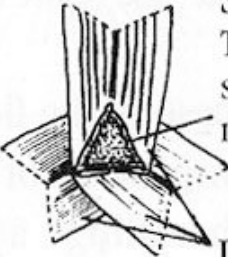
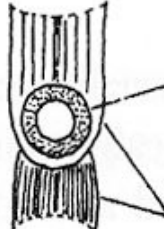


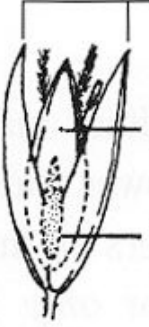



Lab 10: Graminoids

Grasses, Sedges and Rushes

Comparison of Sedges to Other Grasslike Families

	<i>Sedges</i>	<i>Grasses</i>	<i>Rushes, Woodrushes</i>
<i>Simplified Cross Section of Stem, Leaves</i>	 <p>Stem Triangular solid not jointed</p> <p>Leaves 3-ranked</p>	 <p>Stem round hollow jointed</p> <p>Leaves 2-ranked</p>	 <p>Stem round solid not jointed</p> <p>Leafless or 2- ranked</p>
<i>Flower, Fruit</i>	 <p>Perigynium</p> <p>Achene 1-seeded</p> <p>Scale</p>	 <p>Glumes</p> <p>Lemma</p> <p>Grain 1-seeded</p>	 <p>Capsule 3 to many seeded</p> <p>Bract-like segments</p>

(Adapted from Roberts 1983)

Morphology of grasses

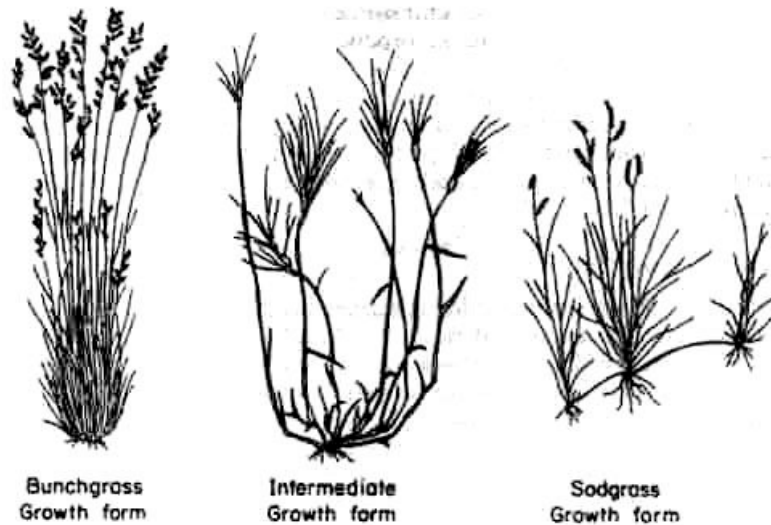
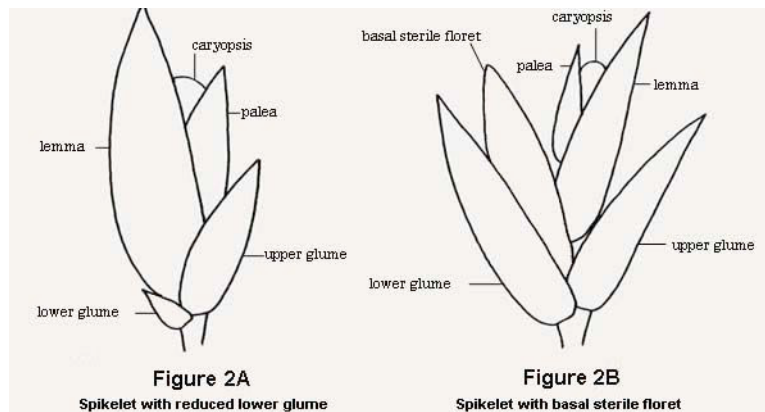
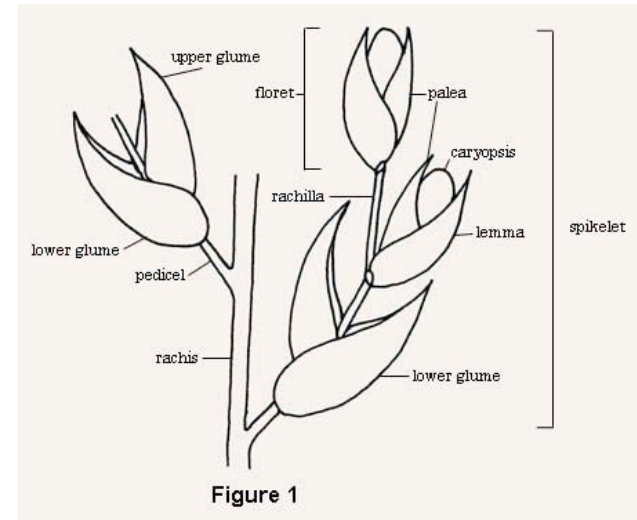


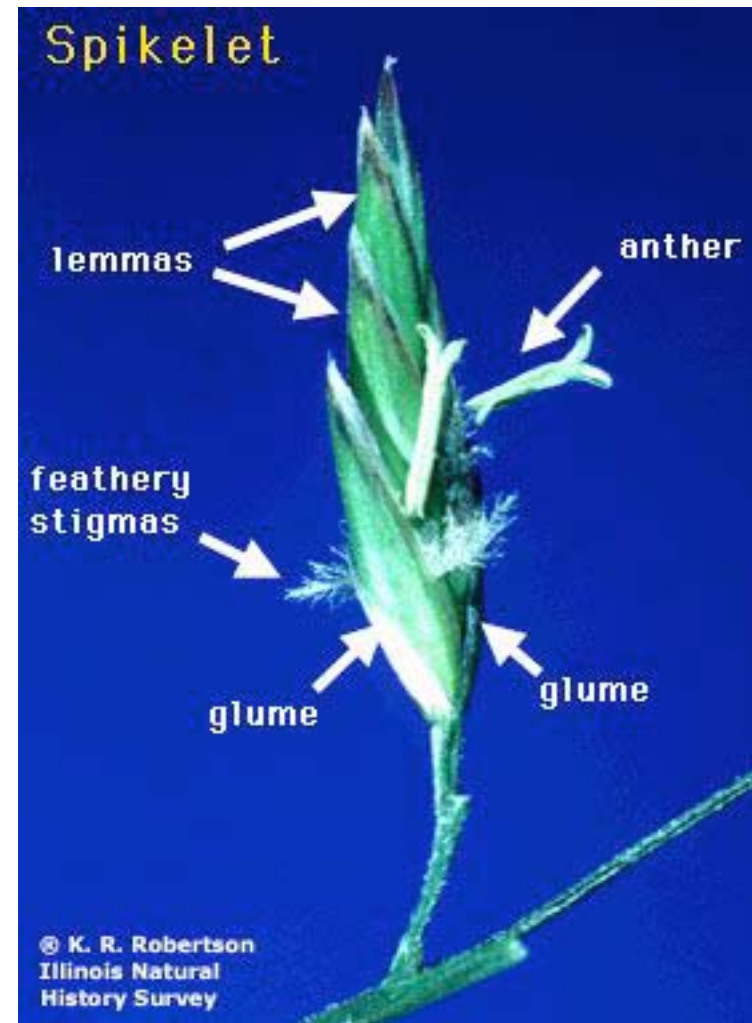
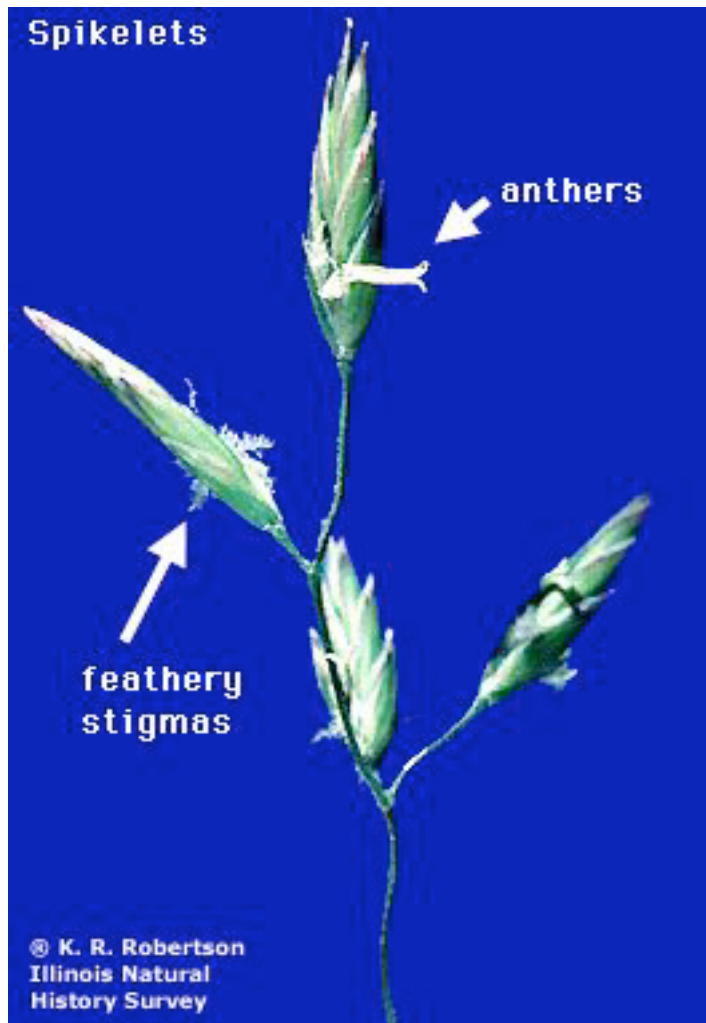
Figure 4.4. Variation within the grass growth form originates from the pattern of tiller emergence expressed by various species groups. The bunchgrass growth form originates from intravaginal tiller development, while extravaginal tiller development contributes to a more diffuse tiller arrangement and serves as a prerequisite to the sodgrass growth form. Stolons or rhizomes further increase inter-tiller distances within plants.



- Each branch of the inflorescence can have numerous spikelets.
- Each spikelet is subtended by two glumes.
- Each spikelet can contain many florets.
- Each floret has a lemma, a palea, and a caryopsis (seed).

<http://cnrit.tamu.edu/rlem/textbook/Chapter4.htm#index6>
www.lucidcentral.org/.../Grass_morphology.htm

Spikelet



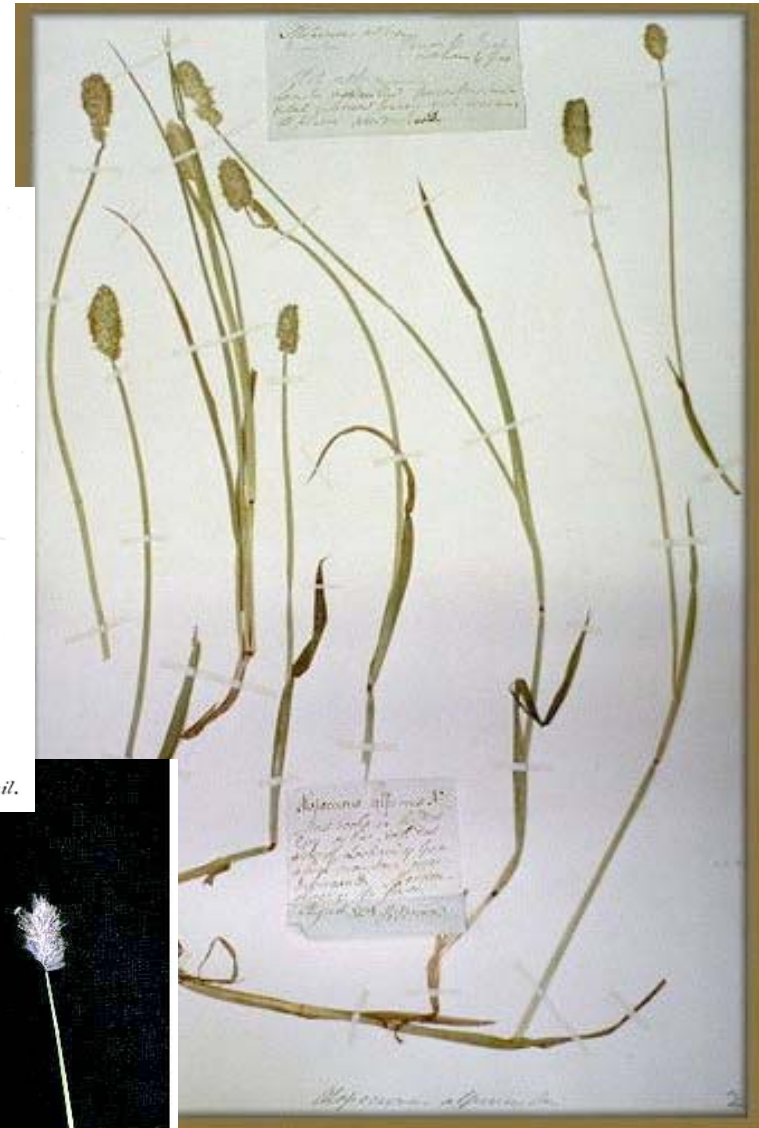
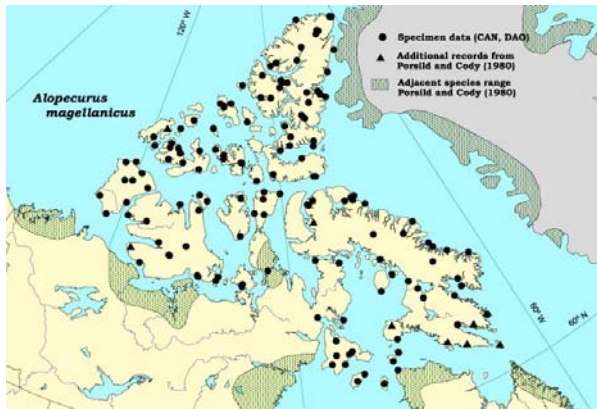
Excellent reference for Arctic Poaceae

- S.G. Aiken, L.L. Consaul, and M.J. Dallwitz. 1995 onwards. Poaceae of the Canadian Arctic Archipelago: Descriptions, Illustrations, Identification, and Information Retrieval. Version: 10th December 2001.
<http://www.mun.ca/biology/delta/arcticf/>.

