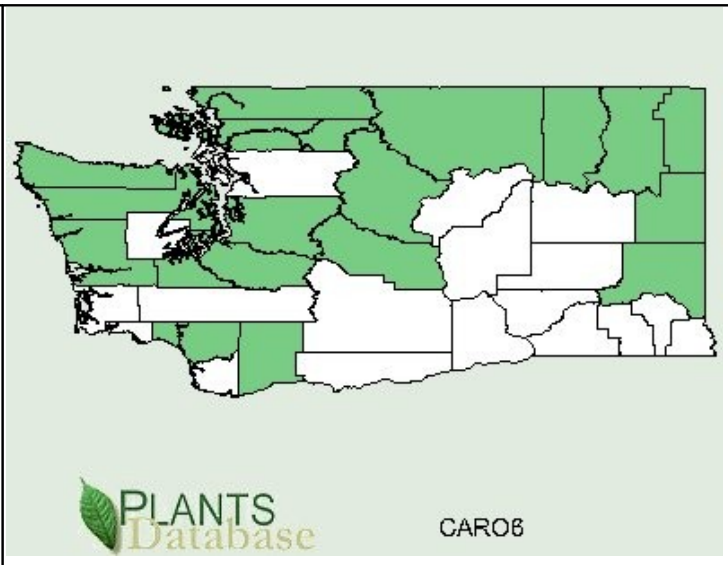
Plant Propagation Protocol for *Carex rostrata*
ESRM 412 – Native Plant Production

TAXONOMY	
Family Names	
Family Scientific Name:	Cyperaceae
Family Common Name:	Sedge
Scientific Names	
Genus:	*Carex*
Species:	*rostrata*
Species Authority:	Stokes
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	
Common Synonym(s) (include full scientific names (e.g., *Elymus glaucus* Buckley), including variety or subspecies information)	CAROA2 *Carex rostrata* Stokes var. *ambigens* Fernald CAROU *Carex rostrata* Stokes var. *utriculata* (Boott) L.H. Bailey This variety is *Carex utriculata* Boott CAUT
Common Name(s):	Beaked sedge, sometimes Bottle sedge
Species Code (as per USDA Plants database):	CARO6
GENERAL INFORMATION	
Geographical range (distribution maps for North America and Washington state)	 (http://plants.usda.gov/java/profile?symbol=CARO6)

	 (http://plants.usda.gov/java/profile?symbol=CARO6)
Ecological distribution (ecosystems it occurs in, etc):	In North America it can be found in riparian communities; subarctic, boreal, and north-temperate wetlands; and wet subalpine meadows. (Anderson 2008)
Climate and elevation range	Found at a variety of elevations, up to the timberline in some cases. (Anderson 2008)
Local habitat and abundance; may include commonly associated species	Nebraska sedge (*C. nebrascensis*), leafy tussock sedge (*C. aquatilis*), smallwinged sedge (*C. microptera*), wheat sedge (*C. atherodes*), woollyfruit sedge (*C. lasiocarpa*), mountain sedge (*C. scopulorum*), analogue sedge (*C. simulata*), and blister sedge (*C. vesicaria*) bluejoint reedgrass (*Calamagrostis canadensis*), tufted hairgrass (*Deschampsia cespitosa*), spotted water hemlock (*Cicuta maculata*), fowl mannagrass (*Glyceria striata*), creeping bentgrass (*Agrostis stolonifera*), Baltic rush (*Juncus balticus*), and Kentucky bluegrass (*Poa pratensis*) (Anderson 2008)
Plant strategy type / successional	Early pinoeer species in conditions with mineral soils

stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	and continuously high water tables. (Anderson 2008)
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	Strongly rhizomatous grass like perennial that often forms dense colonies. (Anderson 2008)
PROPAGATION DETAILS	
Ecotype :	No information
Propagation Goal:	Plants
Propagation Method (Options: Seed or Vegetative):	Seed
Product Type:	Container
Stock Type:	10 cubic inch conetainer
Time to Grow:	3 months
Target Specifications:	Well developed roots filling the volume of container.
Propagule Collection:	Hand collected seed, using shears or hand scythe. Seeds ripen from August to September and are hard and brown when mature.(Anderson 2008)(Tilley 2010)
Propagule Processing/Propagule Characteristics:	Fresh seed germinates best. Dry/cold stored seeds loose viability. The long term storage (< 2.5 years) is best done under wet/cold conditions.(Anderson 2008) Seed heads are air dried in paper bags prior to processing with a hammer mill with a .25 inch screen. Seed can then be cleaned with a 1.80mm screen followed by a 1.55mm screen. 95% purity is commonly achieved.(Tilley 2010) 440,000 seeds/lb with perigynium 535,000 seeds/lb with perigynium removed
Pre-Planting Propagule Treatments:	Cold/wet stratification at 4°C for 30 days..(Tilley 2010) Alternately fresh seed can be alternated between 10°C and 24°C to improve germination rates. (Anderson 2008)
Growing Area Preparation / Annual Practices for Perennial Crops):	No information
Establishment Phase:	Seeds should be planted in a 1:1:1 mix of coir, compost, and perlite. The seeds can be planted directly from stratification, or air dried for easier handling. Seeds should be pressed into the surface of substrate and misted for 2 minutes hourly from 9am to 5pm. Temperatures can range from a low of 30°C to a high of 43°C. .(Tilley 2010)
Length of Establishment Phase:	17-19 days

Active Growth Phase:	Fertilize weekly with a 15-30-15 plant food. After day thirty misting should be increased to 3 minutes per hour and the maximum temperature lowered to 30-32°C. (Tilley 2010)
Length of Active Growth Phase:	3 months
Hardening Phase:	Match greenhouse temperature to local conditions. Watering should be discontinued three days prior to delivery date.
Length of Hardening Phase:	No information
Harvesting, Storage and Shipping:	No information
Length of Storage:	No information
Guidelines for Outplanting / Performance on Typical Sites:	Hand planting or dibbling into moist soil or standing water. 100% establishment is common.
Other Comments:	*Carex utriculata* has been commonly misidentified as *Carex rostrata*. (Care should be taken to verify seed source identity.
INFORMATION SOURCES	
References (full citations):	Tilley, Derek James 2010. Propagation protocol for production of container *Carex rostrata* Stokes plants (10 cubic inch conetainer); USDA NRCS - Aberdeen Plant Materials Center, Aberdeen, Idaho. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 19 April 2011). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery. Anderson, Michelle D. 2008. Carex rostrata, C. utriculata. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2011, April 19]. "PLANTS Profile"*Carex rostrata* Stokes beaked sedge http://plants.usda.gov/java/profile?symbol=CARO6 (Accessed 19 April 2011) Budelsky, Rachel A.; Galatowitsch, Susan M. 1999. Effects of moisture, temperature, and time on seed germination of five wetland Carices: implications for restoration. Restoration Ecology. 7(1): 86-97. [37330] Leck, M. A.; Schutz, W. 2005. Regeneration of Cyperaceae, with particular reference to seed ecology and seed banks. Perspectives in Plant Ecology, Evolution and Systematics. 7(2): 95-133. [61210]

	Jones, Kimberly L.; Roundy, Bruce A.; Shaw, Nancy L.; Taylor, Jeffrey R. 2004. Environmental effects on germination of Carex utriculata and Carex nebrascensis relative to riparian restoration. Wetlands. 24(2): 467-479. [68338] "Beaked Sedge – *Carex rostrata*" http://www.mt.nrcs.usda.gov/technical/ecs/plants/technotes/pmtechnotemt37/beakedsedge.html (Accessed 19 April 2011) Steinfeld, David E 2002. Propagation protocol for production of container *Carex utriculata* plants (Root-trainer 20); USDA FS - J Herbert Stone Nursery, Central Point, Oregon. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 20 April 2011). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery. Rook, Earl JS 2002 "*Carex rostrata* Beaked Sedge" http://www.rook.org/earl/bwca/nature/grass/carexros.html (Accessed 20 April 2010) 1997 "*Carex rostrata* beaked sedge" http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/caro.pdf (Accessed 20 April 2010) Griffiths, G.C.D. 1989. The three *Carex rostrata* (Cyperaceae) in Alberta. Alberta Naturalist 19(3): 105-108. Kovalchik, B.L. and J. Mastrogiuseppe. 1991. First record of the real *Carex rostrata* in Washington. Douglasia 15(3): 3-4. Reznicek, A.A. 1985. What is *Carex rostrata* Stokes? [Abstract] Am. J. Bot. 72: 966.
Other Sources Consulted (but that contained no pertinent information) (full citations):	
Protocol Author (First and last name):	Jennifer J. Abbott
Date Protocol Created or Updated (MM/DD/YY):	04/20/11

