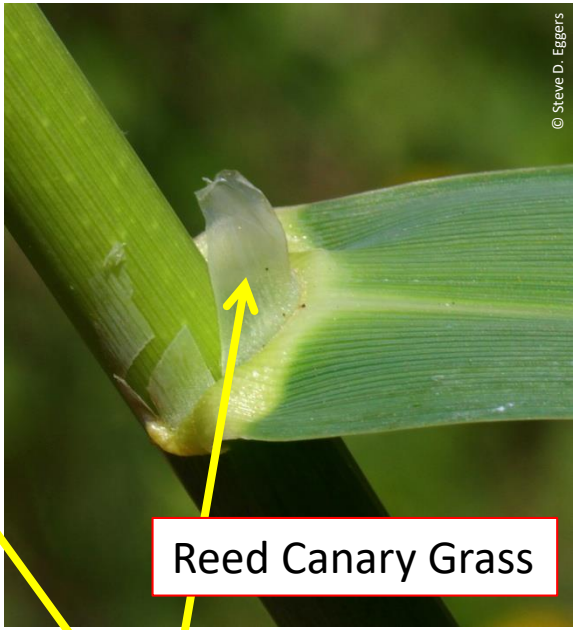
- Spikelets more than one-flowered



Illustrations from *Manual of the Grasses of the United States* by Hitchcock (1950) and *Grasses of Iowa* drawn by Froeschner (1966)

Junction of Leaf and Stem





INDICATOR CATEGORIES:

	Wetland Indicator Status	Description (Lichvar and Gillrich 2011)	Estimated Frequency of Occurrence in Wetlands
OBL	Obligate (OBL)	Require standing water or seasonally saturated soils near the surface to assure adequate growth, development, and reproduction and to maintain healthy populations. Cattails, Bulrushes	>99%
FACW	Facultative Wetland (FACW)	Depend on and predominately occur with hydric soils, standing water, or seasonally high water tables in wet habitats for assuring optimal growth, development, and reproduction and for maintaining healthy populations. These plants often grow in geomorphic locations where water saturates soils or floods the soil surface at least seasonally. Reed Canary Grass, Sensitive Fern	67-99%
FAC	Facultative (FAC)	These plants can occur in wetlands or nonwetlands. They can grow in hydric, mesic, or xeric habitats. Red Maple, Blue-bead Lily	34-66%
FACU	Facultative Upland (FACU)	These plants are not wetland dependent. They can grow on hydric and seasonally saturated soils, but they develop optimal growth and healthy populations on predominately drier or more mesic sites. Basswood, Canada Bluegrass	1-33%
UPL	Upland (UPL)	These plants occupy mesic to xeric nonwetland habitats. They almost never occur in standing water or saturated soils. Smooth Brome Grass (NC/NE Region)	<1%

National Wetland Plant List: 10 Regions

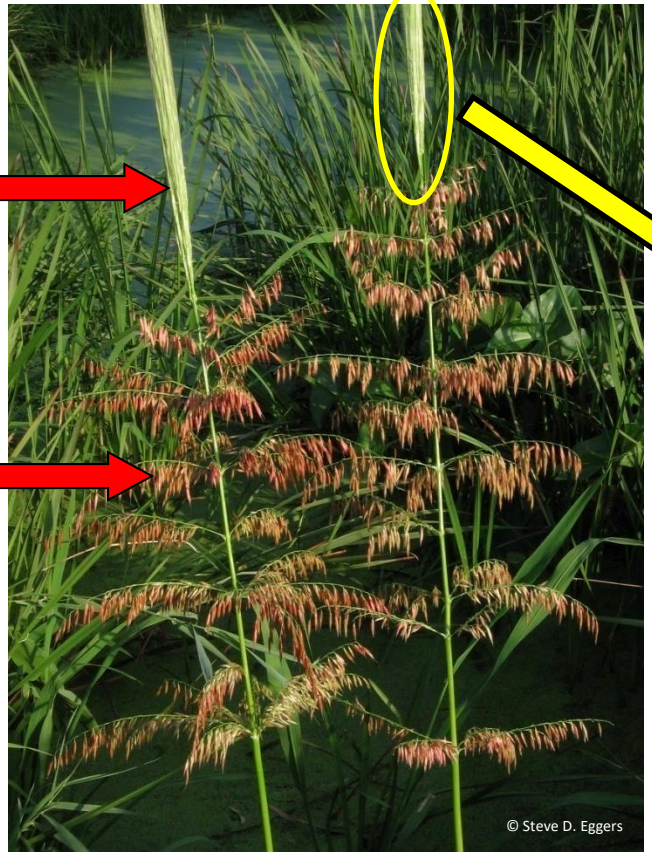
Quick Key to Some Common Wetland Grasses *

*Adapted from Fassett's *A Manual of Aquatic Plants* (1957)

1. Stamens and pistils in different spikelets…..

Pistillate Flowers

Staminate Flowers



Wild Rice

(*Zizania palustris*)

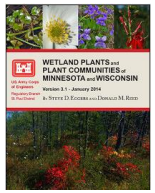
OBL

Pages 106-107*

Wild rice grains

1. Stamens and pistils in the same spikelet…..2

*Refers to *Wetland Plants and Plant Communities of Minnesota and Wisconsin—Version 3.2* (July 2015)
http://cdm16021.contentdm.oclc.org/cdm/compoundobject/collection/p266001coll1/id/2801/rec/1



2. Plants 2-4 m. tall with pennant-like leaves, inflorescence feathery….

Common Reed

(***Phragmites australis***)

FACW

Pages 102-104

Illustration from *Manual of the Grasses of the United States* by Hitchcock (1950)

2. Plants smaller, inflorescence not feathery……3

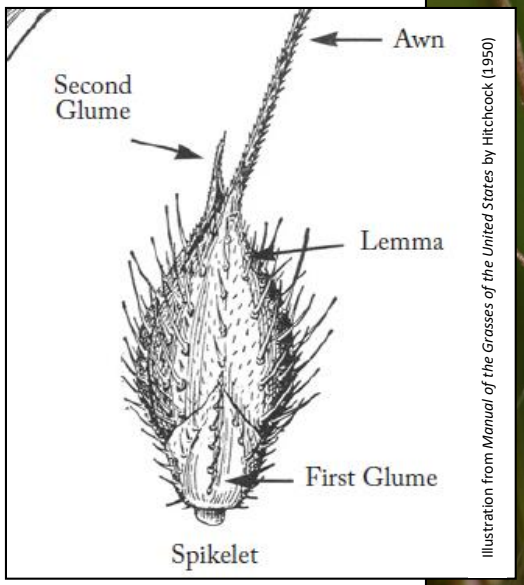
3. Spikelet covered with many little spines…

Wild Millet

(***Echinochloa crus-galli***)

FAC (NC/NE; GP); **FACW** (MW)