Alopecurus alpinus

Family: Graminae (Poaceae)

Common Name: Alpine Foxtail



mpiz-koeln.mpg.de/./high/IMG_9467.html

- Inflorescence very compact (into a "foxtail")
- Leaf sheaths inflated.
- 1 floret per spikelet.
- No palea.
- Rhizomatous.



www.mun.ca/./delta/arcticf/poa/www/poalal.htm

Arctagrostis latifolia

Family: Poaceae
Common Name:
Polar Grass



Photograph by Mollie MacCormac

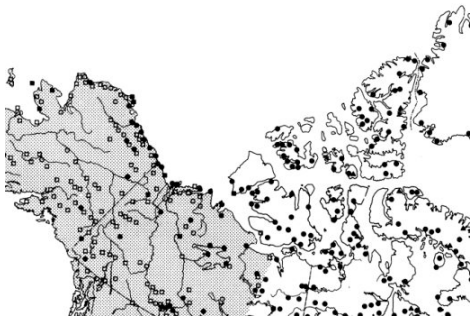


Figure from S.G. Aiken et al 1995

- **Loose inflorescence with many branches, and many spikelets per branch.**
- **1 floret per spikelet.**
- **Rhizomatous**

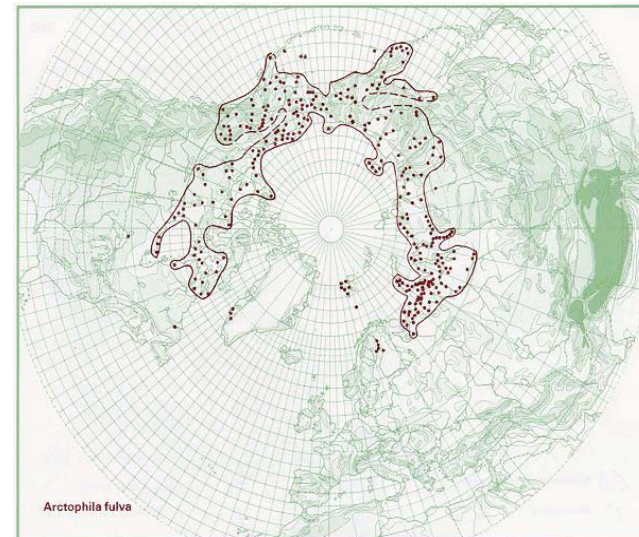


Photograph by K. Clarkin

Arctophila fulva (slide 1 / 2)

Family: Poaceae

Common Name: Pendant Grass



HABITAT : Photo from Swedish Museum of Natural History

- Aquatic grass, often red color late in summer.
- Upper leaf blades much longer than lower.
- 3-5 florets per spikelet.
- Favorite food and habitat of tundra swans.

RANGE : Figure from Swedish Museum of Natural History's Den virtuella floran database

Arctophila fulva (slide 2 / 2)



Photo from Swedish Museum of Natural History



Photo from Swedish Museum of Natural History



Photo from Poaceae of the Canadian Arctic Archipelago website



Photo of stem close up from Poaceae of the Canadian Arctic Archipelago website

Calamagrostis Canadensis (slide 1 / 2)

Family: Graminae (Poaceae)

Common Name: Bluejoint



Photo from Seth Price, Univ. of Wisconsin

- **Many branches, and many spikelets per branch.**
- **1 floret per spikelet.**
- **Tuft of hairs at the base of the lemma.**



Photo from Seth Price, Univ. of Wisconsin

Calamagrostis Canadensis (slide 2 / 2)

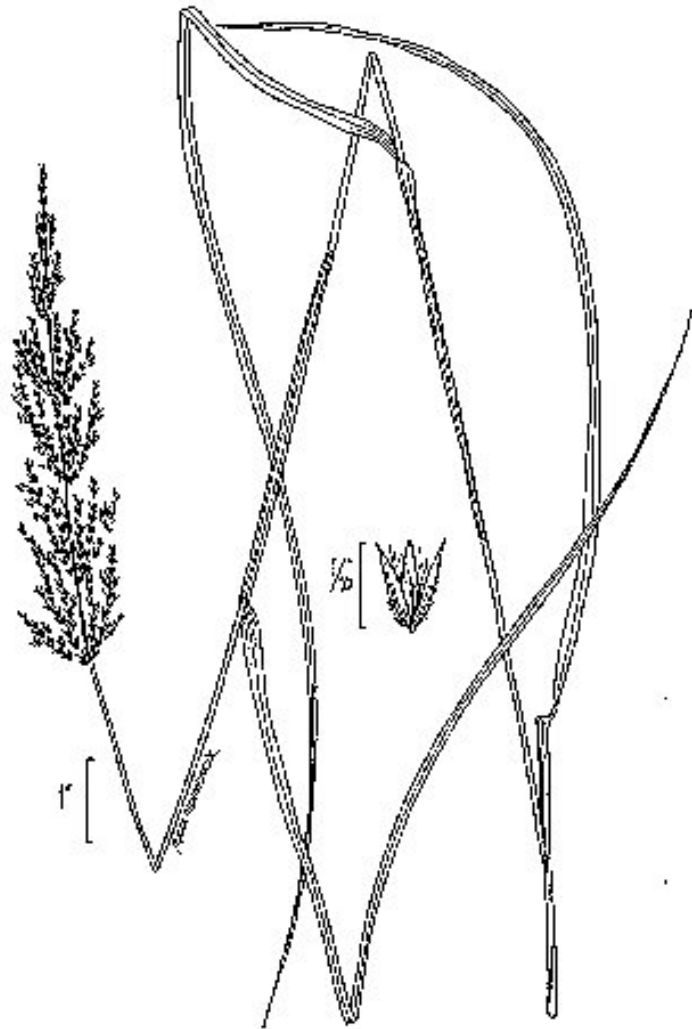


Figure from USGS Northern Prairie Wildlife Research Center website



Photos from USGS Northern Prairie Wildlife Research Center website

Deschampsia caespitosa (*D. brevifolius*) (slide 1 /2)

Family: Poaceae

Common Name: Arctic
Hairgrass



Copyright 1998, by UC Davis



Photo from El Nativo Growers, Inc website

- Caespitose (bunch-forming).
- Disturbed silts and clays, sand dunes, flood plains, wet areas, mostly mineral soils.
- Inflorescence spreading with appressed secondary branches.
- 2-3 florets per spikelet.

Deschampsia caespitosa (slide 2 /2)

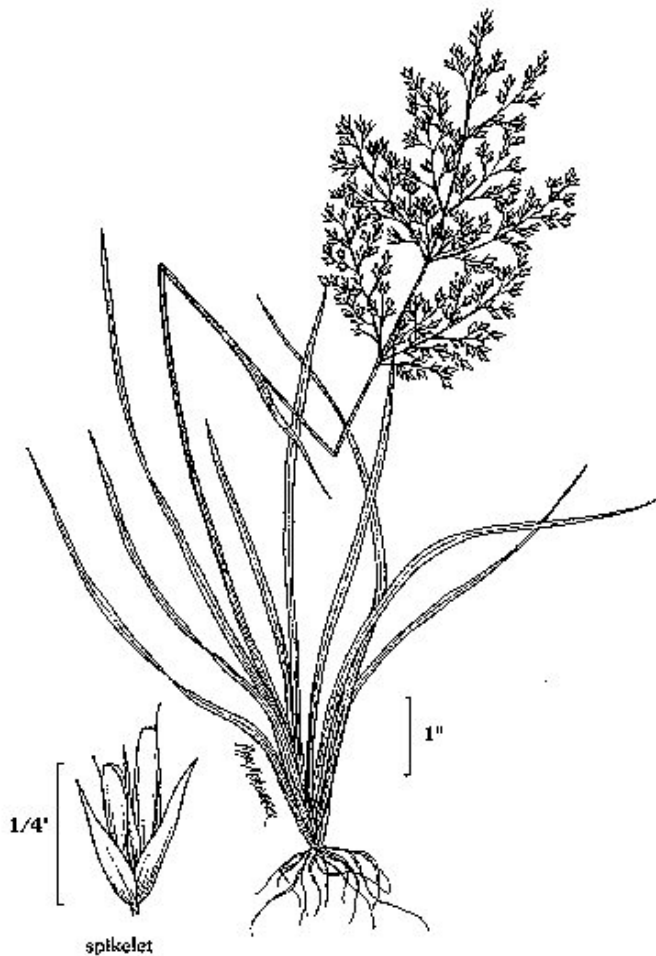


Figure from USGS Northern Prairie Wildlife Research Center website



Photo from Provincial museum of Newfoundland and Labrador



Photo from Provincial museum of Newfoundland and Labrador

DuPontia fisheri

Family: Poaceae

Common Name: Dupontia



Photo from Poaceae of the Canadian Arctic Archipelago website

- **Wet meadows, especially near the sea coast.**
- **Mineral soils**
- **Rhizomatous**
- **Single stiff erect culm, persistent over winter**
- **Inflorescence appressed or spreading**
- **Few branches**
- **1-2 florets spikelet**

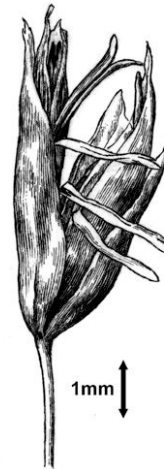


Figure from Poaceae of the Canadian Arctic Archipelago website

Festuca brachyphylla

Family: Poaceae

Common Name: ?



Photo from Poaceae of the Canadian Arctic Archipelago website

- **Short (<15 cm), caespitose,**
- **Narrow 0.3-1 mm leaves**
- **Reddish in nitrogen-rich habitats, often around animal dens, owl perches, dry habitats**
- **Laterally compressed spike. Branches 1-9 mm long**
- **2-4 florets per spikelet**
- **Festuca is differentiated from Poa by awn at the tip of the lemma, and generally narrower leaves.**

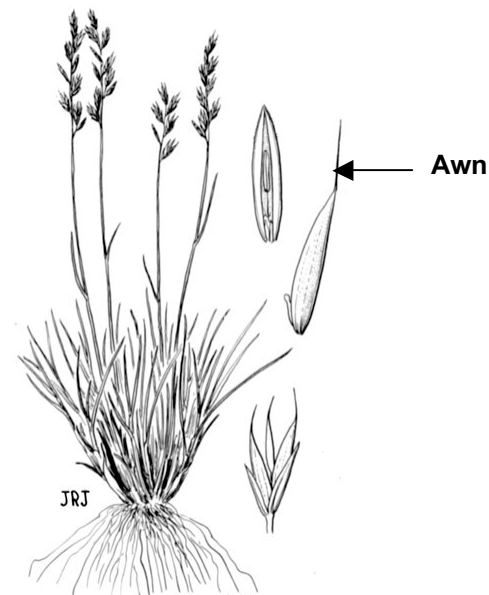


Figure from livinglandscapes.bc.ca

Hordeum jubatum (slide 1 / 2)

Family: Poaceae

Common Name: Squirrel-tail Grass, Foxtail Barley



Photo by Dr Jochen Wegner

- Introduced plant, often along roads, dry meadows, widespread.
- Inflorescence spicate (the spikelets forming a triad at each node with the central one fertile and usually sessile, the lateral ones pedicellate, and usually sterile).
- 1 floret per spikelet.
- Very long awn from tip of lemma, 10-60 mm long.



Photo by Clay Baldwin

Hordeum jubatum (slide 2 / 2)

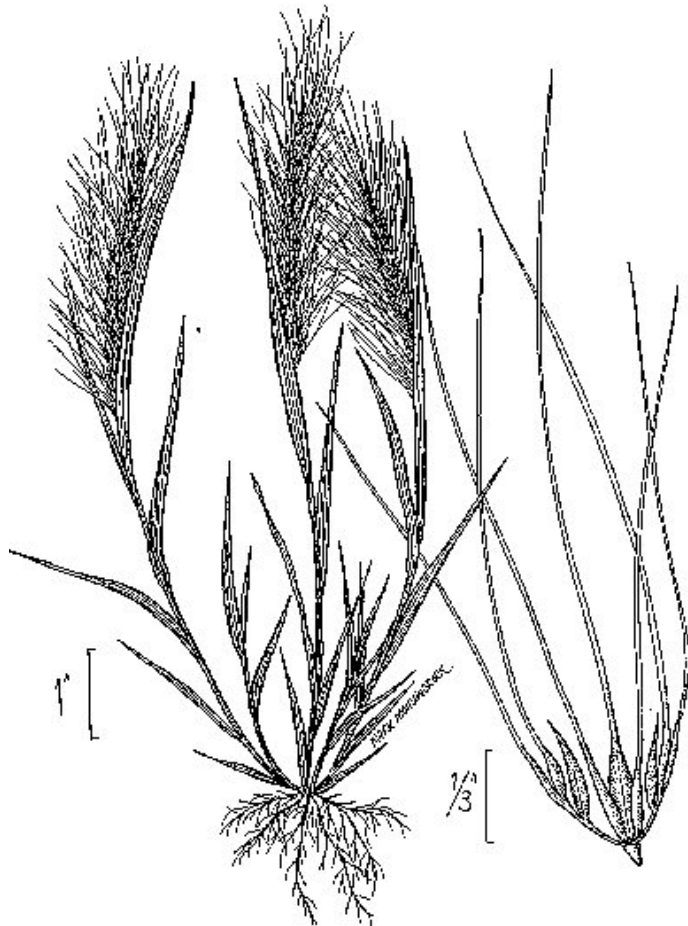


Figure from USGS Northern Prairie Wildlife Research Center website



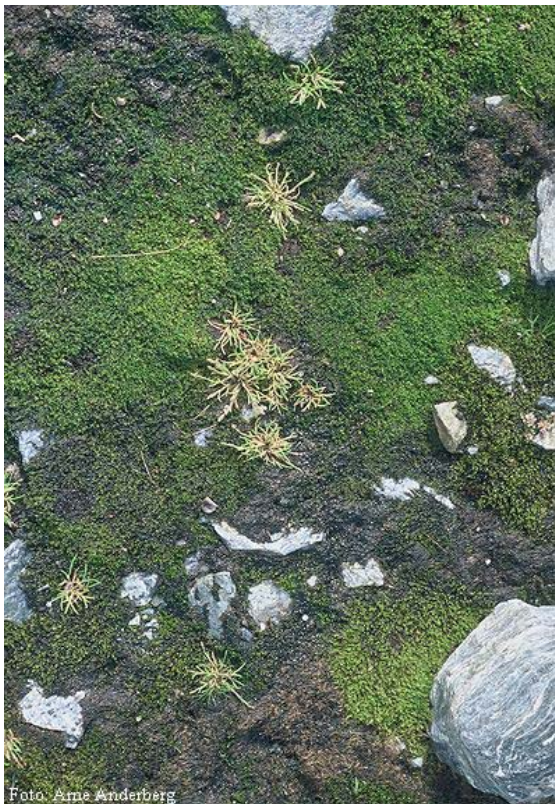
Photo from UC Davis, CA

Phippisia algida (slide 1 / 2)

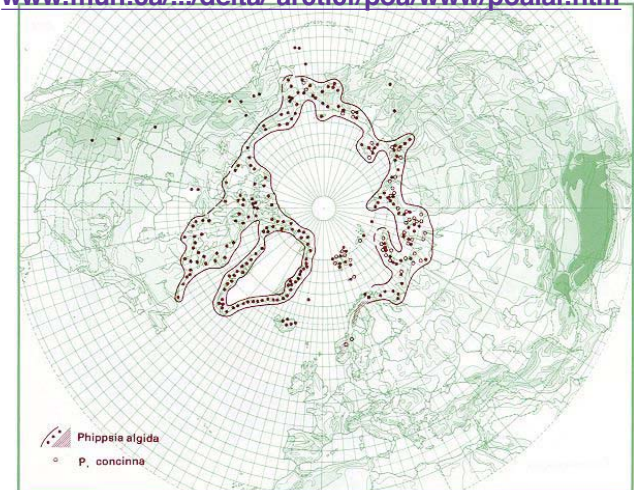
Family: Poaceae

Common Name:

- Circumpolar High Arctic species, mainly coastal species
- Snowbeds, wet areas, disturbed areas. Nitrophilous.
- Generally small caespitose plants
- Compressed spike



www.mun.ca/.../delta/arcticf/poa/www/poalal.htm



RANGE : Figure from Den virtuella floran website

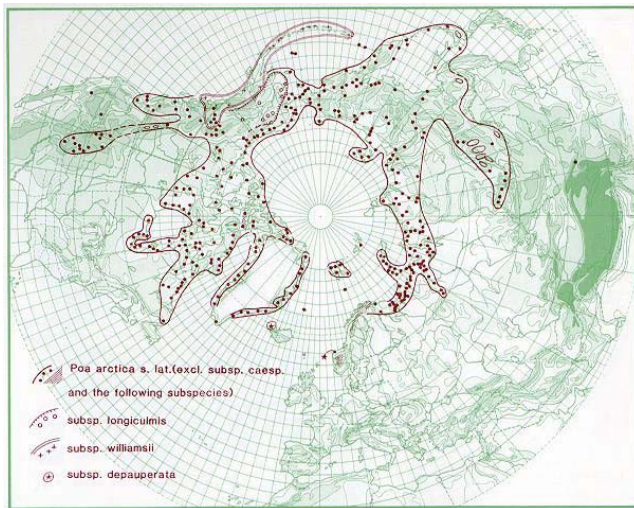
Phippsia algida (slide 2 / 2)



Poa arctica

Family: Graminae

Common Name: Arctic Meadow-grass
Arctic Bluegrass



RANGE : Figure from Den virtuellan floran website

- **Moist habitats, tundra, widespread**
- **Often caespitose and rhizomatous**
- **Aerial stems decumbent (usually lafy for approximately half their length)**
- **Poa and Dupontia have canoe-shaped leaves**
- **2-3 florets per spikelet, no awns on lemmas**



www.mun.ca/.../delta/arcticf/poa/www/poalal.htm



Figure from USGS Northern Prairie Wildlife Research Center website

Trisetum spicatum

Family: Graminae

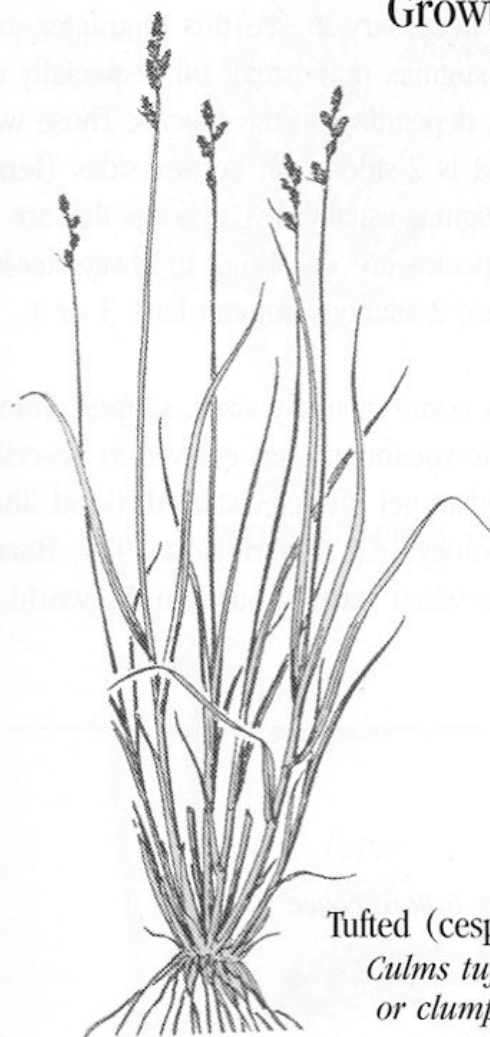
Common Name: Spiked Trisetum, Narrow False-oat

- Inflorescence, dense cylindrical or ovoid, often deep purple brown
- Prominent twisted awns arising from above the middle of the back of the lemma
- Culm, strongly pubescent with soft downward pointing hairs
- Nitrophilous habitats, disturbed areas, mineral soils, generally dry habitats.

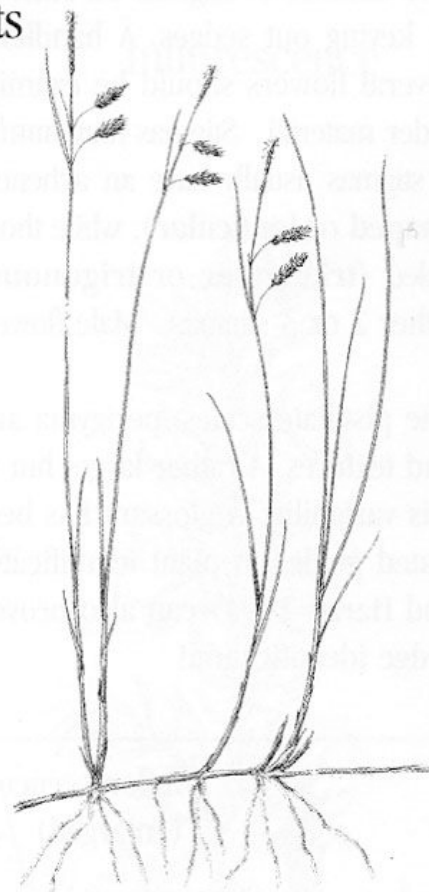


Sedges

Growth Habits



Tufted (cespitose)
*Culms tufted
or clumped*

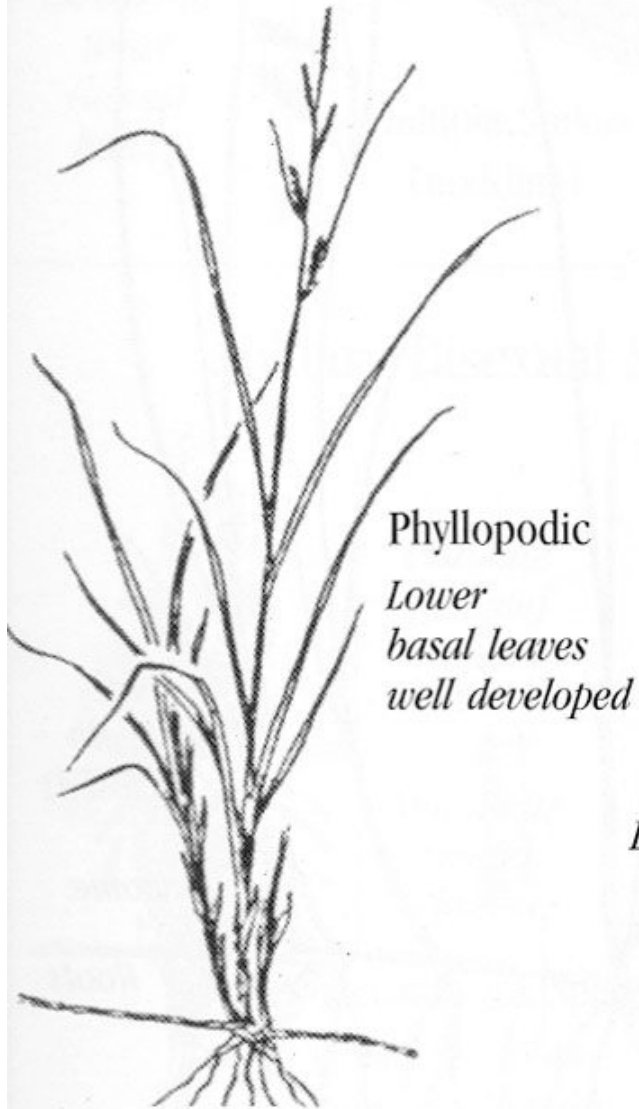


Rhizomatous
*Culms arising singly or
a few together*

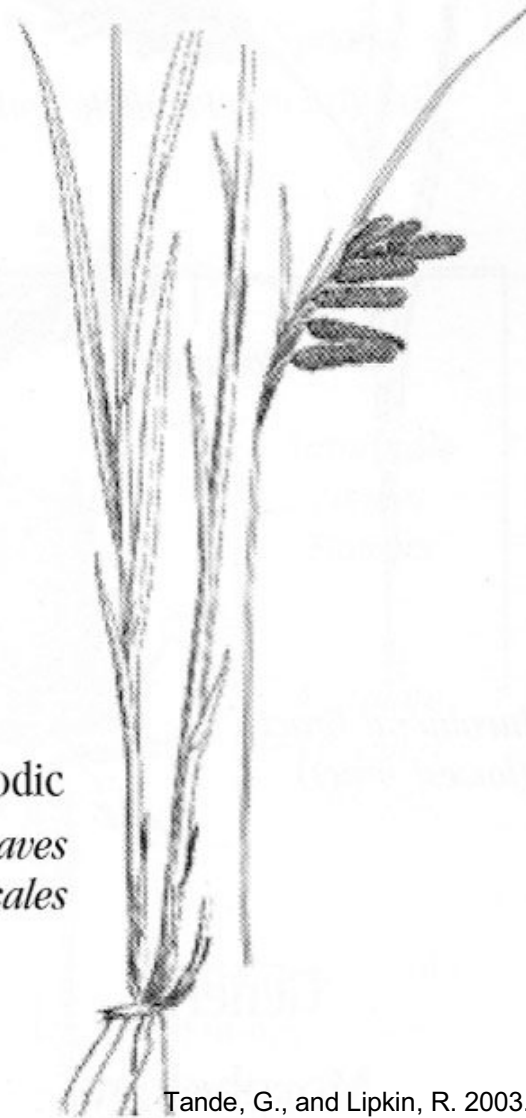
Tande, G., and Lipkin, R. 2003. Wetland Sedges of Alaska. Alaska Natural Heritage Program, Anchorage

Sedges

Basal Leaves

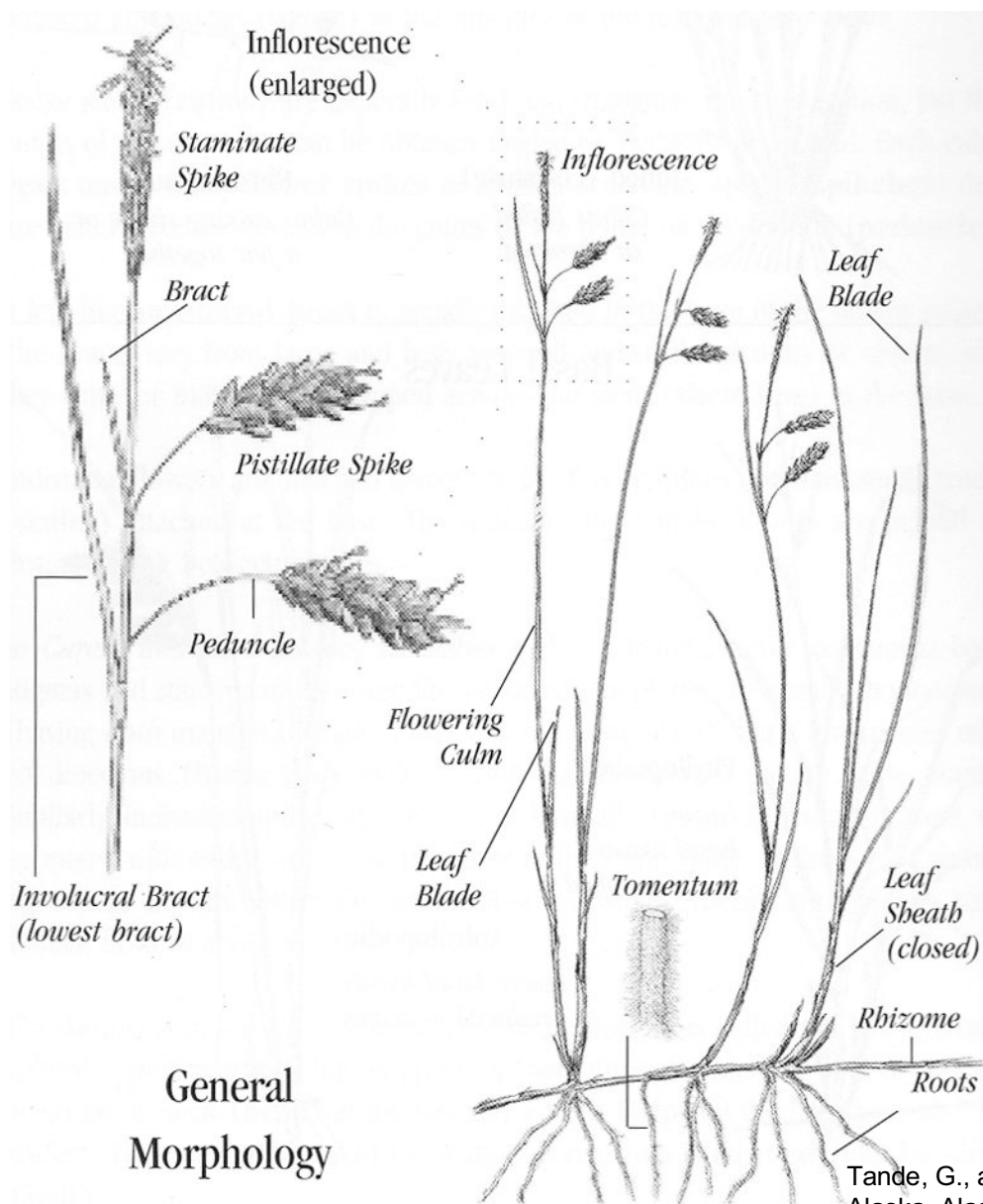


Aphylopodic
Lower basal leaves reduced to scales



Tande, G., and Lipkin, R. 2003. Wetland Sedges of Alaska. Alaska Natural Heritage Program, Anchorage

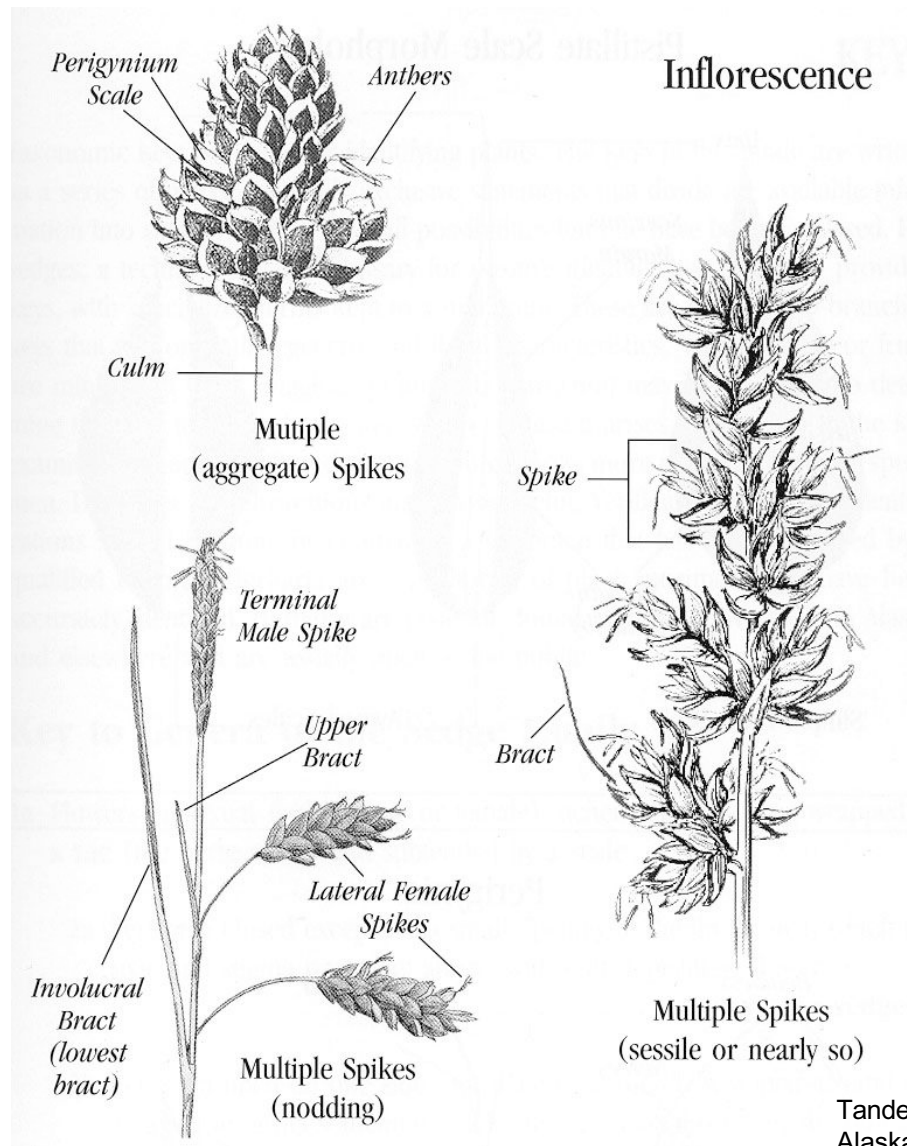
Sedges



Tande, G., and Lipkin, R. 2003. Wetland Sedges of Alaska. Alaska Natural Heritage Program, Anchorage

