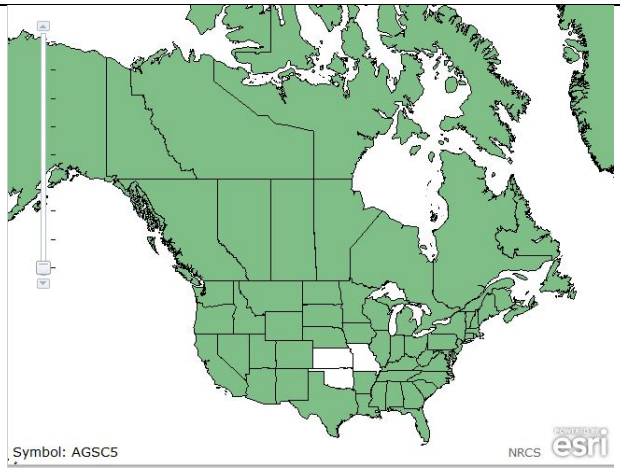
Plant Propagation Protocol for *Agrostis scabra*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/AGSC5.pdf

TAXONOMY	
Family Names	
Family Scientific Name	Poaceae
Family Common Name	Grass Family
Scientific Names	
Genus	*Agrostis* L.
Species	*scabra*
Authority	Willd.
Varieties	N/A
Sub-species	N/A
Cultivar	N/A
Common Synonym(s)	*Agrostis scabra Willd. var. geminata (Trin.) Swallen* *Agrostis scabra Willd. var. septentrionalis Fernald* *Agrostis scabra Willd. subsp. septentrionalis (Fernald) Á. Löve & D. Löve* *Agrostis geminata* Trin. *Agrostis hyemalis* (Walter) Britton, Sterns & Poggenb. var. *geminata* (Trin.) Hitchc. *Agrostis hyemalis* (Walter) Britton, Sterns & Poggenb. var. *scabra* (Willd.) Blomquist *Agrostis hyemalis* (Walter) Britton, Sterns & Poggenb. var. *tenuis* (Tuck.) Gleason
Common Name(s)	Rough bentgrass, hair bentgrass winter bentgrass ticklegrass, fly-away grass
Species Code (as per USDA Plants database)	AGSC5
GENERAL INFORMATION	
Geographical range	 Native range in North America (6 – numbers in parenthesis refer to reference number in citations)

	 Counties with AGSC5 in Washington state with green circles representing specimen markers for AGSC5 (1).
Ecological distribution	Open parks that are wet in spring and early summer and dry out as growing season progresses (8). Also occurs in moist meadows and along streams (7). Often found at disturbed sites, especially in clearings and roadsides. Found in rocky slopes, gravelly river bars and on rocks near waterfalls (7) Has a facultative wetland indicator status (6)
Climate and elevation range	Common at low to middle elevations (7).
Local habitat and abundance	See WA distribution map. Associated with myriad species but common with spruce-cedar-hemlock forests in western Washington (4).
Plant strategy type / successional stage	Facultative Seral Species that is generally a pioneer or invader species that thrives in open sunny locations (4). It is adapted to soils that are low in nutrients and is tolerant of low pH levels (4). Has good tolerance of metals in soils (2).
Plant characteristics	Perennial clump grass that grows about 3.5 feet tall with delicate branches that branch again towards the top. The inflorescence is a shiny purple/green at first and then turns tan; it is wide and found along most the height of the plant (5).
PROPAGATION DETAILS Seed Propagation Method (in Montana) as explained by Majerus (8)	

Ecotype	3 different Yosemite National Park accessions periodically collected and produced from 1988 to 2000. Grassland and forest ecological zones include tufted hairgrass/sedge and lodgepole pine habitats. Elevation range 2,198 m to 2,256 m.
Propagation Goal	Seed Increase for restoration projects
Propagation Method	Direct seeding
Product Type	Seeds
Time to Grow	If seeds are sown in spring there will be a spring to fall rapid growth phase, but new seeds will not be produced until the following summer with a mean harvest date of August 3rd. Depending on when you plant in the spring, it is roughly a 15 month process until seed collection.
Target Specifications	No information available
Propagule Collection Instructions	Wildland collection occurs in mid-August through early September. At this stage the caryopsis are tan-brown and hard, but not yet ready to shatter from the panicle (natural dispersal). Since propagation goal is to produce seeds you want good genetic diversity from seeds used in propagation. Seeds can easily be hand harvested. One collection hour/person will yield an average 77 grams (2.7 oz.)
Propagule Processing/Propagule Characteristics	Seeds are spread out on a tarp in a dry, sheltered environment and turned once per day for 3-5 days until no moisture is detected. Seeds then require cleaning and pre-planting treatments. Seed density is 9,500,000 per kg or 20,900,000 per pound.
Pre-Planting Propagule Treatments	Cleaning: After drying, material is processed with a Wintersteiger plot combine at concave closed, speed 700 rpm, and no wind. Seed is threshed with a hammermill through a 4/64' round hole screen, and air-screen processed on a Clipper M2B or Eclipse cleaner over a 1-24" round hole screen. Due to tiny seed, presence of fluff and other seed debris, and poor seed flow, this species is moderately difficult to clean. Larger seed lots are processed most efficiently with mechanized cleaning equipment and smaller seed lots usually require more hand labor. Dormancy Treatment: Seeds are in physiological