Pages 432-433



3. Spikelets without numerous spines...4

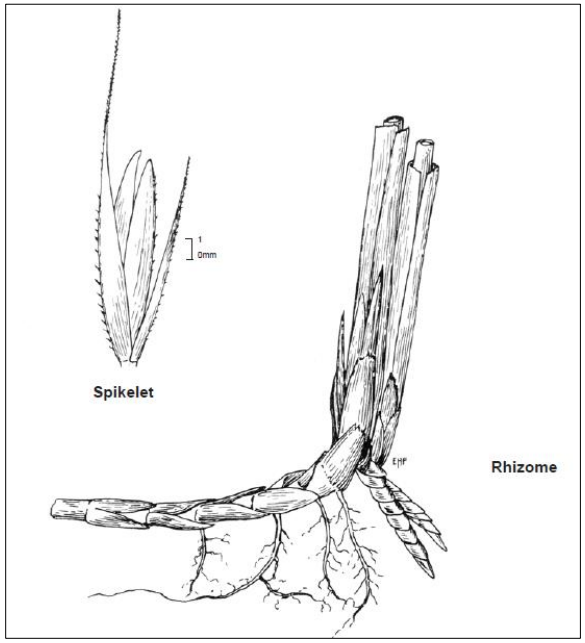
4. Spikelets all on one side (like a comb)……

Prairie Cord-Grass

(***Spartina pectinata***)

FACW

Pages 196-197



4. Spikelets not all on one side……5

5. Spikelets made up of several florets….6

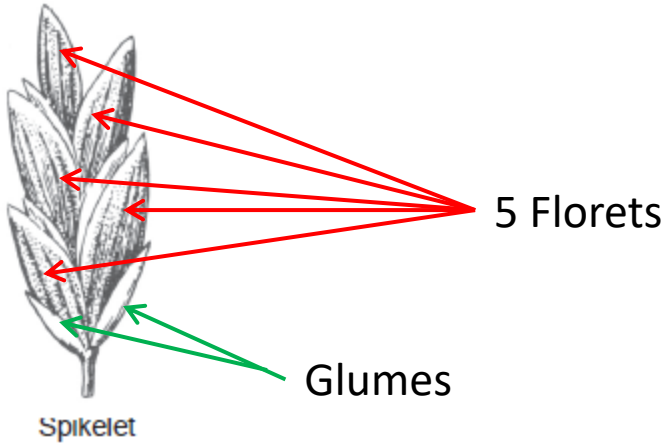


Illustration from *Grasses of Iowa* drawn by Froeschner (1966)

5. Spikelets 1-flowered……..7

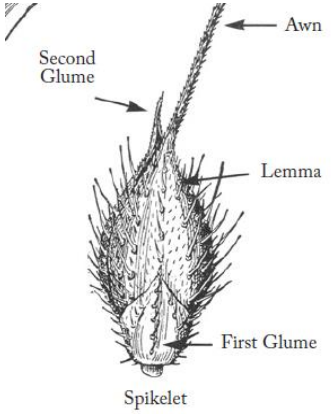
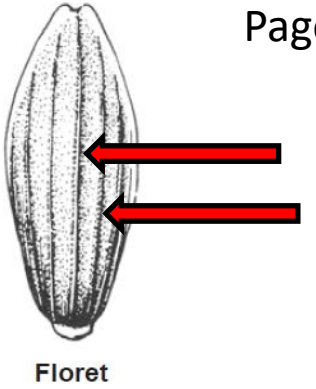


Illustration from *Manual of the Grasses of the United States* by Hitchcock (1950)

6. Lemmas deeply corrugated (nerved), lemma not cottony at base, leaf tips do not end in boat-shaped tip, spikelets not flattened…… **Manna Grasses** (***Glyceria*** spp.)

Pages 108-110



Nerves on lemma

Floret

Illustration from *Grasses of Iowa* drawn by Froeschner (1966)

6. Lemmas not corrugated,……(next slide)

6. con't: …lemma cottony at base, leaf tips end in boat-shaped tip, spikelets flattened……..

Illustrations from *Manual of the Grasses of the United States* by Hitchcock (1950)

Bluegrasses

(***Poa*** spp.)

Pages 170-173

Cottony hairs at base of lemma

One flowered spikelets……

7. Spikelets with fringed margins, overlapping in a row…….

Rice Cut-Grass

(***Leersia oryzoides***)

OBL

Page 105

7. Spikelets not as above……8

8. Spikelets in close, irregular masses……

Reed Canary Grass

(***Phalaris arundinacea***)

FACW

Pages 165-166

8. Spikelets in loose, open arrangement…….9

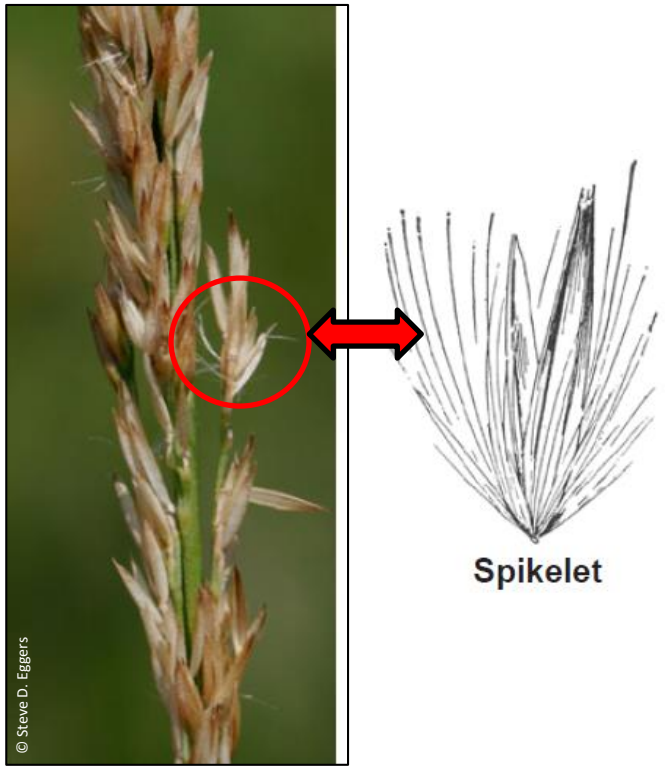
9. Lemma surrounded by a tuft of straight, silky hairs……

Canada Blue-Joint Grass

(***Calamagrostis canadensis***)

OBL

Pages 142-143



9. Lemma without hairs……

……**Redtop** (next slide)

Redtop (*Agrostis gigantea*)

FACW

Pages 167-169

Bullet-shaped, single flowered spikelet, no hairs

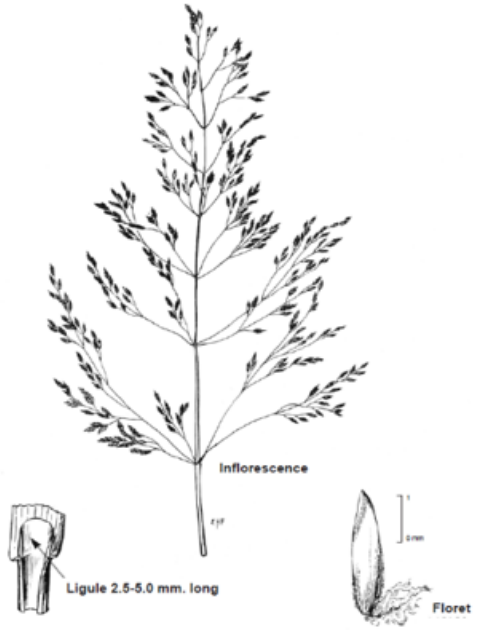
Quick Key to Three Common Bluegrasses (*Poa*)

