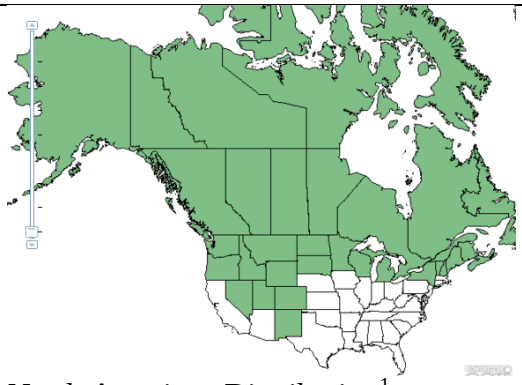
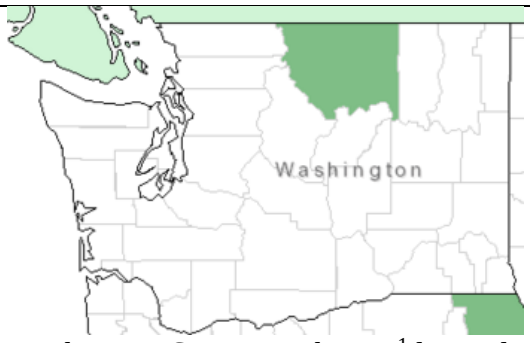
Plant Propagation Protocol for *Carex capillaris* L.
ESRM 412 – Native Plant Production
Protocol URL : http://courses.washington.edu/esrm412/protocols/CACA12.pdf

TAXONOMY	
Plant Family	
Scientific Name	Cyperaceae
Common Name	Sedge family
Species Scientific Name	
Scientific Name	*Carex capillaris* Linnaeus
Varieties	N/A
Sub-species	N/A
Cultivar	N/A
Common Synonym(s)	*Carex boecherina* Á. Löve, D. Löve &Raymond *Carex capillaris* L. ssp. *chlorostachys* (Stev.) Á. Löve, D. Löve &Raymond *Carex capillaris* L. ssp. *robustior* (Drejer ex Lange) Böcher *Carex capillaris* L. var. *elongate* Olney ex Fernald *Carex capillaris* L. var. *fuscidula* (Krecz.) Á. Löve & D. Löve *Carex capillaris* L. var. *major* Blytt [1,3,6]
Common Name(s)	Hair-like sedge[1], hair sedge[10]
Species Code (as per USDA Plants database)	CACA12
GENERAL INFORMATION	
Geographical range	 North American Distribution[1]

	 Washington State Distribution[1] located in Okanogan County
Ecological distribution	Occurs in a large area throughout North America can be found in moderately moist to moist tundras, cliffs or rocky areas, low marshlands, bogs, sea shores, stream banks, moist woods, and wet or dry meadows.[2,4,10]
Climate and elevation range	Generally is considered a wetland species occurring in wetter areas but can also sometimes be in dry climates. Elevation ranges from 0 m to 3,500 m and in Washington it ranges from 850 m to 1980 m. [2,4]
Local habitat and abundance	In Washington, *C. capillaris* is found along streams, wetland lakeshores, in wet meadows and bogs, and in wet areas with calcium carbonate surfaces. *C. capillaris* is considered a sensitive species and is listed as Threatened on the Washington State Endangered Species List.[1,4] Common associated species are *Betula glandulosa* (resin birch), *Juncus spp.*(rushes), *Dasiphora fruitcosa* (shrubby cinquefoil), *Ledum glandulosum* (western Laborador tea), other *Carex* spp. (sedges), and *Zigadenus elegans* (mountain death-camas). [4]
Plant strategy type / successional stage	Considered a sensitive species to changing environmental conditions and in most of its geographic range it is a species that is experiencing decreasing numbers, becoming a rarer species. Some of the threats that are impacting *C. capillaris* are changes in the hydrology, logging practices, and outdoor recreation activities including camping and fishing.[4]
Plant characteristics	*C. capillaris* is a graminoid species with a perennial life cycle.[8] A growth characteristic is dense, clump-like patterns that form mats. The leaves are flat (2-9cm long) on thin hollow stems (60cm).[6] Monoecious containing both male and female reproductive parts on the same plant.[10] There will usually be a terminal spike (usually is the male flower) that droops and it may be accompanied by a lateral spike that is next to it or growing overtop. The staminate scales of *C. capillaris* are a light brown color with a green or brown midvein color.[2] Female flowers have bracts under them and have short scales that are light brown or green and see through white at the tips. *C. capillaris* fruit, called achene, is surrounded by perigynia that range from 2.4 to 3.3mm in size with an elliptical shape and have a shiny darker brown or green color.[4]
PROPAGATION DETAILS	
Ecotype	The distinct form of *C. capillaris* in Washington occupies habitat in Okanogan County. [1]
Propagation Goal	To produce *C. capillaris* plants that can be outplanted.
Propagation Method	Seed propagation