Sedges

Morphology of the Spikes

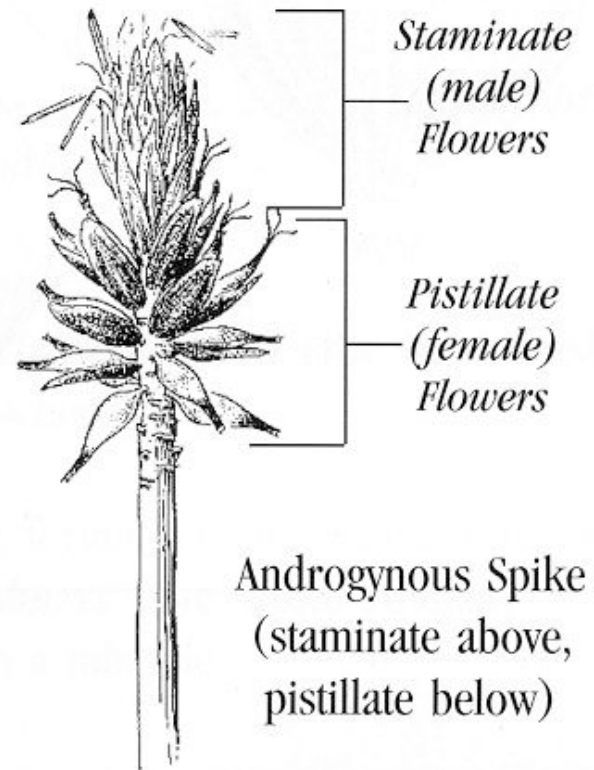
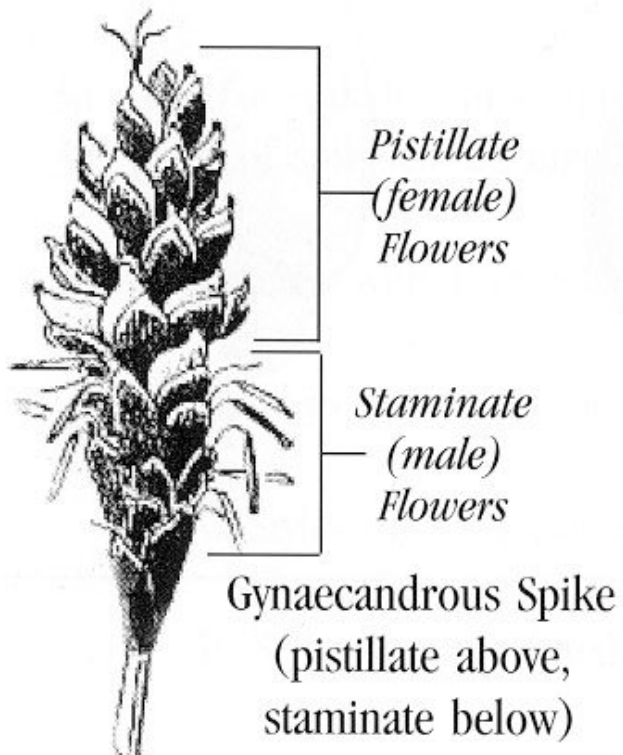


Tande, G., and Lipkin, R. 2003. Wetland Sedges of Alaska. Alaska Natural Heriage Program, Anchorage

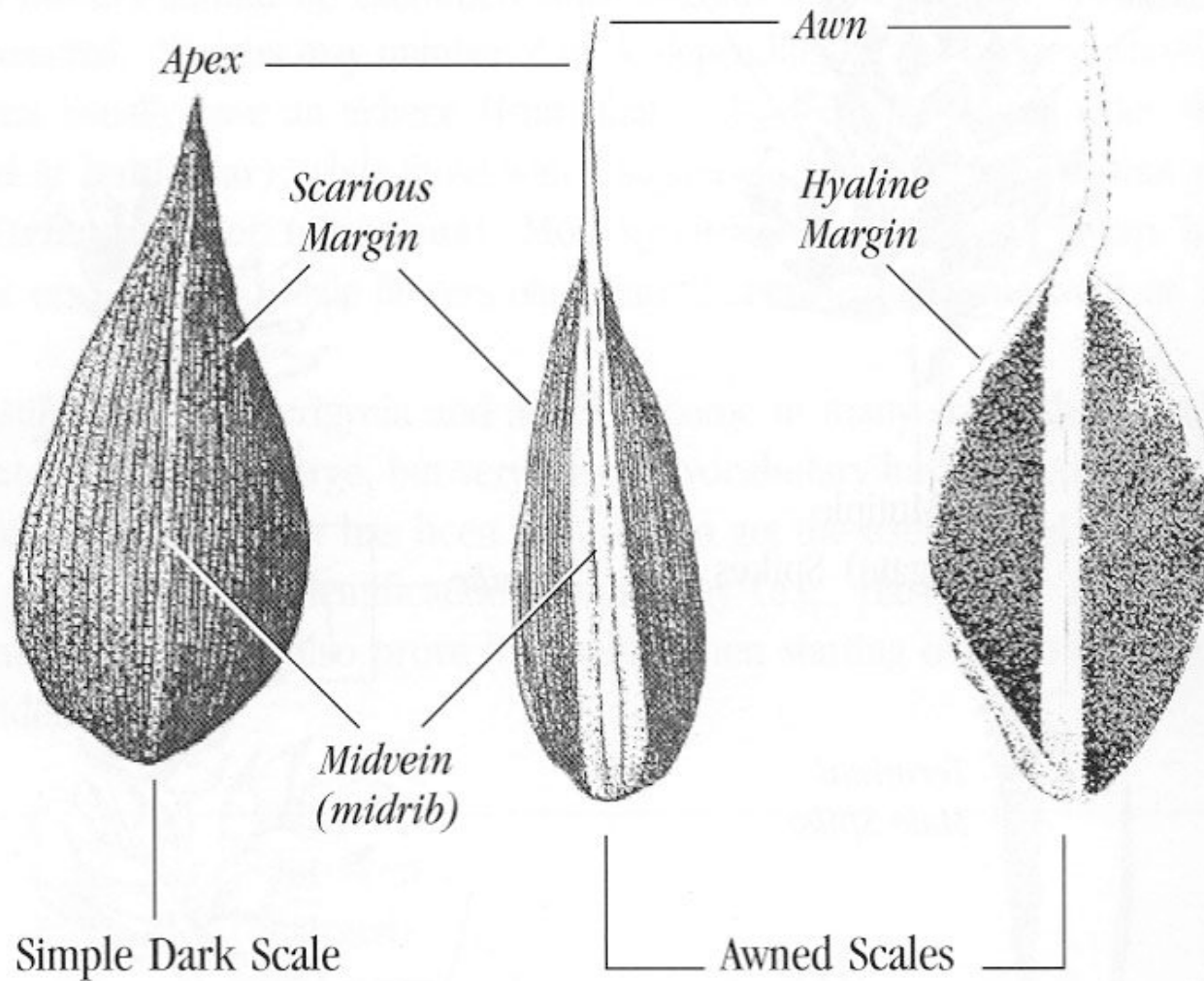
Sedges

Morphology of the Spikes

Solitary Bisexual Spikes

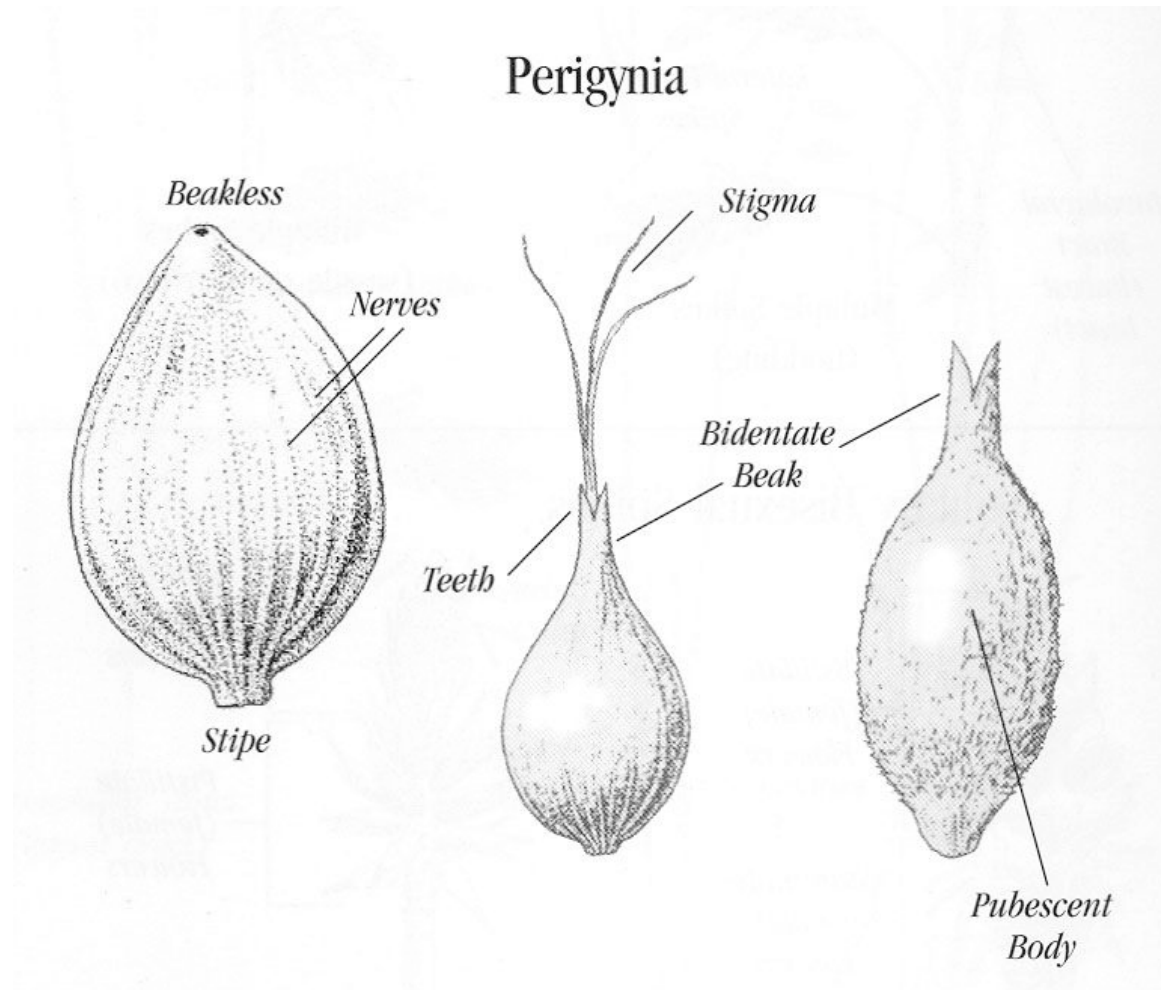


Pistillate Scale Morphology



Sedges

Morphology of the Perigynium



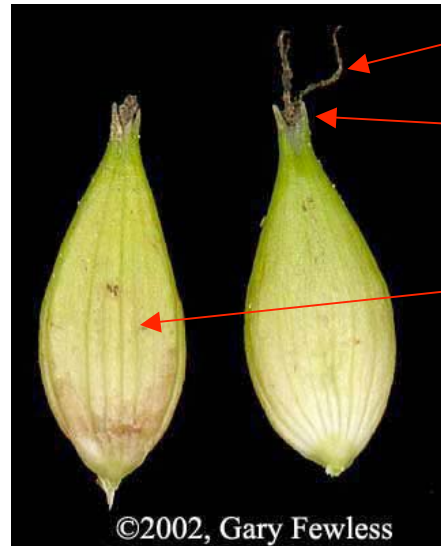
Morphology of *Carex* (Cyperaceae)

Pistillate Spike



Perigynium (sac enclosing the female flower, and eventually the achene or seed)

Pistillate bract or scale



Stigmas

Bidentate beak

Nerves on
perigynium

©2002, Gary Fewless

Perigynia

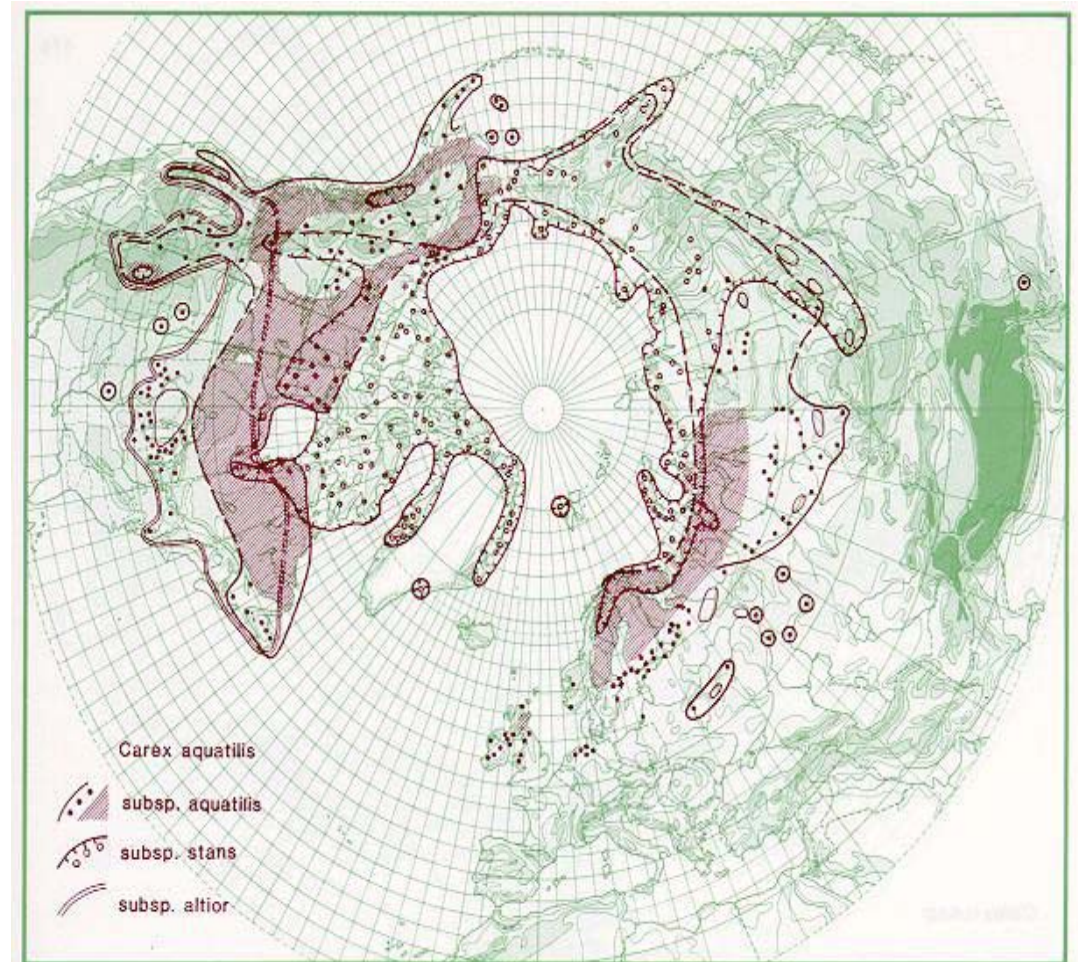
Carex aquatilis (slide 1 / 2)