1. Stem cross section distinctly flattened (compressed); inflorescence contracted (small, compact panicle); ligule short (1-2mm); rhizomes present; tuft of cobwebby hairs at base of lemma sparse, sometimes absent…***Poa compressa*** (Canada Bluegrass)[FACU]

Non-Native

2. Stem cross section oval to round; stem weak, often leaning on other vegetation; inflorescence a very large, open panicle; ligule prominent, 2.5-5.0 mm long (longer than other two species); rhizomes absent; tuft of cobwebby hairs at base of lemma….***Poa palustris*** (Fowl Bluegrass) [FACW]

Native



Quick Key to Three Common Bluegrasses (*Poa*) con't:

3. Stem cross section oval to round, more stout than that of *Poa palustris*; inflorescence an open panicle intermediate in size between other two bluegrasses above; ligule <2mm long; rhizomes present (forms a sod = lawns); tuft of cobwebby hairs at base of lemma.....***Poa pratensis*** (Kentucky Bluegrass)[FAC in MW; FACU in NC/NE and GP]

Rhizomes

Floret

Spikelet

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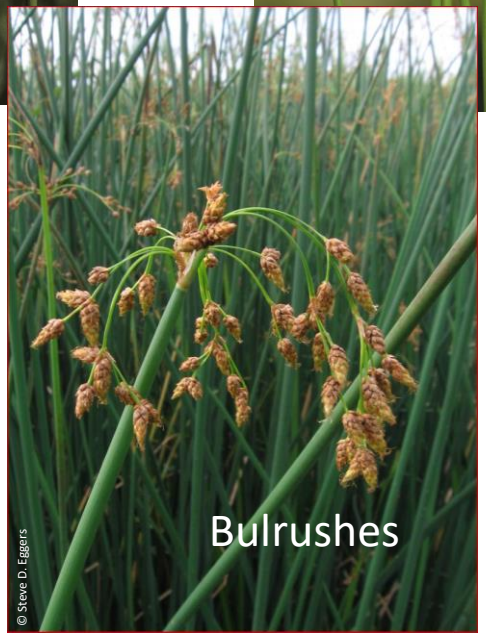
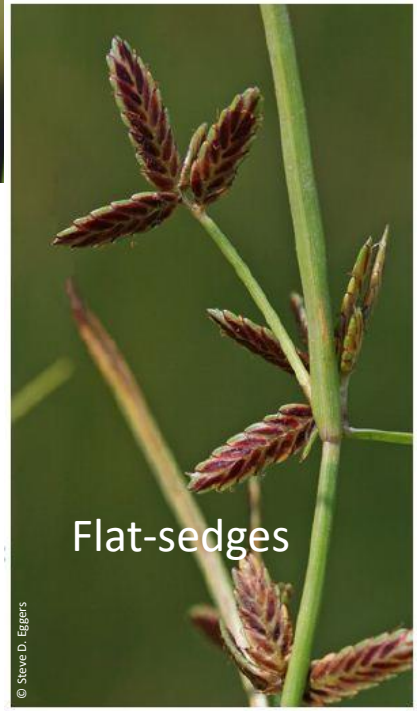
Probably a European exotic (Freckmann et al. 2014). Populations of northern shores, rocks and open forests are perhaps native (Voss and Reznicek 2012). Ubiquitous populations in our region are almost certainly escapes from cultivated European strains (Swink and Wilhelm 1994).

