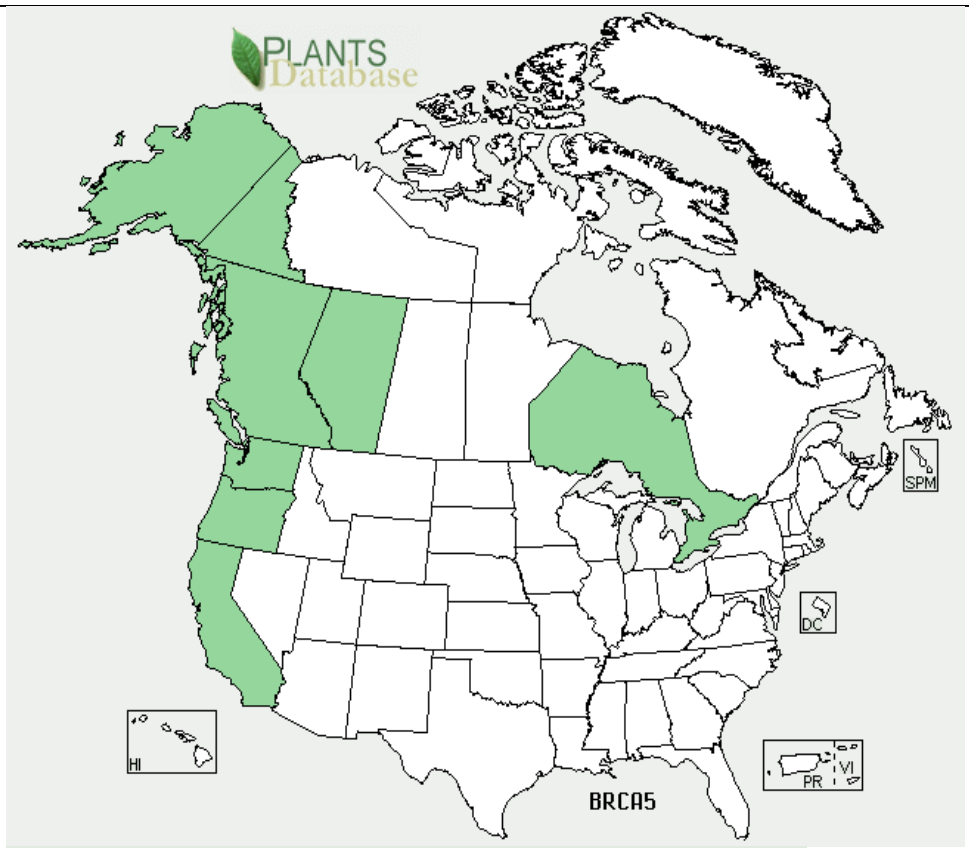
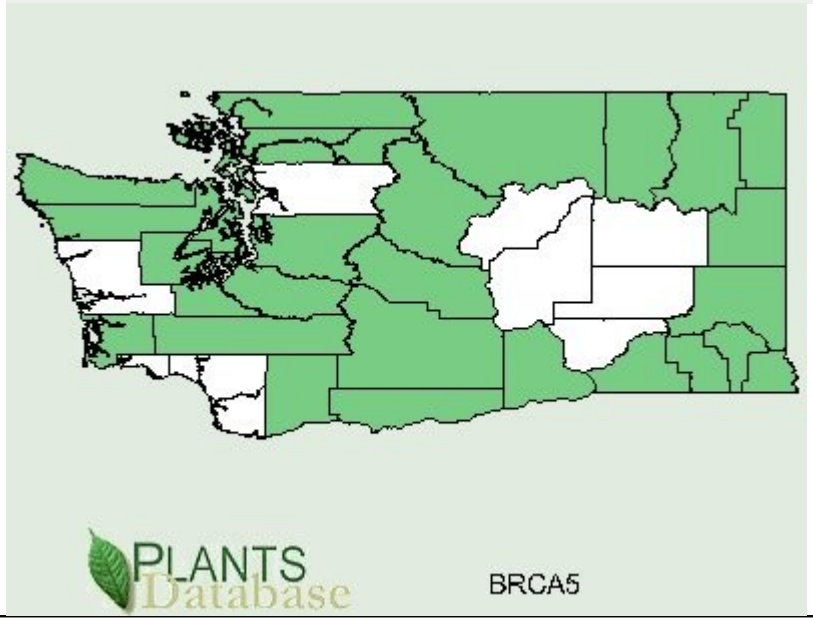
Plant Propagation Protocol for Bromus *carinatus*

ESRM 412 – Native Plant Production

TAXONOMY	
Family Names	
Family Scientific Name:	Poceae
Family Common Name:	Grass
Scientific Names	
Genus:	Bromus L.
Species:	Bromus carinatus
Species Authority:	Hook. & Arn
Variety:	
Sub-species:	
Cultivar:	Readily available from commercial sources
Authority for Variety/Sub-species:	
Common Synonym(s)	*Bromus carinatus* Hook. & Arn. var. *californicus* (Nutt. ex Buckley) Shear *Bromus carinatus* Hook. & Arn. var. *carinatus* *Bromus carinatus* Hook. & Arn. var. *hookerianus* (Thurb.) Shear *Bromus laciniatus* Beal *Ceratochloa carinata* (Hook. & Arn.) Tutin
Common Name(s):	California Brome
Species Code (as per USDA Plants database):	BRCA5
GENERAL INFORMATION	