Family: Cyperaceae

Common Name: Water or Aquatic Sedge



Photo from Alaska Geobotany Center, UAF

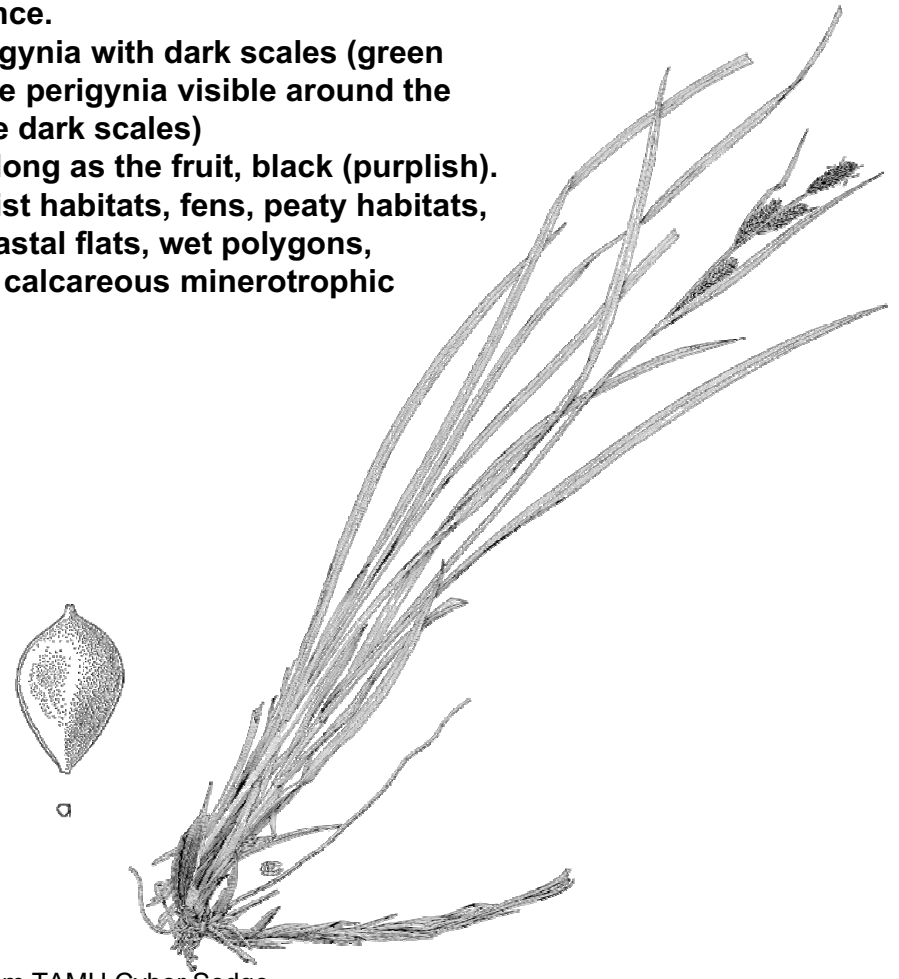


RANGE : Figure from Den virtuella floran website

Carex aquatilis (slide 2 / 2)



- Rhizomatous
- Conspicuous leaf-like bract at base of inflorescence often exceeding length of inflorescence.
- Green perigynia with dark scales (green sides of the perigynia visible around the edges of the dark scales)
- Scales as long as the fruit, black (purplish).
- Wet to moist habitats, fens, peaty habitats, tundra, coastal flats, wet polygons, somewhat calcareous minerotrophic habitats.

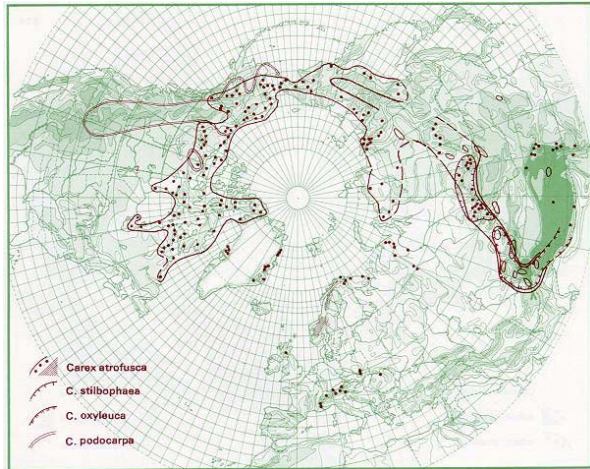


Figures from TAMU Cyber Sedge

Carex atrofusca (slide 1 / 2)

Family: Cyperaceae

Common Name: Dark-brown Sedge

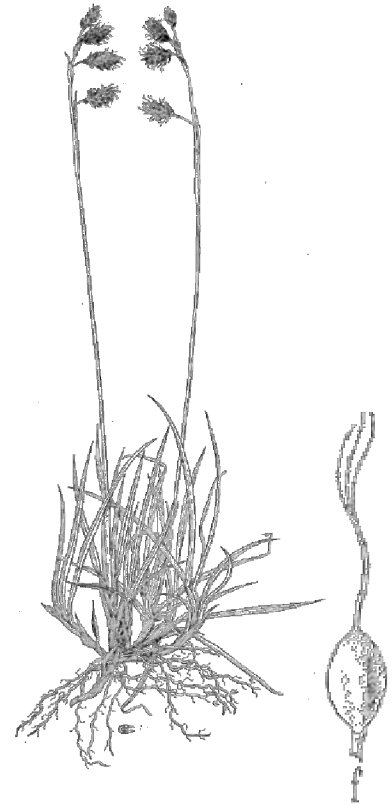


www.mun.ca/.../delta/arcticf/poa/www/poalal.htm

Carex atrofusca (slide 2 / 2)



- 2-4 spikes
- Lateral spikes on pedicels
- Terminal spike staminate, lateral spikes pistillate
- Perigynia with a long bidentate beak, flattened, dull
- Scales as long as the perigynia, black



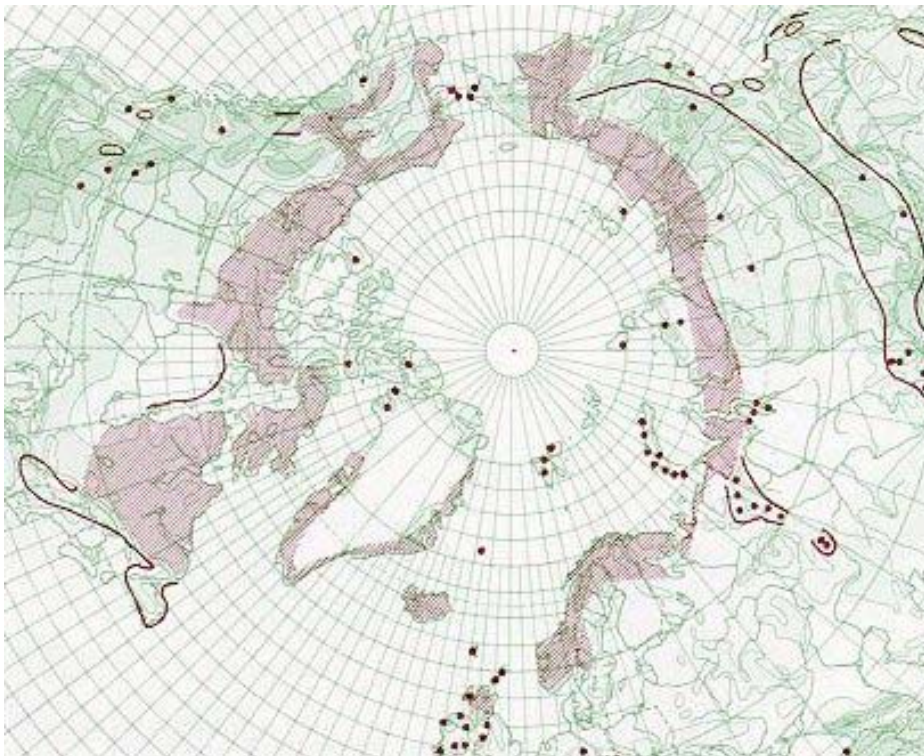
Figures from TAMU Cyber Sedge

Carex bigelowii (slide 1 / 3)

Family: Cyperaceae

Common Name:

Rigid, Stiff or
Bigelow's Sedge



RANGE : Figure from Den virtuellan floran website



Photo from www.sci.muni.cz

Carex bigelowii (slide 2 / 3)



- Rhizomatous
- Culms triangular, scabrous
- Leaf or reduced bract at base of inflorescence, two lack auricles at the base of the bract
- Terminal spike staminate, lateral spikes mostly pistillate
- Perigynia green sometimes with purple spots at apex
- Scales shorter than the perigynia, with light brown or green midvein

Carex bigelowii (slide 3 / 3)



Foto: Arne Anderberg



Foto: Arne Anderberg

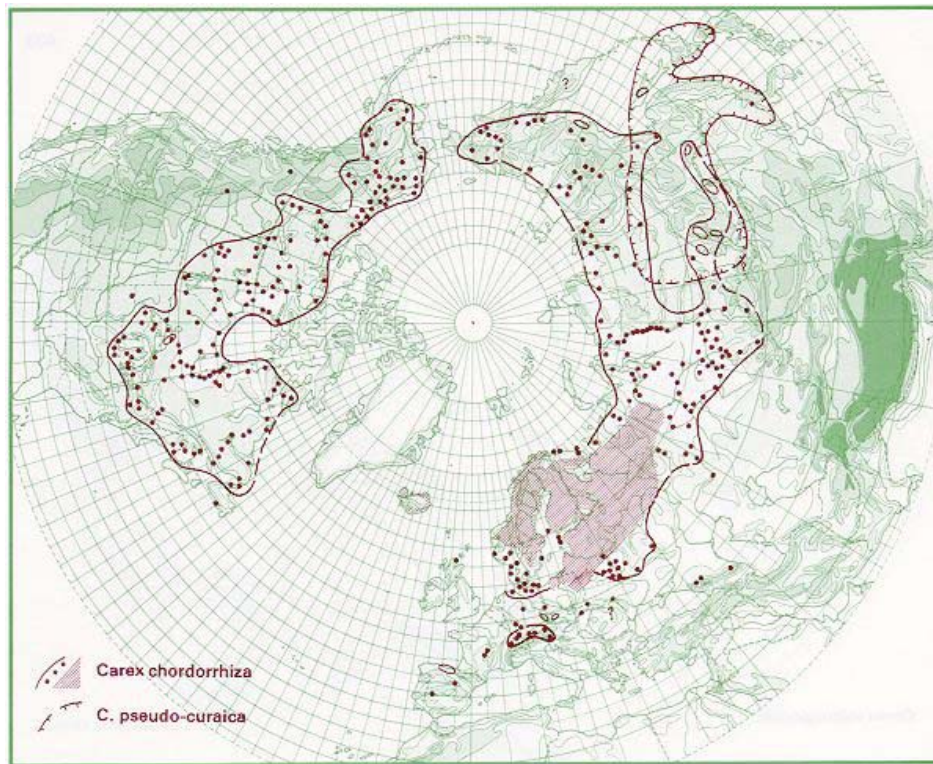


Photo from Provincial Museum of Newfoundland and Labrador website

Carex chordorrhiza (slide 1 / 2)

Family: Cyperaceae

Common Name:
Creeping Sedge or
Cordroot Sedge



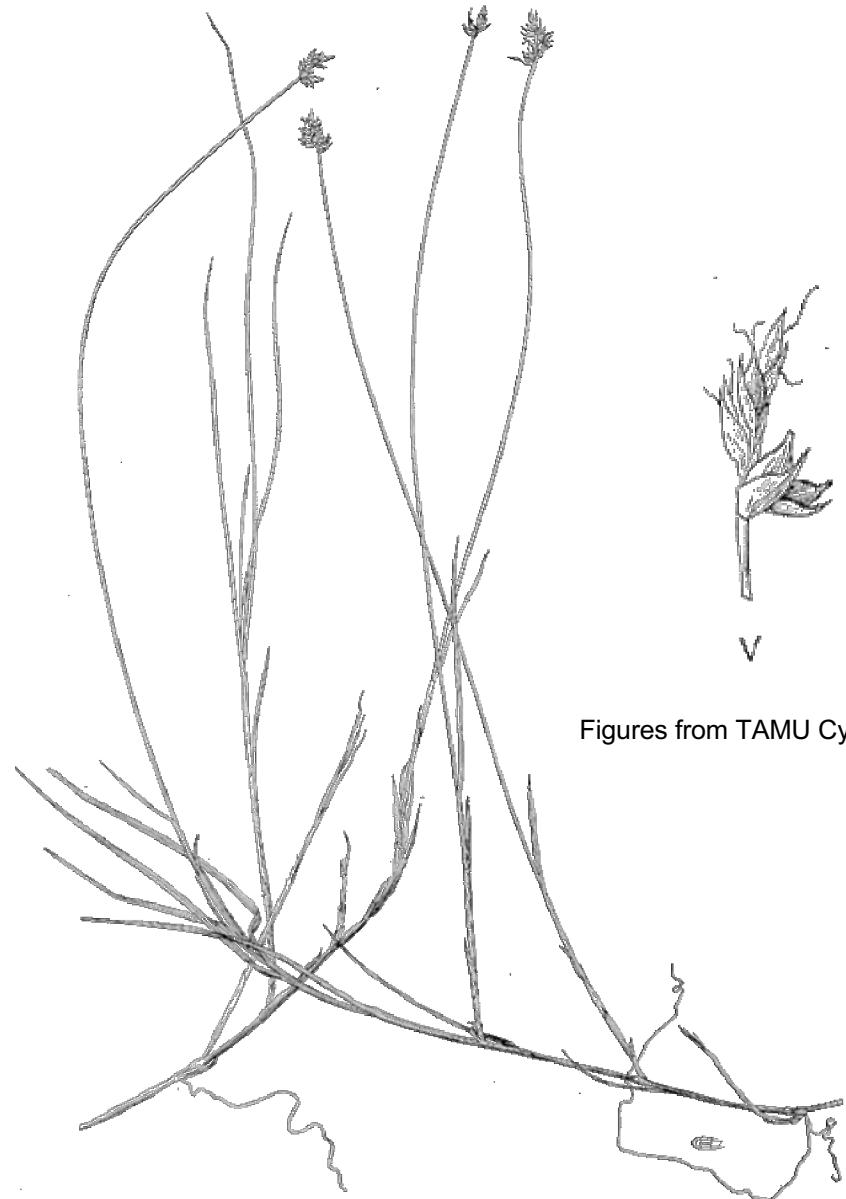
RANGE : Figure from Den virtuella floran website