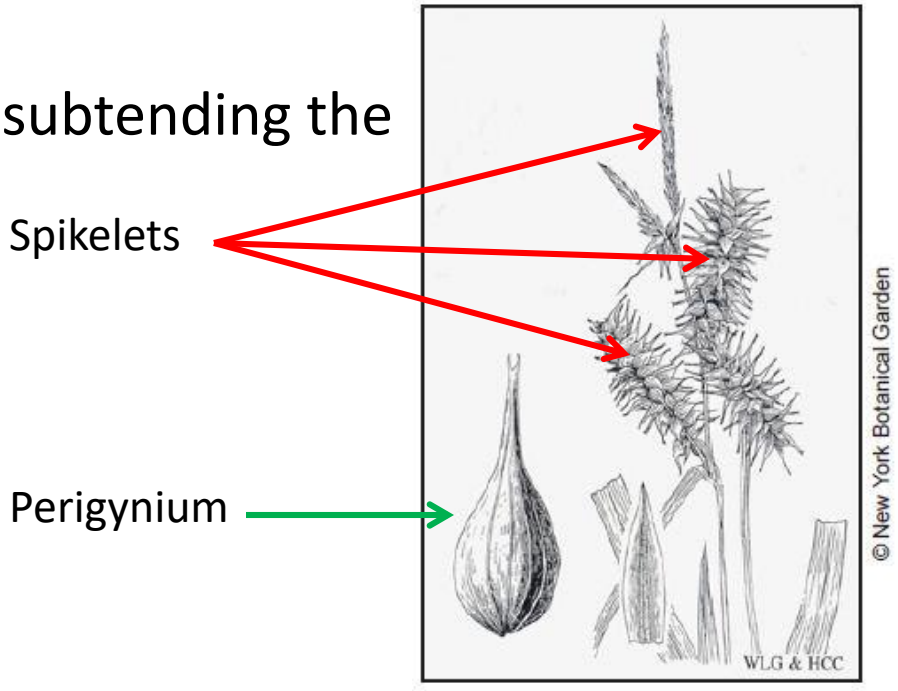
SEDGE FAMILY



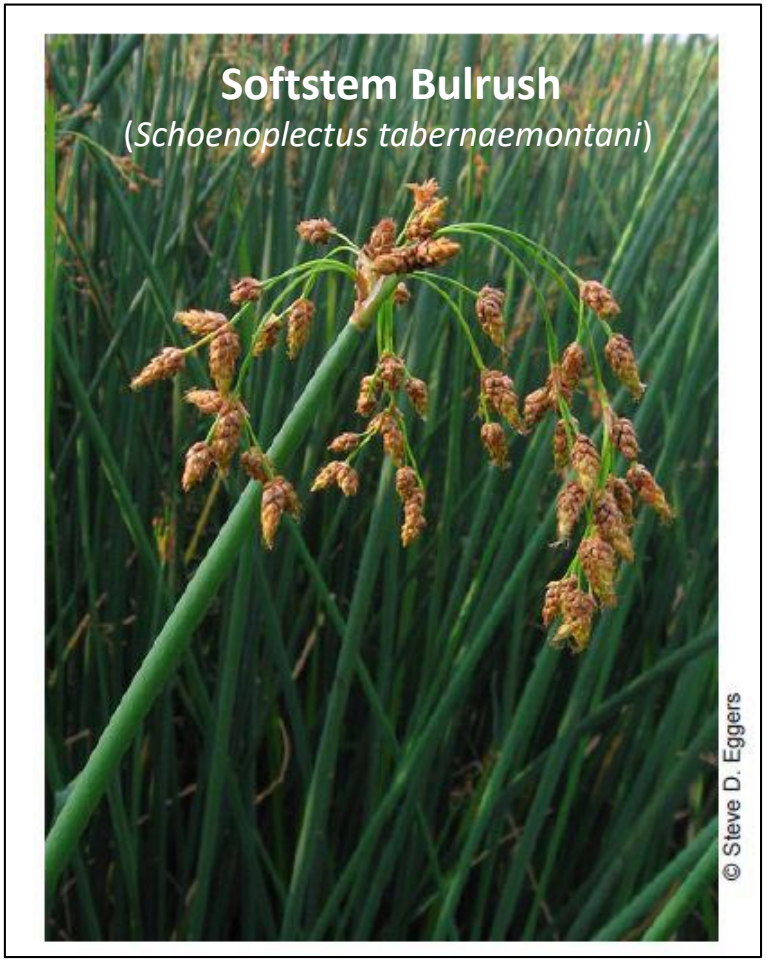


BOTANICAL TERMS: SEDGE FAMILY

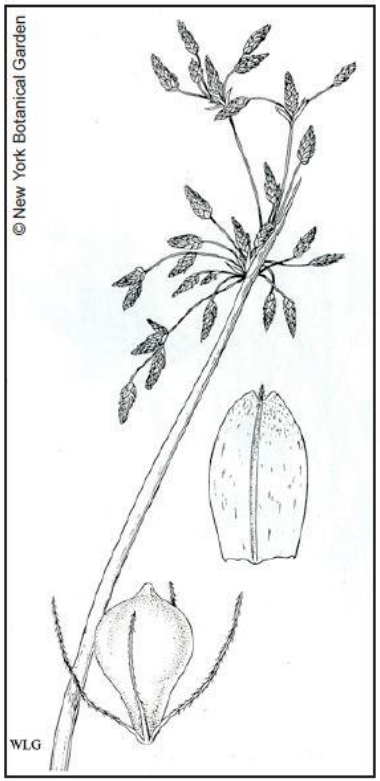
- **Spikelet:** a small spike with reduced flowers on a central axis
- **Perigynium:** the papery, flask-like structure that surrounds the ovary; unique to the genus ***Carex***
- **Achene or nutlet:** a small, hard fruit that does not split open along a seam
- **Scale:** a highly reduced leaf subtending the flower



SEDGE FAMILY: Bulrushes
(*Schoenoplectus* and *Scirpus*)

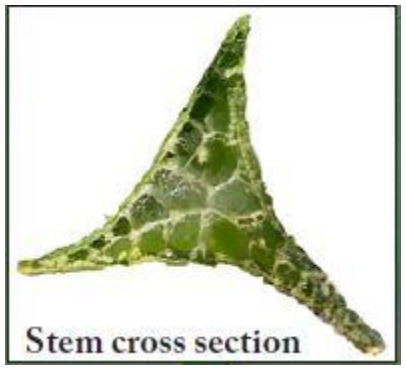


Hardstem Bulrush
(*Schoenoplectus acutus*)



About 19 spp. in our area

SEDGE FAMILY: Bulrush Stem Cross Sections

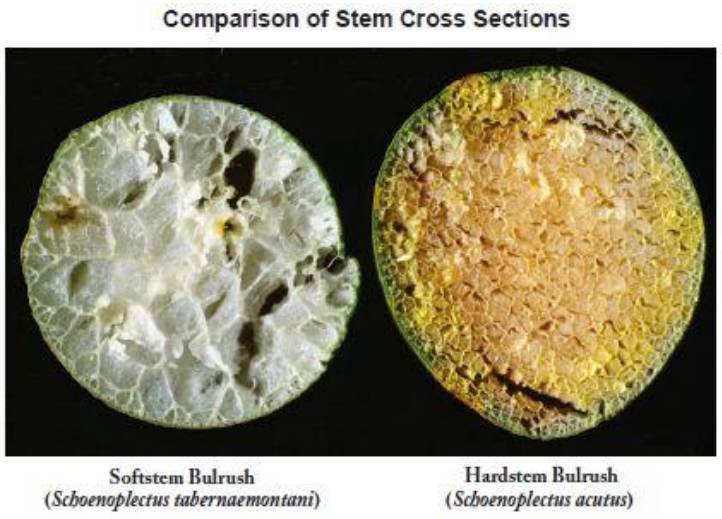


Three-Square Bulrush
(*Schoenoplectus pungens*)

River Bulrush
(*Schoenoplectus fluviatilis*)


Stem cross section.

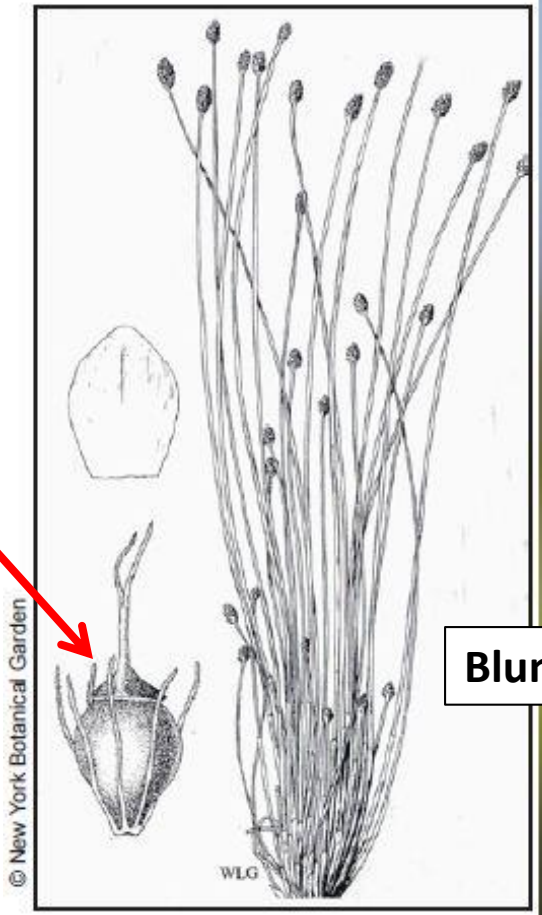
Softstem vs. Hardstem Bulrush
(*Schoenoplectus tabernaemontani*)
vs. *S. acutus*)



SEDGE FAMILY: Spike-Rushes (*Eleocharis*)

About 23 spp. in our area

Nutlet has a "cap" (tubercle)



Blunt Spike-Rush (*Eleocharis obtusa*)

SEDGE FAMILY: Cottongrasses (*Eriophorum*)

About 7 spp. in our area

Nutlets have many, long, silky bristles

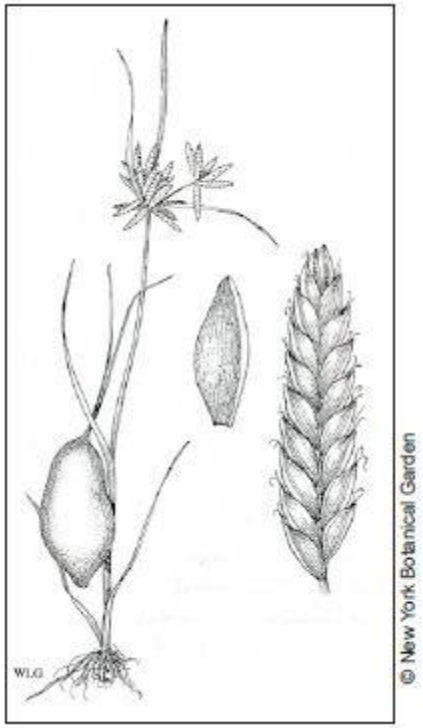
Narrow-leaved Cottongrass
(*Eriophorum angustifolium*)