Geographical range (distribution maps for North America and Washington state)	 
Ecological distribution :	A variety of open habitats in B.C., south through Washington, Oregon to California. Occurs through boreal, temperate, cool, semi-arid and marginally summer-dry mesothermal climates. More a Cordilleran species than a coastal species, except in the dry Coastal Douglas-fir zone. Increases with increasing temperatures and decreases with increasing precipitation (1)
Climate and elevation range	

Local habitat and abundance:	California brome grows in open woods and forests, shrublands, grasslands, meadows, and waste places. It is closely associated with pine dropseed, bracken fern, corn lily, dwarf purple monkey flower, mountain muhly, and Rocky Mountain iris and shares dominance in many plant communities such as coastal prairie, both montane and coastal Chapparal scrub, sagebrush steppes, aspen, oak woodland, and variously mixed conifer forests. (1) (2) (3)
Plant strategy type / successional stage:	California brome is considered a pioneer species as well as a late seral species under open canopy/full sun situations. (1)
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	California brome is a native, cool-season perennial bunchgrass that lives 3 to 5 years and grows to be 60 to 120 cm tall. The roots of California brome are fibrous, grow very quickly, and become deep and widespread. Young plants are erect, but older stems grow along the ground with only the apical tips remaining erect (decumbent). Stems are robust with hairy sheaths. Leaf blades are 0.5 to 1 cm wide and 15 to 30 cm long. They can be pubescent or glabrous. The inflorescence is a stiff, open panicle, 10 to 20 cm long and droops at maturity. The spikelets are 5 to 7 flowered, 2 to 4 cm long, 5 to 7 mm wide and flattened. Lemmas are 1 to 1.5 cm long, flattened, keeled and usually pubescent. The awns are 2 to 5 mm long.
PROPAGATION DETAILS	
Ecotype:	Crater Lake National Park; 6,400 to 7,000 ft
Propagation Goal:	Seeds
Propagation Method:	Seeds
Product Type:	Propagules (seeds, cuttings, poles, etc.)
Stock Type:	Seed
Time to Grow (from seeding until plants are ready to be outplanted):	
Target Specifications:	78,000 to 82,000 seeds / lb.
Propagule Collection:	Seed is fairly easily collected by hand-stripping into cloth sacks or by hand -sickle in more solid stands. Seed germination of native-collected lots varied widely between lots 2 and years.
Propagule Processing/Propagule Characteristics:	Small lots could be threshed with a geared-down hammermill or small brush machine; larger lots were sent through a Kamas-Westrup or similar brush machine; then run through an air-screen machine with a #14 round screen and medium-high air flow.
Pre-Planting Propagule:	None
Growing Area Preparation / Annual Practices for Perennial Crops:	Seeds can be sown directly into prepared seed bed, early spring or fall; rate of 30 to 40 PLS / foot row
Establishment Phase:	Some disagreement exists as to the optimum germination conditions; in general, the species responds to a dark period of 16-18 hours with corresponding temperatures between 59-68F and a light period of 6-8 hours with temperatures ranging between 68-86F. Irrigation, weed control and herbicide were utilized in this study to reduce competition.

Length of Establishment Phase:	Rapid stand emergence; 21 days
Active Growth Phase:	Boot stage is generally reached by mid May; Seed fill occurs in late May / June and the crop is harvested at the end of June / early July. (1)
Length of Active Growth Phase:	April to June
Hardening Phase:	NA
Length of Hardening Phase:	NA
Harvesting, Storage and Shipping:	This crop was mostly hand-harvested using sickles to avoid weedy grasses and smutted seed heads as much as possible. Ripe seed shatters very easily, so seed heads were collected directly into buckets and barrels and taken to a sheltered location with good air flow to air-dry. Larger lots that were swathed and combined required extensive seed conditioning. (2) (3) (4)
Length of Storage:	Several years at cold storage is acceptable and will not inhibit germination. It is understood that long term storage (beyond several years) will inhibit germination. (3) (4)
Guidelines for Outplanting / Performance on Typical Sites:	Direct seeding in early fall at Crater Lake (2)
Other Comments:	1. Soft chess (Bromus secalinus) seed was especially difficult to remove from these seed lots. In a few lots, the heaviest 5 or 10 % of the crop had to be discarded along with the unwanted chess seeds. (2) 2. The grass is noted for its rapid establishment of deep roots and good soil stabilizing capabilities which make it valuable for revegetation and erosion control in disturbed areas such as rangeland sites, spent oil shale, coalmine spoils, heavy metal mine tailings, and roadsides. It is also well-suited for sideslopes and back-slopes because it can withstand periodic drought once established. It is effective in improving water infiltration and has been used successfully on waterfront sites. (1) 3. The Western Society of Weed Science has listed California brome as having invasive characteristics. This plant may become weedy or invasive in some regions or habitats and may displace desirable vegetation if not properly managed.
INFORMATION SOURCES	
References (full citations):	1. Klinka, K., V. Krajina, A. Ceska, and A. Scagel. (1989, Reprinted 1995). Indicator Plants of Coastal British Columbia. University of British Columbia Press, Vancouver, British Columbia 2. Corvallis Plant Materials Center Technical Report: Plants for Woodland and Rangeland Reclamation and Erosion Control 1980 – 1997 3. Link, Ellen, ed. 1993. Native Plant Propagation Techniques for National Parks Interim Guide; Compiled by Rose Lake Plant Materials Center 4. Rose, Robin, C.E.C. Chachulski and D. Haase. Propagation of Pacific Northwest Native Plants 1998. Or. State U. Press,

	Corvallis, Oregon USDA, NRCS. 2001.
Other Sources Consulted:	
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