Carex chordorrhiza (slide 2 / 2)



- Wet habitats
- Cord-like stolons
- 2-8 spikes closely aggregated into a small ovoid head



Figures from TAMU Cyber Sedge

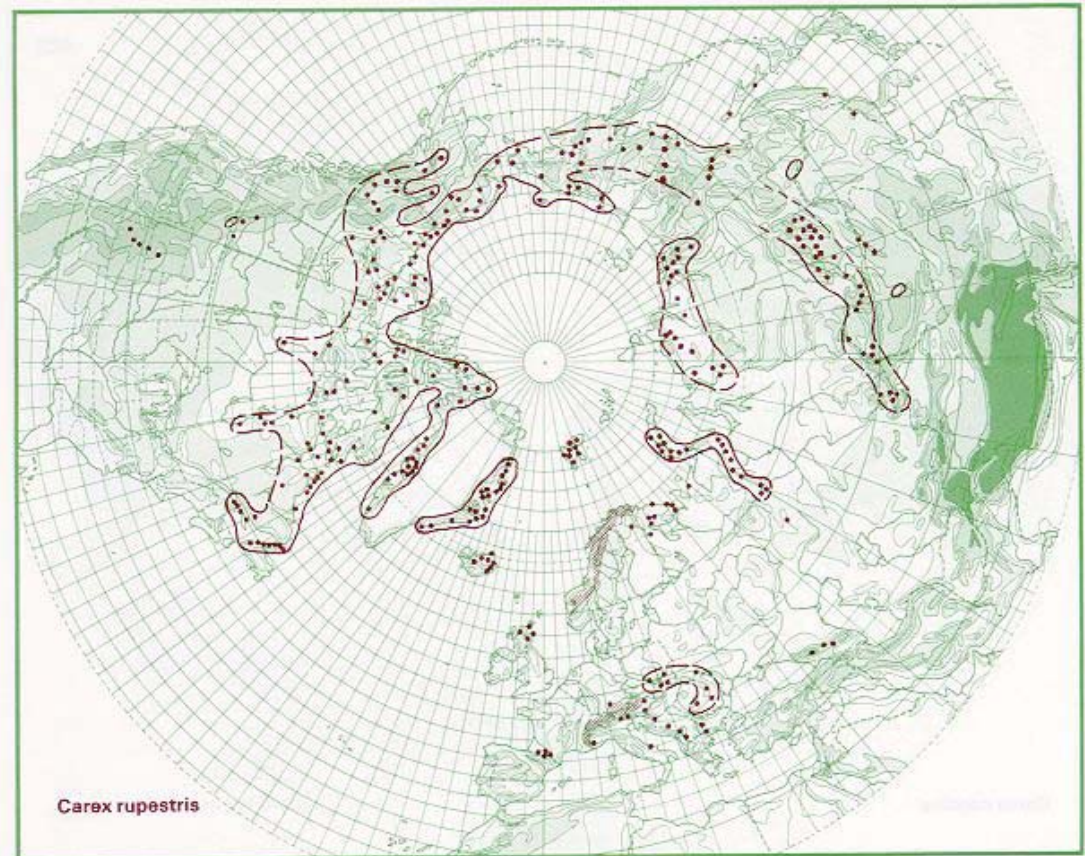
Carex rupestris (slide 1 / 3)

Family: Cyperaceae

Common Name:
Rock Sedge



Photo by Olaf I. ROENNING



RANGE : Figure from Den virtuella floran website

Carex rupestris (slide 2 / 3)



Carex rupestris (slide 3 / 3)



Foto: Anna-Lena Anderberg



Figures from TAMU Cyber Sedge

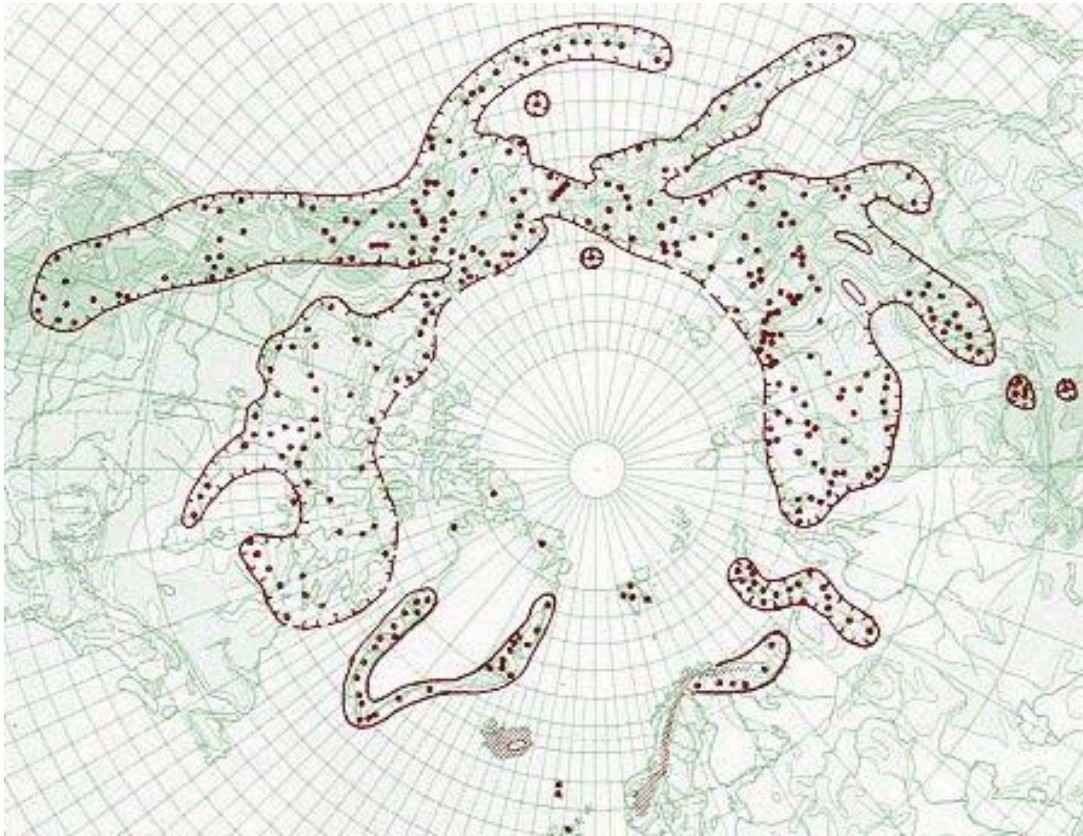
**An Illustrated Flora of the Northern United States, Canada
and the British Possessions: From...**by Nathaniel Lord Britton,
Addison Brown

- **Dry habitats**
- **3 stigmas**
- **Curly leaves**
- **Single androgynous spike (males at the top)**
- **Few pistillate flowers at base**

Carex saxatilis (slide 1 / 3)

Family: Cyperaceae

Common Name: Russet or Rocky Sedge



RANGE : Figure from Den virtuella floran website



Photo from Den virtuella floran website

Carex saxatilis (slide 2 / 3)

- Plants caespitose, rhizomatous
- Terminal spike staminate, with leaves sweeping upward from the base
- Lateral spikes on pedicels, pendate (drooping in maturity)
- Perigynium is shiny dark brown or black broadly ovate or nearly spherical
- 2 stigmas
- Floral scales shorter than perigynia



Figures from TAMU Cyber Sedge

Carex saxatilis (slide 3 / 3)



Carex subspathacea (slide 1 / 2)

Family: Cyperaceae

Common Name: ?



Photo from Flora of the Canadian Arctic Archipelago



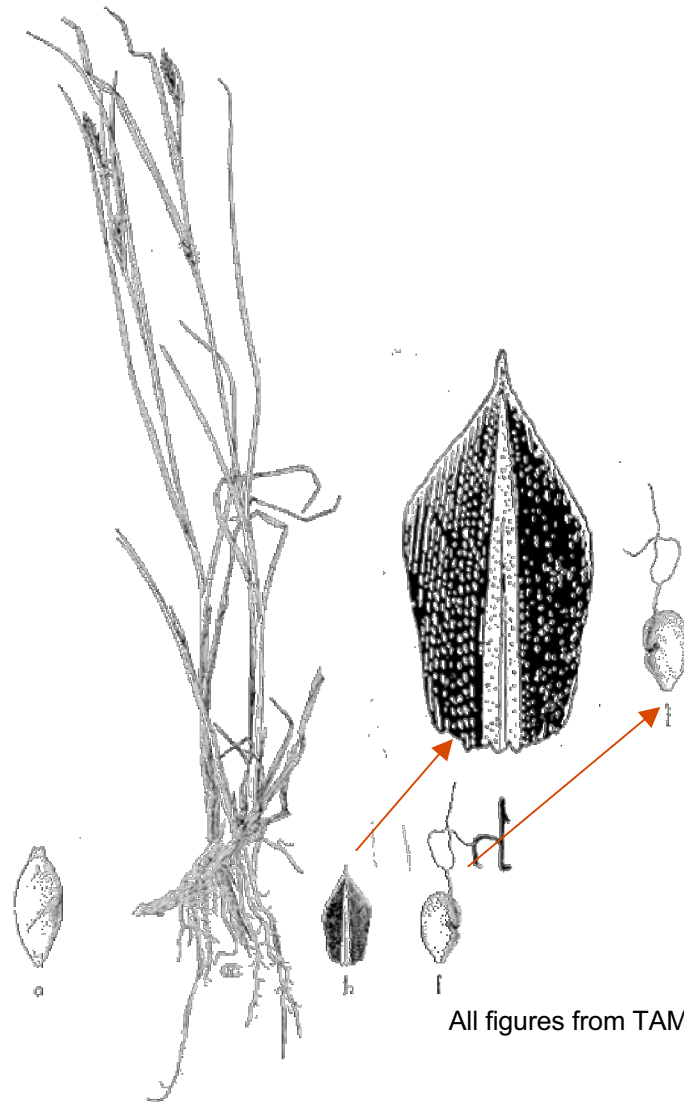
Figure from USDA Plants Database



Photo from Flora of the Canadian Arctic Archipelago

Carex subspathacea (slide 2 / 3)

- Saline habitats
- Turf forming, low growing (2-15 cm), ground level stems, rhizomatous
- Spikes often hidden among the leaves
- Perigynium with pale midvein
- Multispicate, terminal spike staminate
- Preferred forage for snow geese along with *Puccinellia phyganodes*



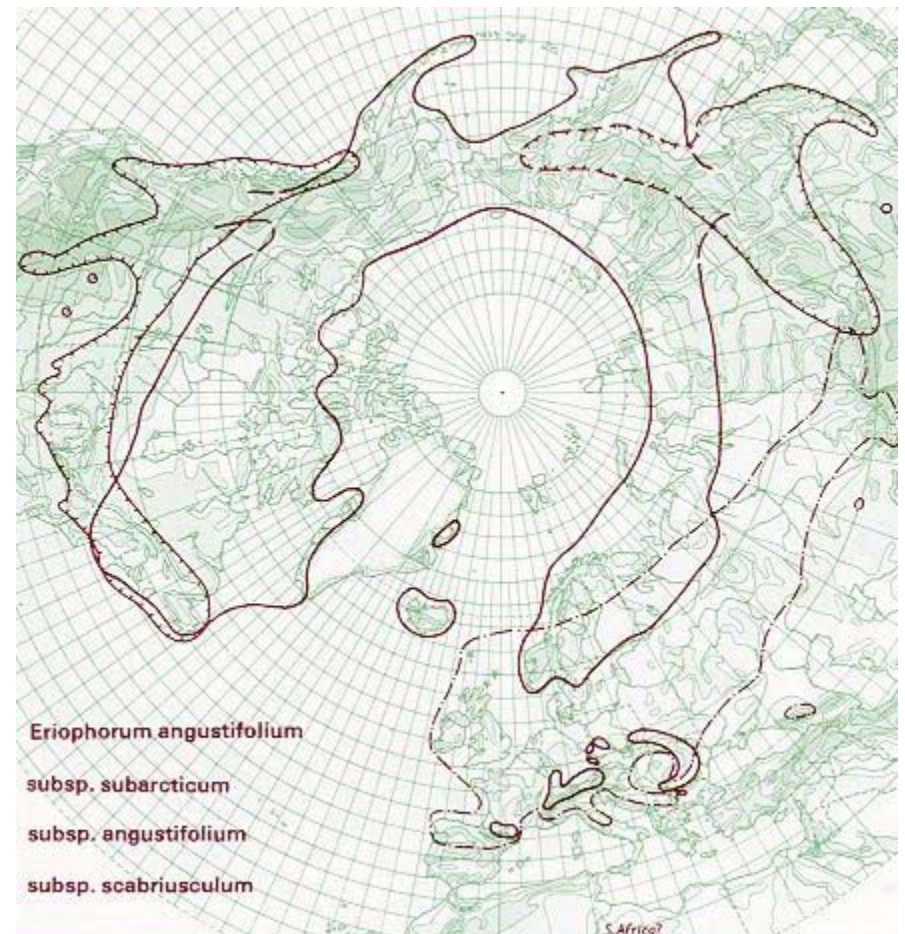
All figures from TAMU Cyber Sedge



Eriophorum angustifolium (slide 1 / 3)

Family: Cyperaceae

Common Name:
Common, Tall or
Narrow-leaf Cottongrass



RANGE : Figure from Den virtuella floran website

Eriophorum angustifolium (slide 2 / 3)



Eriophorum angustifolium (slide 3 / 3)

- Cottongrass with white bristles (the perianth) in maturity
- Several pendant spikes
- Leaf margins fused at the apex