SEDGE FAMILY: Flat-Sedges (*Cyperus*)

About 14 spp. in our area

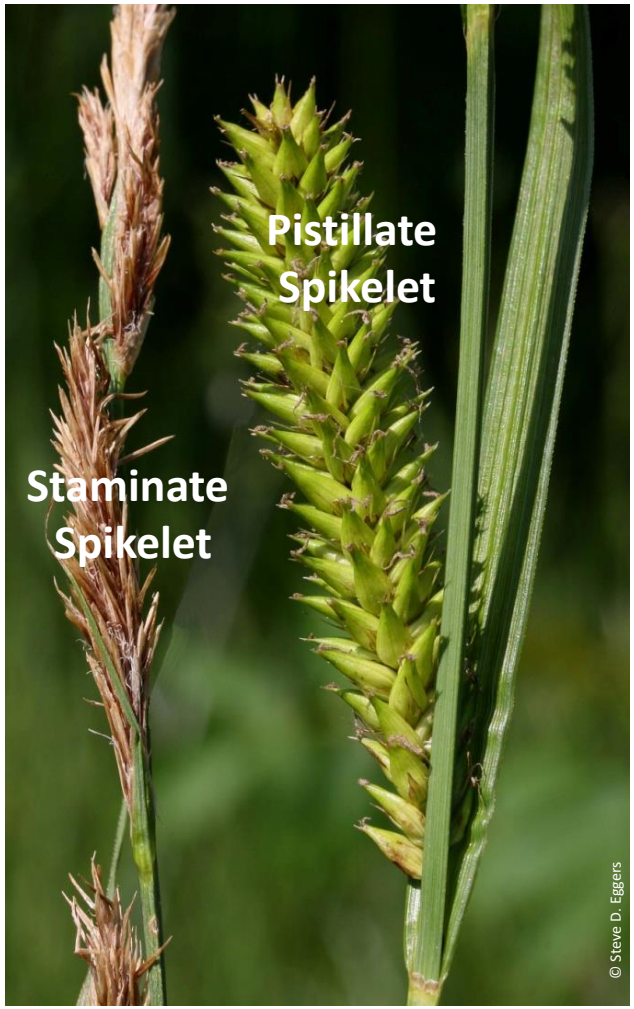
Spikelets are flattened (2-sided)

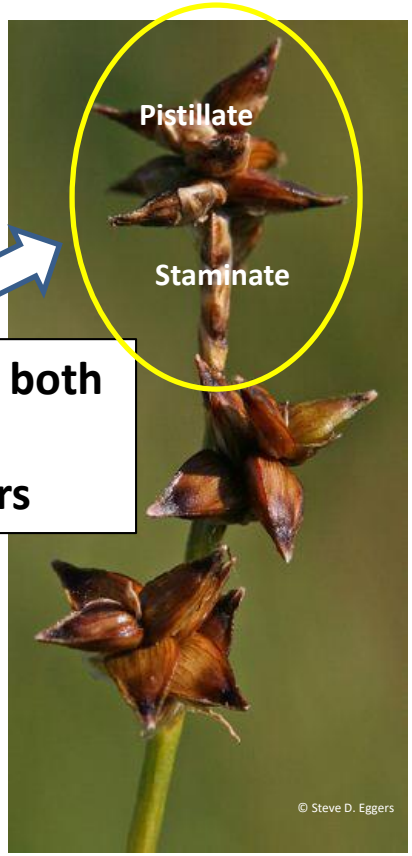
Also called nutgrasses



SEDGE FAMILY: Sedges (*Carex*)