Product Type	Container seedlings (plugs)
Stock Type	*C. capillaris* seed
Time to Grow	Estimated time from seeding in a greenhouse to being ready to outplant can be a minimum of 2 and a half months but the timing of the needed conditions that are right to plant in can delay this time.[7]
Target Specifications	Target size of the plant is to have full length stems of 1-6dm tall, and to have target characteristics that identifying traits of *Carex capillaris* (see 'Plant Characteristics' section above).[4]
Propagule Collection Instructions	Collect the fruit (achenes) from plant in late spring.[9] Achenes are found in perigynia and are identifiable on the plant from June to August.[4,7] The usual fruiting time is from mid spring to late summer.[2] Achenes can be hand-picked from plant and because of the species sensitivity fruit should be picked carefully and fruits should be left on the plant to not deplete native population.
Propagule Processing/Propagule Characteristics	Fruit are 1.2 to 1.7mm in size. The fruit has an obovoid shape when viewed from the side.[4] No information on species specific seed longevity could be found but the seed falls into the orthodox seed category meaning the seed can be dried and stored in the dry state for long periods of time.[5]
Pre-Planting Propagule Treatments	Dry fruits (achenes) are cleaned to extract seeds. Methods of seed cleaning and removal of fruit to expose seed can vary and method done depends on size of anticipated propagation. One method is to dry to fruits for a two week period, hand screen to sort out other plant material that is unwanted, and then aspirated with a seed blower. This propagation method leaves the achene intact for sowing.[7] Seeds/fruit are dormant until stratified.
Growing Area Preparation / Annual Practices for Perennial Crops	Growing media is potting soil. Size of container can be chosen for intended plug size but an example container is a 70 cell tray. [7] Achenes are sown shallowly into the cells of the tray that are filled with potting medium. Once sown the tray can be put into a greenhouse to germinate seeds.
Establishment Phase Details	Germination of *Carex* depends on breaking physiological dormancy, soil temperatures, and exposure to light. Physiological dormancy is overcome by cold/moist stratification that mimics winter conditions. [7]
Length of Establishment Phase	Seeding to germination in greenhouse conditions takes about 2 weeks.[7]
Active Growth Phase	Sedges experience rapid growth after germination and under the right conditions the majority of the growth can happen in two months.[7]
Length of Active Growth Phase	Two months in greenhouse conditions.[7]
Hardening Phase	No information on hardening phase could be found.
Length of Hardening Phase	No information on hardening phase could be found.

Harvesting, Storage and Shipping	Storage and shipment can be done in planting trays or containers until outplanting can be done.
Length of Storage	No information on length of storage for *C. capillaris* was found.
Guidelines for Outplanting / Performance on Typical Sites	Wetland *Carex* tend to have a good performance in transplanted sites with a high percent survival in their native habitats and the outplanted sites can be established with the plants by mid-summer of the first growing season. The elapsed time before the first flowering is 2 years as flowering can delayed in transplanting of perennial species.[7]
Other Comments	Propagation information of *Carex capillaris* in Washington and other locations in North America was limited and information on related wetland *Carex* species was used.
INFORMATION SOURCES	
References	1. PLANTS Database. United States Department of Agriculture. Accessed on April 25, 2016 from http://plants.usda.gov/core/profile?symbol=CACA12 2. Carex capillaris. *Flora of North America, volume 23.* Accessed April 26, 2016 from http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=242357103 3. Carex capillaris L. IT IS Report. Accessed on April 25, 2016 from http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=39540 4. Department of Natural Resources. *Carex capillaris L.* Accessed on April 25, 2016 from http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/caca12.pdf 5. Hartmann, H.T., Kester D.E., Davies, F.T., Geneve, R.L. (2015). *Plant Propagation: Principles and Practices.* (8th ed.). 6. 3309045 Carex capillaris L. *Panarctic flora*. Accessed on April 26, 2016 from http://nhm2.uio.no/paf/results?biogeographic=&bioclimatic=&region=&name=Carex+capillaris#paf-3309045 7. Housel, G. Propagation and Agronomic Seed Increase of Native Sedges (Carex). *Tall Grass Prairie Center.* Accessed on April 25, 2016 from http://www.tallgrassprairiecenter.org/pdf/Houseal.pdf 8. Wisconsin Department of Natural Resources. *Hair-like Sedge (Carex capillaris).* Accessed on April 26, 2016 from http://dnr.wi.gov/topic/EndangeredResources/Plants.asp?mode=detail&SpecCode=PMCYP032G0 9. Department of Agriculture, Conservation, and Forestry. *Carex capillaris L.* Accessed on April 26, 2016 from http://www.maine.gov/dacf/mnap/features/carxcap.htm 10. Aiken, S.G., Dallwitz, M.J., Consaul, L.L., McJannet, C.L., Boles, R.L., Argus, G.W., Gillett, J.M., Scott, P.J., Elven, R., LeBlanc, M.C., Gillespie, L.J., Brysting, A.K., Solstad, H., & J.G. Harris. (2007).

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Date Protocol Created or Updated	06/06/16