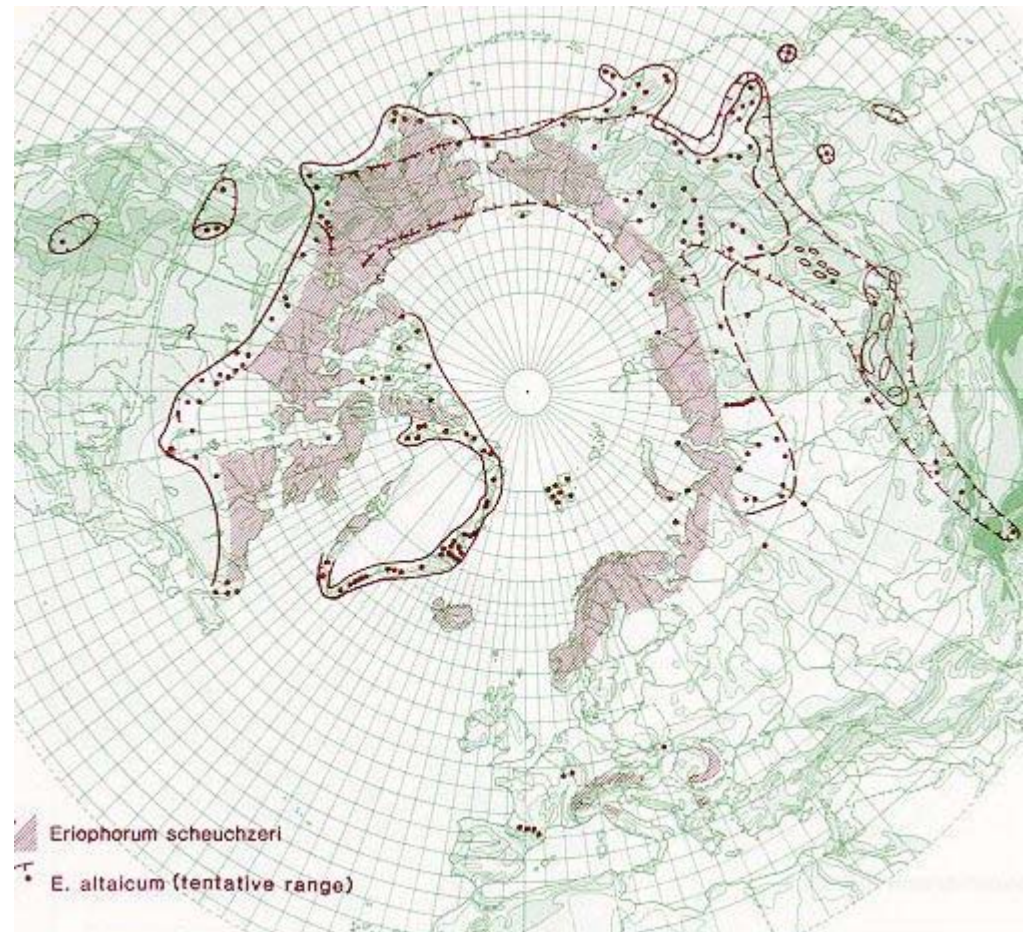


Foto: Arne Anderberg

Eriophorum scheuchzeri (slide 1 / 2)

Family: Cyperaceae

Common Name: Scheuchzer's or
Arctic Cottongrass



RANGE : Figure from Den virtuella floran website

Eriophorum scheuchzeri (slide 2 / 2)

- Single stem with single terminal ovoid spike
- Anthers 0.5-1mm long
- Wet meadows, calcareous mineral sites, also in fens

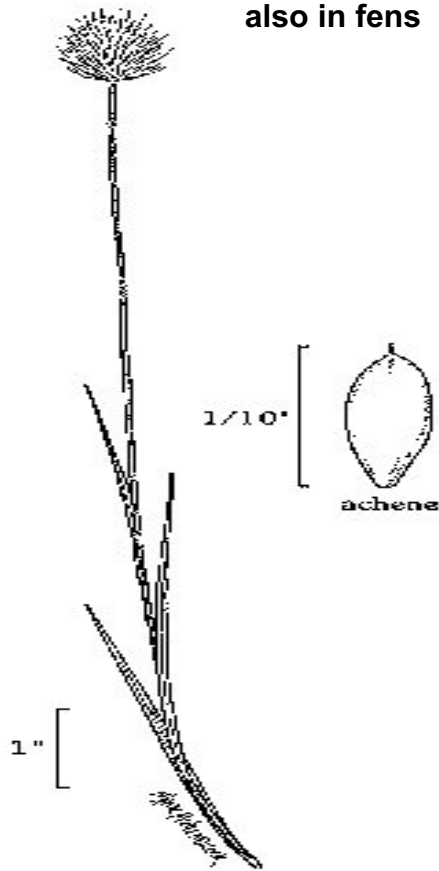


Figure from USGS Northern Prairie Wildlife Research Center website



Photo from Den virtuella floran website

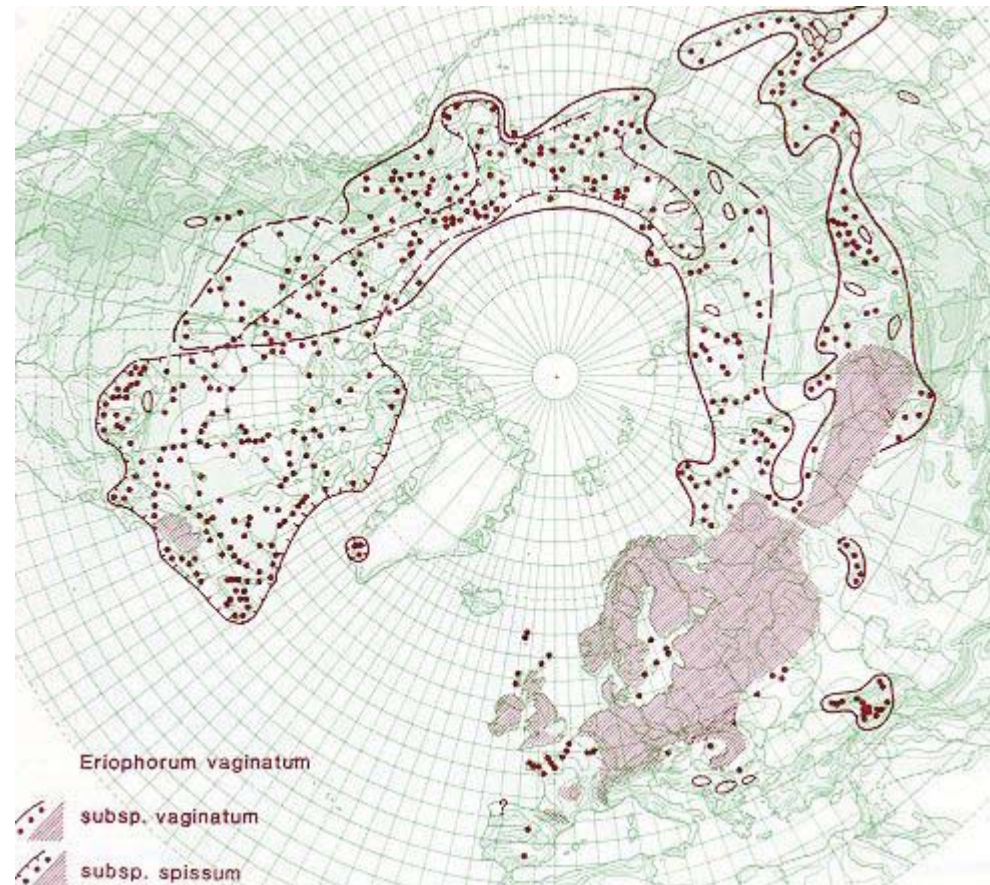
Eriophorum vaginatum (slide 1 / 2)

Family: Cyperaceae

Common Name:

Sheathed Cottongrass

Hare's Tail



RANGE : Figure from Den virtuella floran website

Eriophorum vaginatum (slide 2 / 2)

- Plants caespitose, tussock forming
- Single spike

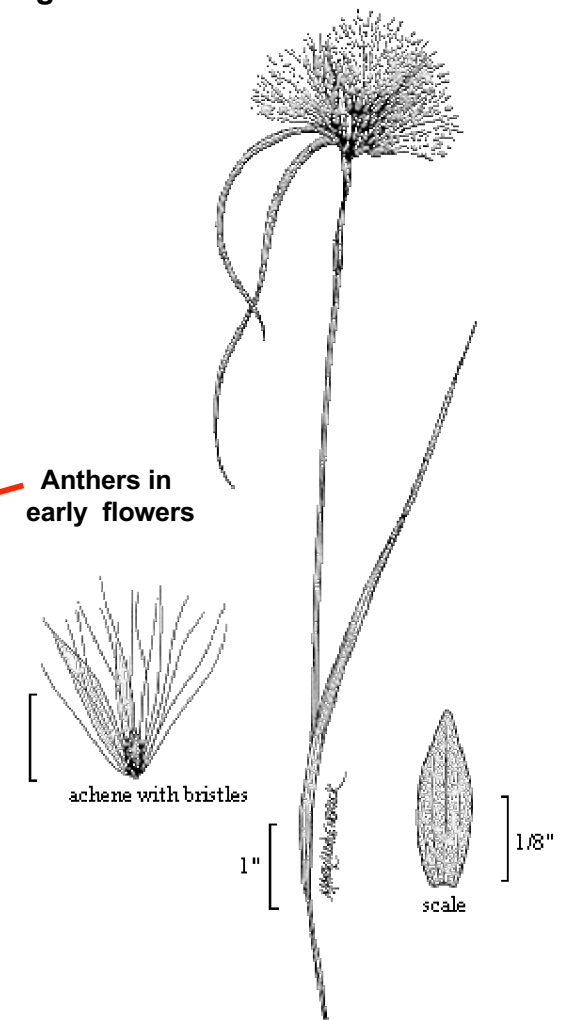


Figure from USGS Northern Prairie Wildlife Research Center website

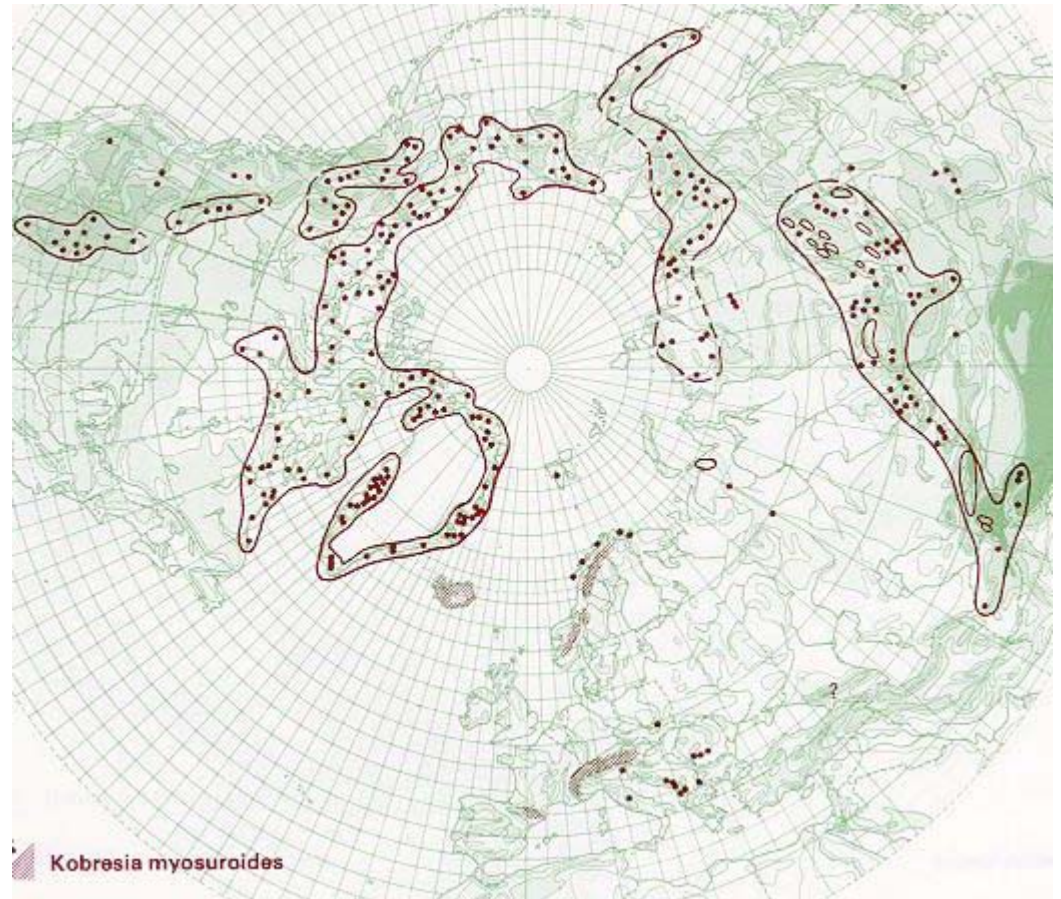
Kobresia myosuroides (slide 1 / 2)

Family: Cyperaceae

Common Name: Bellard's Kobresia



Photo from Den virtuella floran website



RANGE : Figure from Den virtuella floran website

Kobresia myosuroides (slide 2 / 2)



USDA Plants Database

- *Kobresia* is very similar to *Carex* except that the perigynium is open on one side (the primordial leaf is not fully fused to form the bottle-shaped perigynium as in *Carex*).
- Single spike
- Low growing (3-20 cm tall)
- Tightly caespitose
- Dry calcareous habitats with *Dryas*, but also sands, and in somewhat wet sites, fens

Juncaceae (Rushes)

- Round solid stems
- Flowers concentrated in terminal inflorescence
- Flowers lily-like: 3 sepals, 3 petals, 2-6 stamens, pistil with 3 styles
 - *Juncus* (Rush)
 - Continuation of “stem” above the inflorescence is a bract
 - Flowers very lilly-like
 - Smooth stem
 - Narrow, linear leaves
 - Flowers with many seeds
 - *Luzula* (Woodrush)
 - Leaves broader, flat, with widely spaced hairs
 - Flowers have 3 seeds

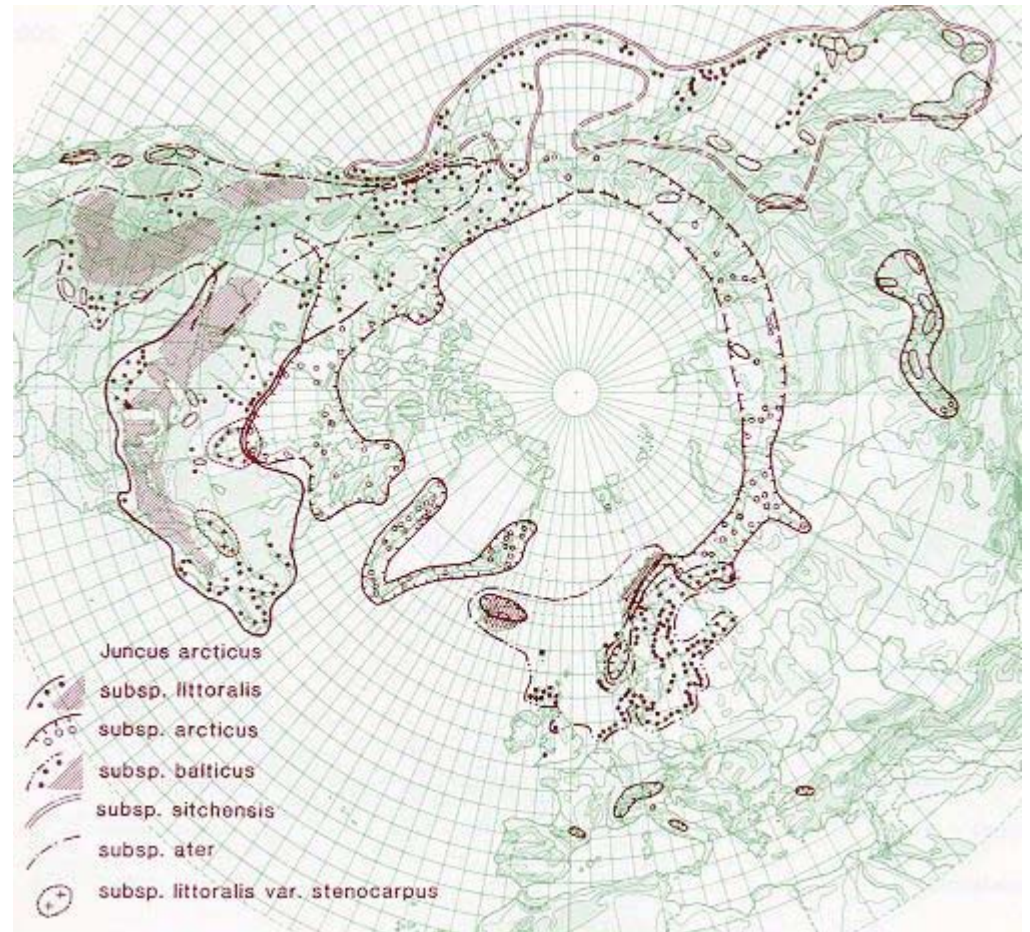
Juncus arcticus (slide 1 / 2)