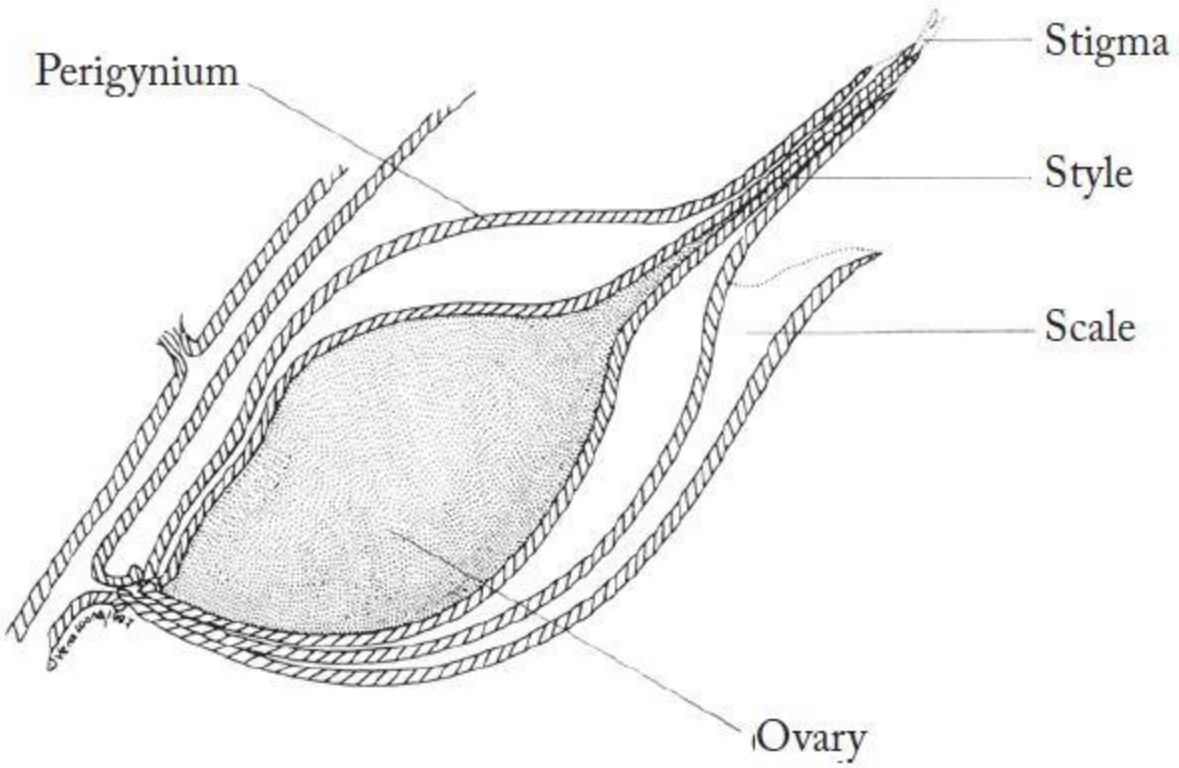
About 180 spp. in our area





Spikelet (circled) has both pistillate and staminate flowers

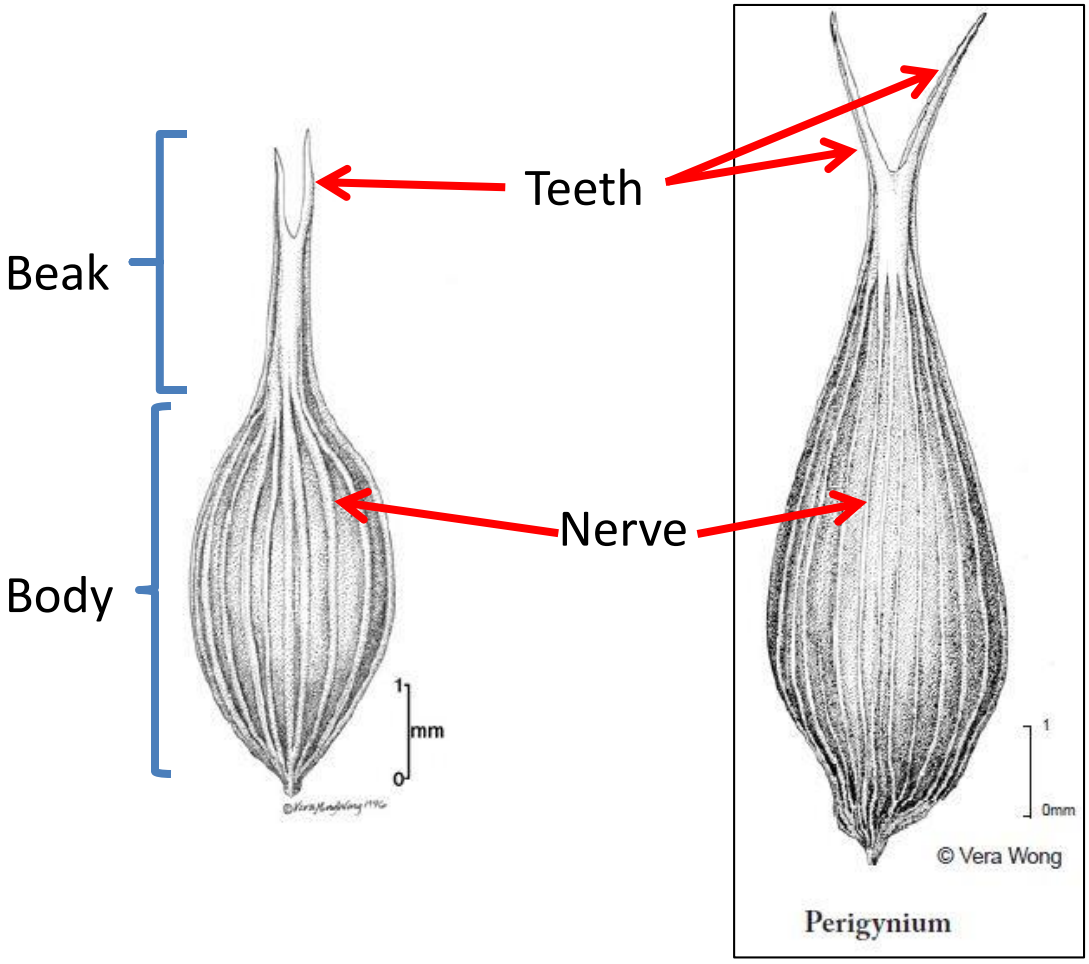
Carex: Perigynium and Scale



Cross Section of a Perigynium (*Carex*)

Illustration from *Wetland Plants and Plant Communities of Minnesota and Wisconsin, Version 3.1* by Eggers and Reed (2014)

Carex: Perigynium



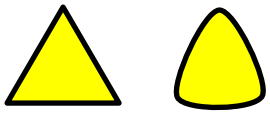
Illustrations from *Wetland Plants and Plant Communities of Minnesota and Wisconsin, Version 3.1* by Eggers and Reed (2014)

Carex: Flower Structure

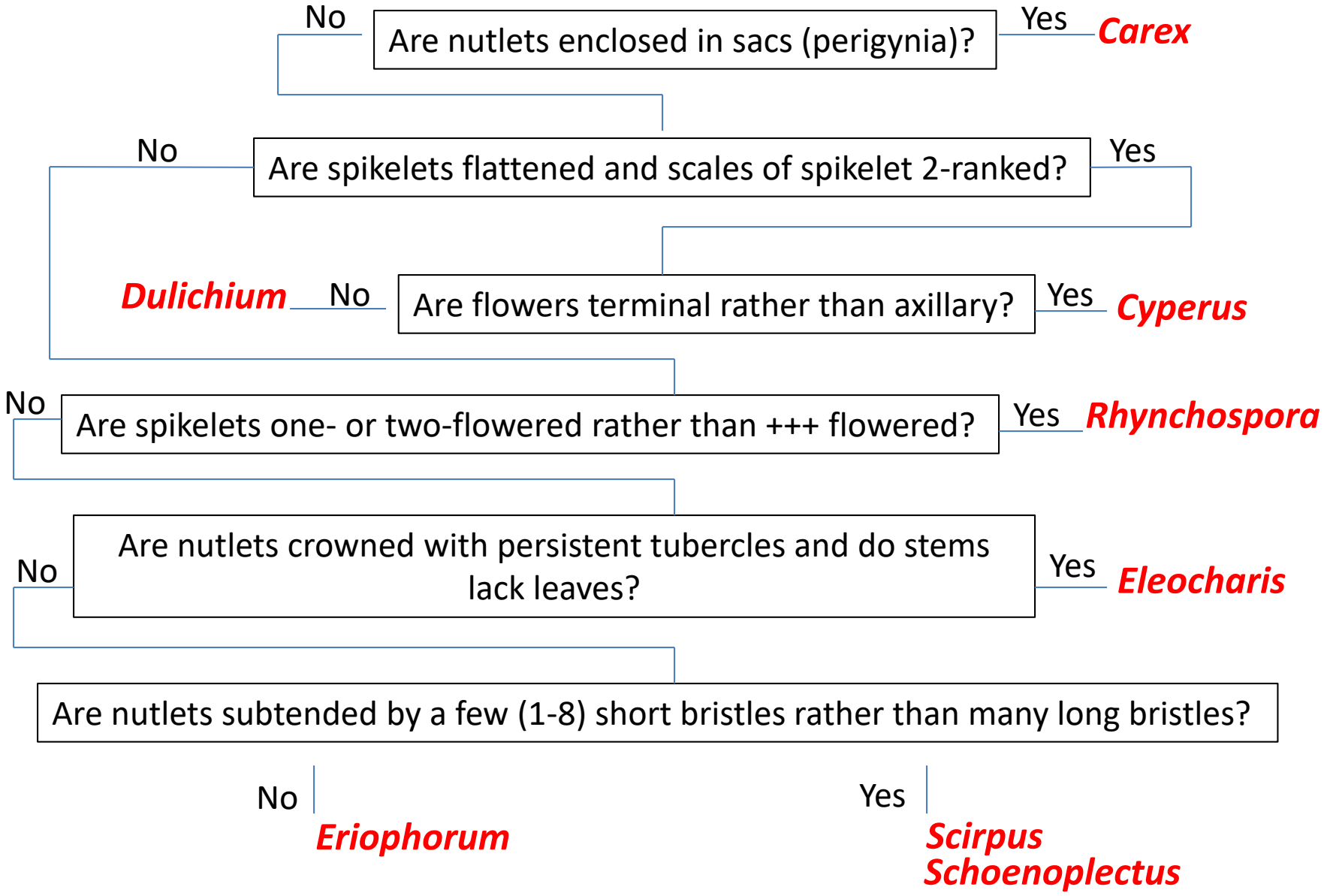
Perigynia = ***peri*** (around) + ***gynia*** (gynoecium, female portion of flower)