	dormancy. Seeds need to be placed in 0-1ºC (32-34ºF) for 10-day cold stratification treatment and then exposed to 22-25ºC (72-77ºF). Storage: Seeds should be stored in plastic seed bags in a dry, cool environment. Storage duration is 5-7 years.
Growing Area Preparation / Annual Practices for Perennial Crops	Seedbed should be firm and free of weeds with good field moisture to 4" depth. This is an outdoor field seed increase bed so containers are not used. Sow seeds in spring or fall. Optimum seeding depth is ¼". Sow 25-30 pure live seeds per foot in rows that are spaced 36" apart. Fertilizer application is not recommended in the first year since it can increase weed growth and competition.
Establishment Phase Details	14-16 day germination and emergence period. Soil surface is kept moist throughout the 14-16 day germination and emergence period (also helps prevent soil crusting); lower rates of Buctryl or romoxynil are applied at 3-5 leaf stage to control broadleaf weeds.
Length of Establishment Phase	2 growing seasons
Active Growth Phase	Rapid Growth Phase is spring to fall. Broadleaf weed control with herbicides must occur prior to boot stage; soil moisture is critical during boot stage, milk stage of seed development, and post-harvest to pre-freeze. No irrigation is applied during flowering (pollination) Fertilizer is broadcast in mid-September.
Length of Active Growth Phase	2 to 3 growing seasons
Hardening Phase	N/A
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	Harvest occurs in late July though late August. Harvest yields vary due to weather and age of stand. Average annual production is 142kg/ha (127 lbs/ac). Seedlings are not shipped since gathering seeds for local outplanting in restoration projects is the goal. Seeds for this protocol were collected using a John Deere Windrower.
Length of Storage	N/A
Guidelines for Outplanting /	No information from protocol. Seed collection and

Performance on Typical Sites	treatment would be similar as within this protocol but if intended to be planted in a natural area you would need to find adequate moisture and likely would not plant in rows.
Other Comments	No federal collection restrictions (4). Has some cover value for deer and small mammals. Rated fair in energy value for nutrition but low in protein value. However, it is considered to be relatively unpalatable to livestock though sometimes is consumed early in the growing season. (4) Grows well and can invade disturbed areas with high nitrogen levels in the soil (10)
INFORMATION SOURCES	
References	See below
Other Sources Consulted	See below
Protocol Author	Dan Hintz
Date Protocol Created or Updated	04/26/15

References:

(1) *Agrostis Scabra*, Rough Bentgrass. Burke Museum of Natural History and Culture. Available: http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Agrostis&Species=scabra [2015, April 26].

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(3) Judziewicz E., Epstein, E., Spencer, E. 2012. Natural Communities for *Agrostis scabra* Willd. Robert F. Freckmann Herbarium University of Wisconsin –Stevens Point. Available: http://wisplants.uwsp.edu/scripts/habitats.asp?spCode=AGRSCA [2015, April 26].

(4) Matthews, Robin F. 1992. Agrostis scabra. 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/ [2015, April 26].

(5) NPIN: Native Plant Database: *Agrostis scabra.* Lady Bird Johnson Wildflower Center the University of Texas at Austin. Available: http://www.wildflower.org/plants/result.php?id_plant=AGSC5 [2015, April 26].

(6) Plants Database: *Agrostis scabra* Willd. rough bentgrass. United States Department of

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(7) Pojar J., McKinnon A.,1994. Plants of the Pacific Northwest: Washington, Oregon, British Columbia and Alaska. B.C. Ministry of Forests and Lone Publishing, Canada.

(8) Winslow, Susan R. 2002. Propagation protocol for production of *Agrostis scabra* seeds; Natural Resources Conservation Service - Bridger Plant Materials Center, Bridger, Montana. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 26 April 2015). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

(9) Xu, Y. and Huang, B. 2008. Differential protein expression for geothermal *Agrostis scabra* and turf-type Agrostis stolonifera differing in heat tolerance. *Environmental and Experimental Botany*, 2008, 64 (1): 58-64.

Not Pertinent to Protocol

(10) Tillman, D. 1983. Plant Succession and gopher disturbance along an experimental gradient. *Oecologia*, 1983, 60: 285-292.