Family: Juncaceae

Common Name:
Arctic Rush



Photo from Den virtuella floran website



RANGE : Figure from Den virtuella floran website

Juncus arcticus (slide 2 / 2)



Photo from Flora of the Canadian Arctic Archipelago



Foto: Anders Jacobson

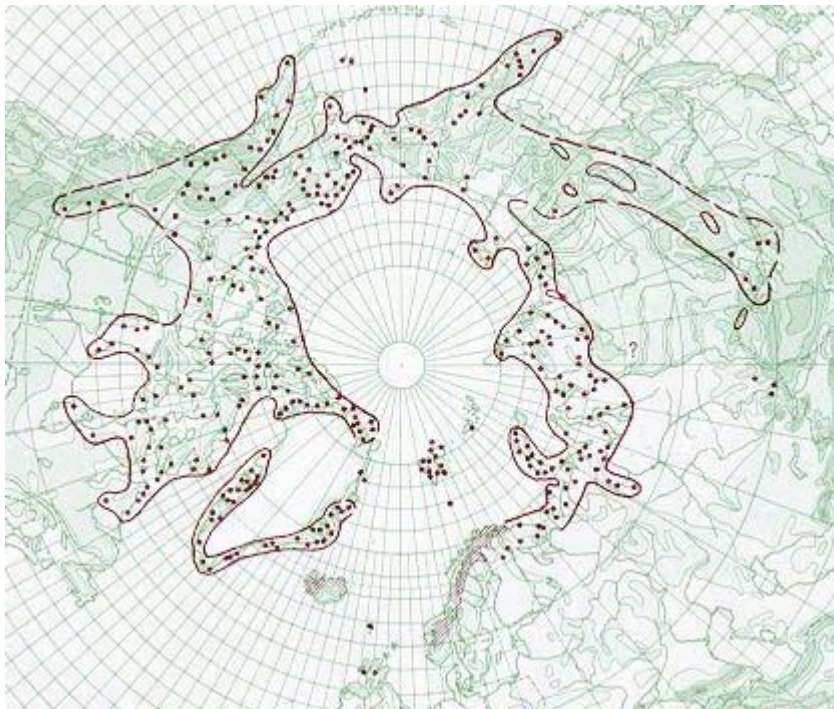


Photo: Den virtuella floran

Juncus biglumis (slide 1 / 2)

Family: Juncaceae

Common Name:
Two-flowered Rush



RANGE : Figure from Den virtuella floran website

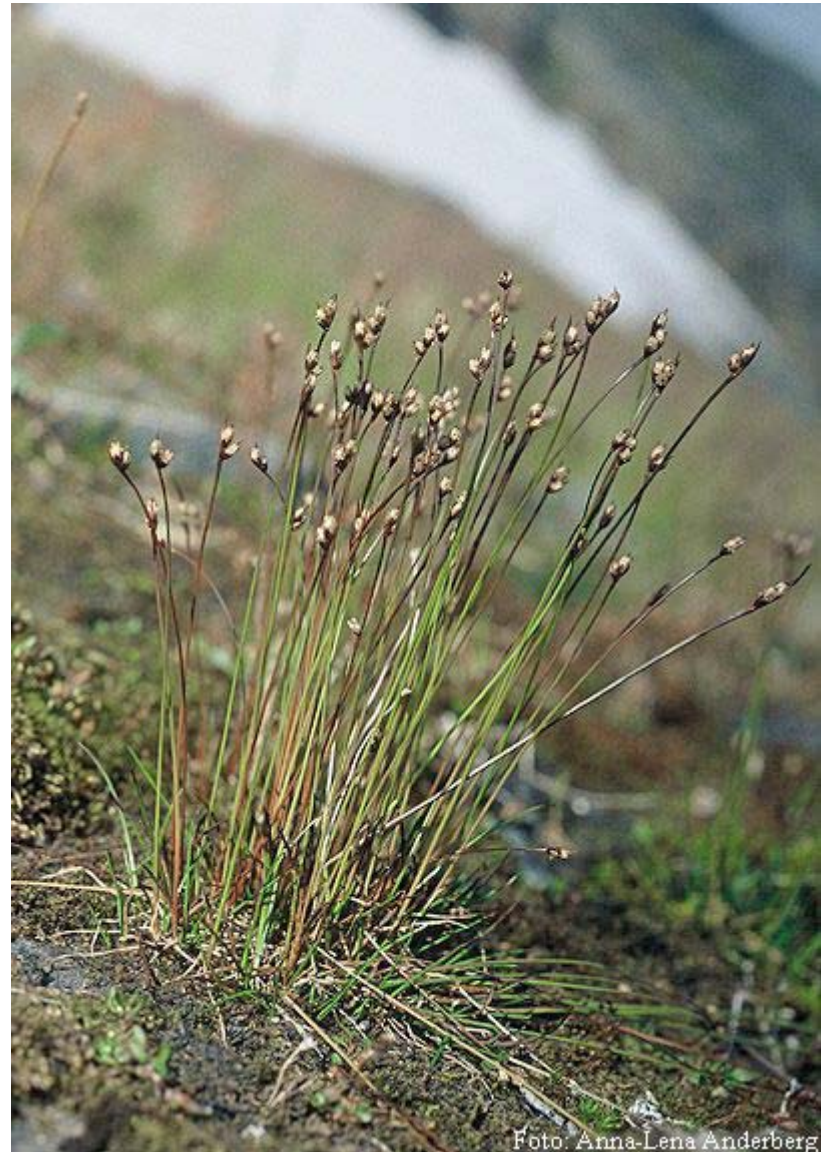


Foto: Anna-Lena Anderberg

Juncus biglumis (slide 2 / 2)

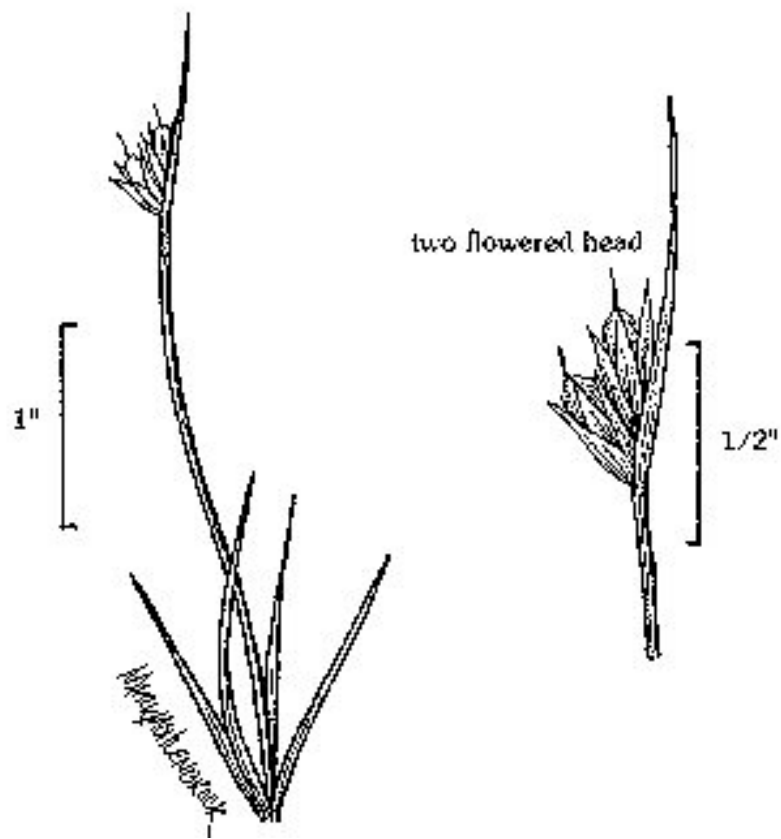


Figure from USGS Northern Prairie Wildlife Research Center website



Photos from Den virtuella floran website

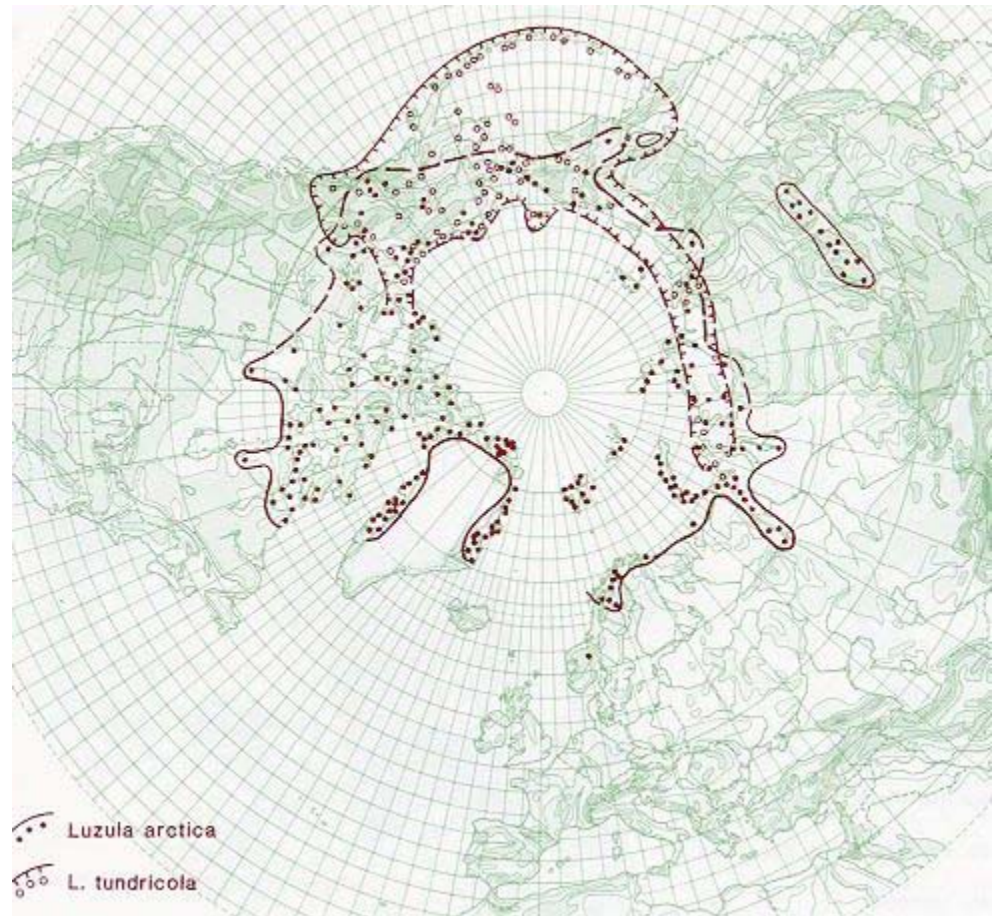
Luzula arctica

Family: Juncaceae

Common Name:
Snow or Arctic Wood Rush



Photo from Den virtuella floran website

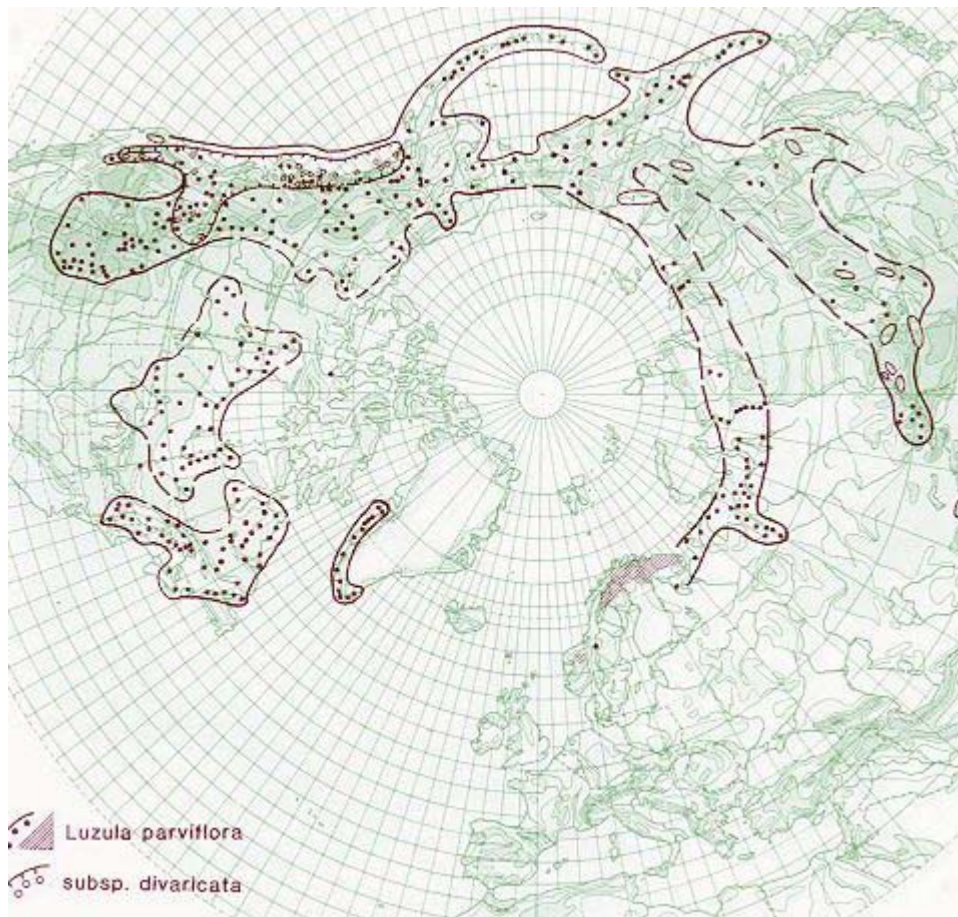


RANGE : Figure from Den virtuella floran website

Luzula parviflora (slide 1 / 2)

Family: Juncaceae

Common Name:
Small-flowered Wood Rush



RANGE : Figure from Den virtuella floran website



Luzula parviflora (slide 2 / 2)



Photo from Provincial Museum of Newfoundland and Labrador

Luzula confusa

Family: Juncaceae

Common Name: Small-flowered Wood Rush



Photo from www.rolv.no