Sedge pistils with 2 carpels produce lens-shaped nutlets (*lenticular*)

Sedge pistils with 3 carpels produce triangular-shaped nutlets (*trigonous*)

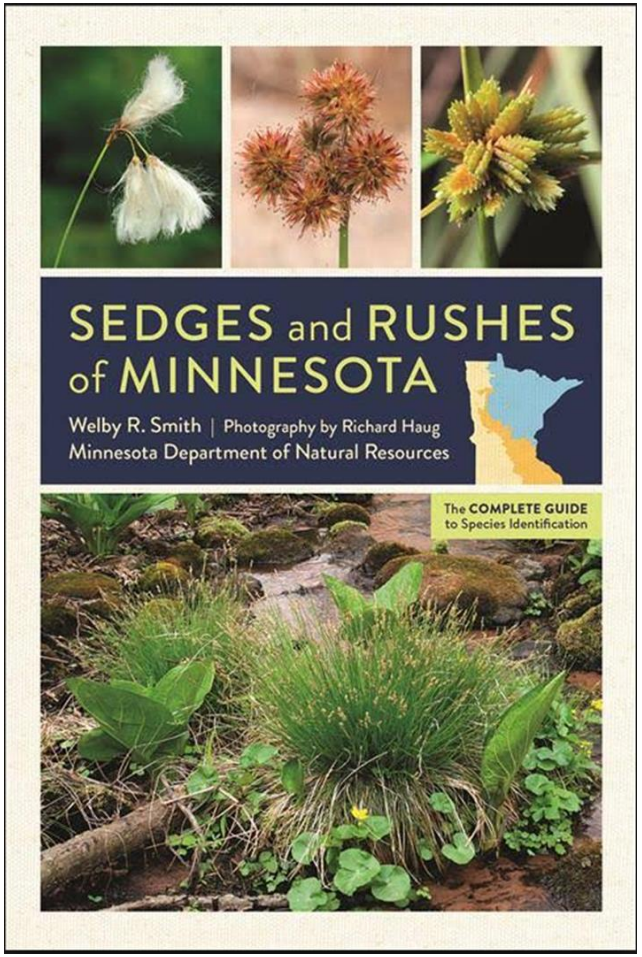


Carpel: the basic female structural unit of the flower; in a compound pistil, the carpels are united, but the number can often be determined by the number of styles, stigmas, or locules (compartments of the ovary) [from Voss (1972) *Michigan Flora*]



Modified from S. Galatowitsch, U of MN, 1994

References



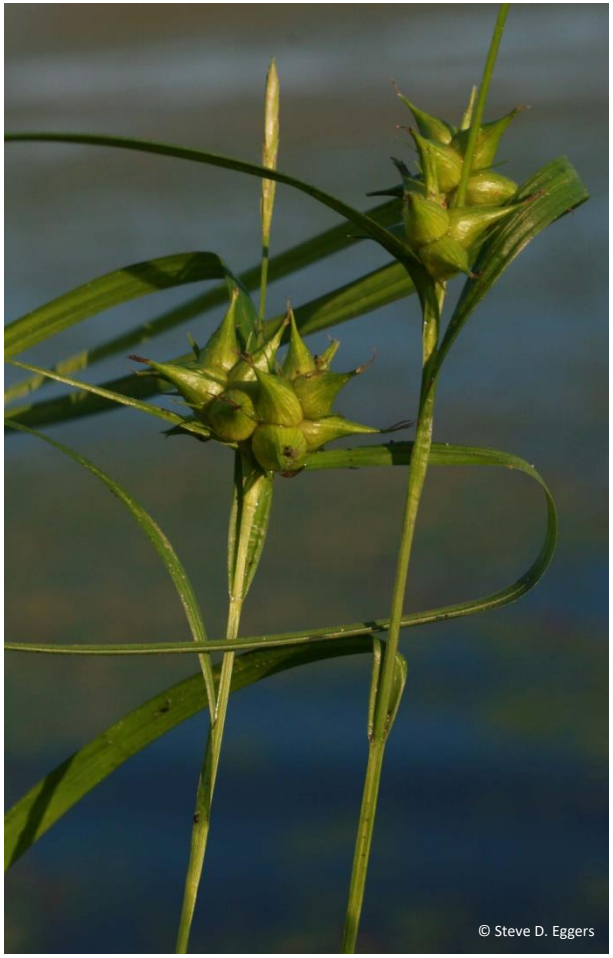
http://www.mvp.usace.army.mil/

Common Sedges

BLADDER SEDGE

(*Carex intumescens*)

FACW



- Unmistakable
- Very large (bladder-like) perigynia

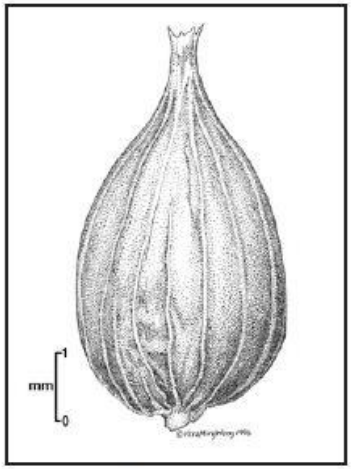
(Page 355) [Page numbers refer to *Wetland Plants and Plant Communities of MN and WI, Version 3.1* by Eggers and Reed (2014)].

Common Sedges

BOG SEDGE

(*Carex oligosperma*)

OBL



Perigynium

© Photos by Steve D. Eggers

- Leaves wiry, less than 3 mm. wide
- Forms extensive stands

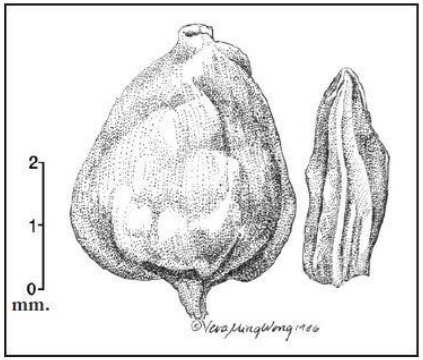
(Page 258)

Common Sedges

TUSSOCK SEDGE

(*Carex stricta*)

OBL



Perigynium and scale.

- Forms tussocks
- W-shaped leaf shape
- Base reddened, has pinnate fibers
- Stem diameter smaller than a pencil

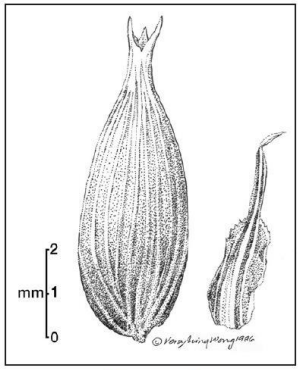
(Pages 138-139)

Common Sedges

LAKE SEDGE

(*Carex lacustris*)

OBL



Perigynium and scale.