Note: This template was modified by J.D. Bakker from that available at:
http://www.nativeplantnetwork.org/network/SampleBlankForm.asp

Prior Protocol:

Plant Data Sheet

Species

Beaked Sedge, Carex rostrata

Range

Alaska to Greenland south to Delaware and west to Kansas, New Mexico, Arizona, and California; also Scandanavia, Iceland, and Eurasia (www.rook.org)

Climate, elevation

The climate is often cool and semiarid, with a mean annual precipitation of 12 inches (300 mm) (www.fs.fed.us). Low to mid-elevation (Pojar and Mackinnon, 1994)

Local occurrence (where, how common)

Very common in perennially wet areas (Pojar and Mackinnon, 1994)

Habitat preferences

Most common in wet meadows, marshes, edges of lakes, ponds, and streams, and other riparian areas (grows best on gentle slopes.) Adapted to a variety of mineral and organic soils with a pH

tolerance range of 3.0-7.9. Grows in areas where water is up to 32" below the soil surface, as well as areas with standing water to 39" deep. Common in recently formed beaver ponds and on sites with a high water table. (www.rook.org).

Plant strategy type/successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)

Facultative Seral Species (www.fs.fed.us). Beaked sedge is a frost-tolerant, prolific seeder and is usually dominant or codominant where it occurs. It has climax ecological status on wet sites of the Cascade Range. Beaked sedge communities have little species diversity, and invasion is limited by the dense rhizome network. Often succeeded by willows (*Salix* spp.), rushes (*Juncus* spp.), and reed grasses (*Calamagrostis* spp.) (www.rook.org).

Associated species

Other common names include: Inflated sedge and Retrose sedge

Also known as *Carex exsiccata*, *Carex vesicaria*, *Carex retrorsa,* and *Carex rostrata* var. *ambigens* (Pojar and Mackinnon

May be collected as: (seed, layered, divisions, etc.)

Division

Collection restrictions or guidelines

Shoots emerge between July and August but may also emerge in the fall. Flora primordia develop in August or September.

Seed germination (needs dormancy breaking?)

Flowers May-August

Seed life (can be stored, short shelf-life, long shelf-life)

Recommended seed storage conditions

Propagation recommendations (plant seeds, vegetative parts, cuttings, etc.)

By division.

Soil or medium requirements (inoculum necessary?)

Installation form (form, potential for successful outcomes, cost)

Recommended planting density

Care requirements after installed (water weekly, water once etc.)

Normal rate of growth or spread; lifespan

Begins producing new green leaves in early spring; growth at this time is rapid. There is a decrease in root biomass, and most energy is allocated to height increment. In July, when almost at its full height, energy allocation is shifted to shoot production. Lifespan is 2-6 years (www.rook.org).

Sources cited

http://www.rook.org/earl/bwca/nature/grass/carexros.html

http://www.fs.fed.us/database/feis/plants/graminoid/carrot/botanical.html

Pojar, Jim and Andrew MacKinnon. 1994. Plants of the Pacific Northwest Coast Washington, Oregon British Columbia & Alaska. BC Ministry of Forests and Lone Pine Publishing, Vancouver, British Columbia, Canada 527 p.

Data compiled by (student name and date)

Lara Johnson, April 8th, 2003