- Does not form tussocks
- W-shaped leaf shape
- Base reddened, has pinnate fibers
- Stem diameter larger than a pencil

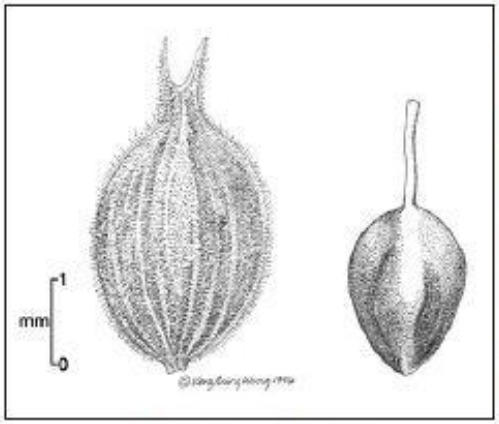
(Pages 112-113)

Common Sedges

WOOLY SEDGE

(*Carex pellita*)

OBL



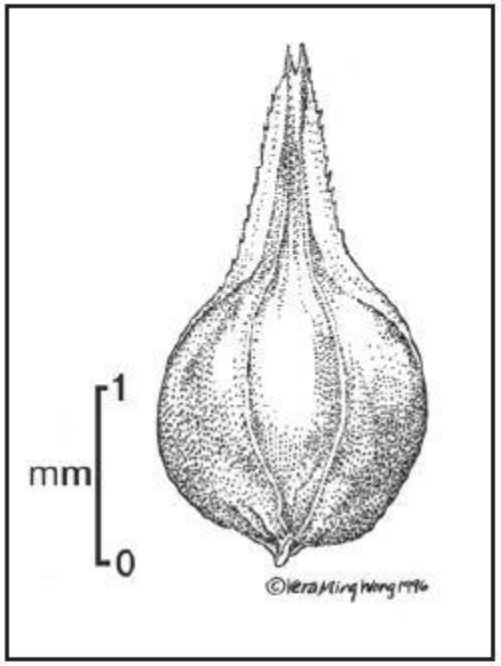
Perigynium and nutlet.

© Steve D. Eggers

- Perigynia pubescent (e.g., woolly)
- Leaves flat, greater than 2.5 mm. wide
- Very common, good colonizer of disturbed sites (e.g., wetland restorations)

(Page 140)

Common Sedges



Perigynium

FOX SEDGE

(*Carex vulpinoidea*)

OBL

- "Foxtail" inflorescence
- Leaf sheaths with cross wrinkles
- Stems hard, stiff

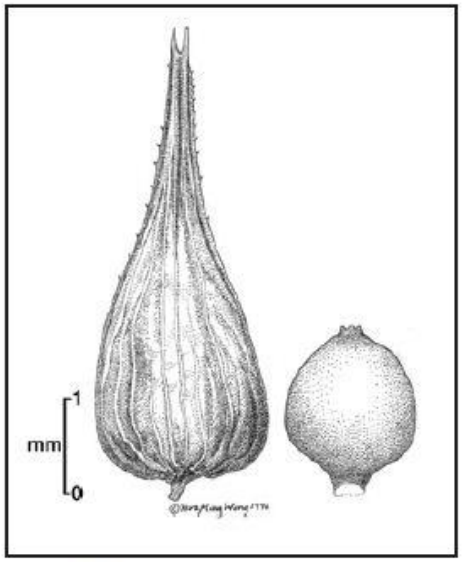
(Page 178)

Common Sedges

STALK-GRAIN SEDGE

(*Carex stipata*)

OBL

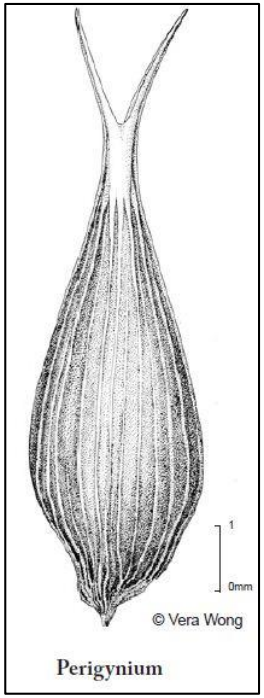


Perigynium and nutlet.

- Leaf sheaths with cross wrinkles
- Stems soft, winged, deeply concave, three-angled

(Page 310)

Common Sedges



SLOUGH SEDGE

(*Carex atherodes*)

OBL

- Large, robust sedge
- Perigynia with 2 widely spreading teeth
- Pubescent leaf sheaths

(Page 117)

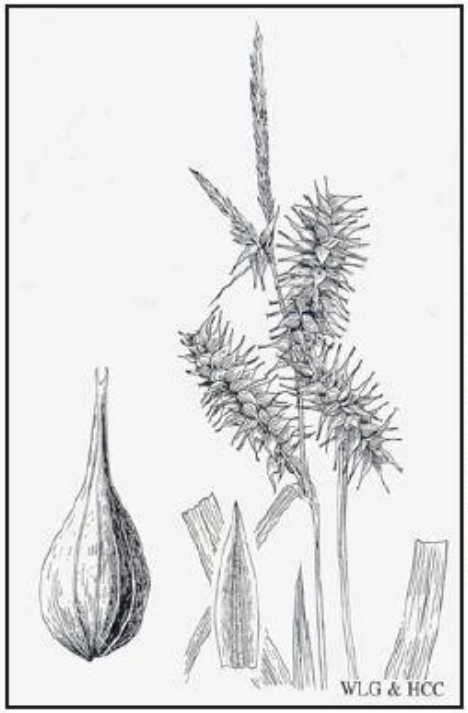
Common Sedges

RETRORSE SEDGE

(*Carex retrorsa*)

OBL

- Lowest perigynia are backward (retro) facing



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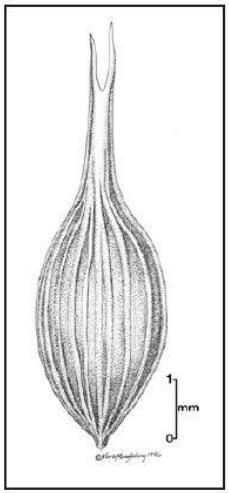
Common Sedges

PORCUPINE SEDGE

(*Carex hystericina*)

OBL



Perigynium

- Perigynia with ultra-long, straight beak with closed teeth, strongly nerved
- Lower spikelets pendant

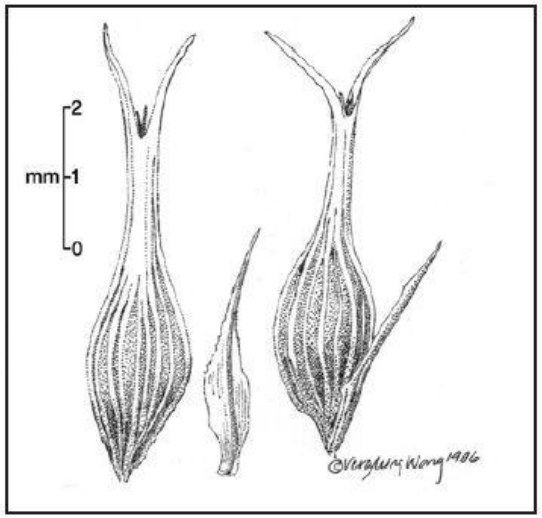
(Page 111)

Common Sedges

BOTTLEBRUSH SEDGE

(*Carex comosa*)

OBL



Perigynia and scale.

- Similar to Porcupine Sedge except teeth of perigynia are widely spreading

(Page 118)