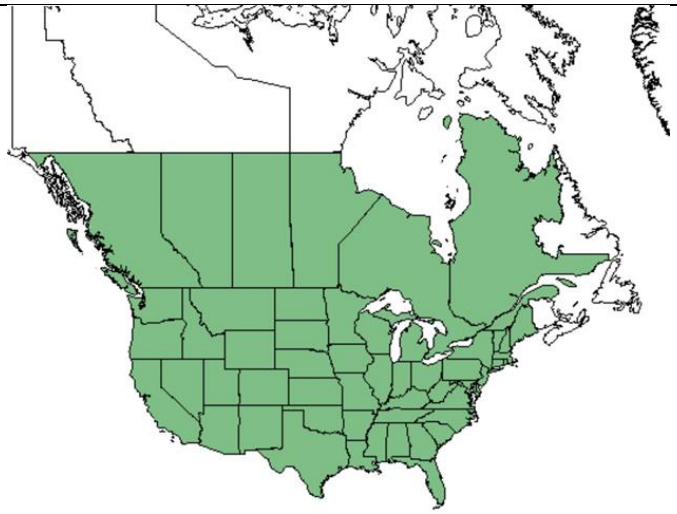
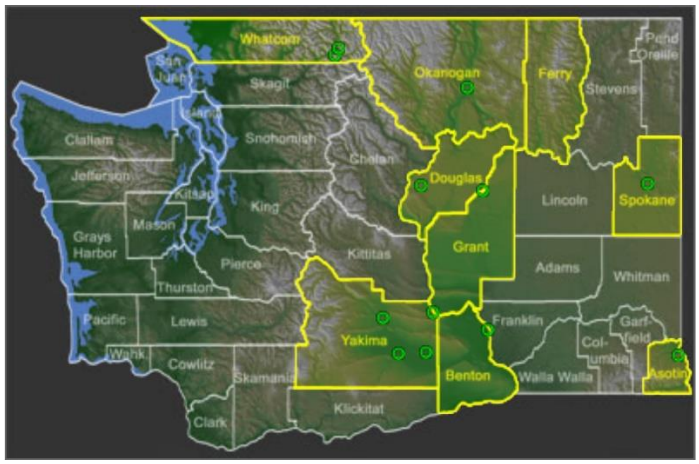
Plant Propagation Protocol for *Vulpia octoflora*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/VUOC.pdf

©Matt Lavin

©Mary Wright Gill

©University of South Florida

TAXONOMY	
Plant Family	
Scientific Name	Poaceae
Common Name	Grass family
Species Scientific Name	
Scientific Name	*Vulpia octoflora* (Walter) Rydb.
Varieties	*Vulpia octoflora* var. *octoflora* *Vulpia octoflora* var. *glauca* *Vulpia octoflora* var. *hirtella* *Vulpia octoflora* var. *tenella* (ITIS, 2017)
Sub-species	*Festuca glacilenta* Buckley *Festuca tenella* Willd (ITIS, 2017)
Cultivar	None found
Common Synonym(s)	*Festuca octoflora* Walt. var. *aristulata* Torr. ex L.H. Dewey *Diarrhena setacea* (Poir.) Roem. & Schult. *Festuca parviflora* Elliott *Festuca setacea* Poir. *Gnomonia octoflora* (Walter) Lunell *Vulpia antofagastensis* Parodi *Festuca tenella* var. *aristulata* Torr.

	Note: *Vulpia octoflora* was listed under the genus of fescue for a number of years, thus many of the common synonyms are under the name *festuca*. However, the current taxonomy now lists *Vulpia octoflora* under the vulpia genus. (ITIS, 2017)
Common Name(s)	Sixweek fescue Sixweeks grass Six-weeks grass Common sixweeks grass Pull out grass Eight-flower sixweeks grass Eight-flowered fescue (ITIS, 2017)
Species Code	VUOC
GENERAL INFORMATION	
Geographical range	 (USDA, 2018)  (WTU, 2018)

Ecological distribution	*Vulpia octoflora* can be found across a variety of ecosystems in North America. Desert grasslands, desert shrub, sagebrush, mixed grass prairie, and annual grasslands are among the ecosystems that the grass inhabits. (Thacker, 2008)
Climate and elevation range	Sun: Direct sunlight Elevation: 15'-6455' Annual precipitation: 3.0" - 49.5" Summer precipitation: 0.14" - 2.69" Coldest Month: 37.4 °F - 60.4 °F Hottest Month: 60.7 °F - 88.7 °F Humidity: 0.47 - 40.10 vpd (vapor pressure deficit) Drainage: Fast (CNPS, 2018)
Local habitat and abundance	*Vulpia octoflora* is found abundantly in pristine prairie ecosystems, commonly on dry sites and between bunchgrass species in the Pacific Northwest. *Vulpia octoflora* is also found on sites that experience fire disturbance. The presence of *Vulpia* declines as canopy shade increases. (CNPS, 2018)
Plant strategy type / successional stage	*Vulpia octoflora* has been observed to tolerate drought induced stress. Also, this grass is listed as a weedy species in the Global Compendium of Weeds. While *Vulpia octoflora* establishes quickly on disturbed sites, it does not appear to have an early successional advantage. (Howard, 2006; Thacker, 2008)
Plant characteristics	*Vulpia octoflora* is a minor grass that grows solitarily or in small tufts, reaching a minimum height of 3 inches tall and a maximum of 23 inches tall. Blades of the leaf are cauline (growing directly from the roots), and range from 1 to 2 mm wide and 2 to 10 cm long. Flowers form in inflorescences of narrow panicles, vibrantly green as they grow and gradually turning tan as they ripen. As an annual, *Vulpia octoflora* only grows from seed. *Vulpia* has a high rate of seed production, with seed germination occurring in April-June. Wind is the main mode of seed dispersal from the dry, mature panicles. (University of Texas, 2007; Howard, 2006)
PROPAGATION DETAILS	
Ecotype	Pacific Northwest

Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	1.5” x 8” cone-tainers
Time to Grow	Information specific to *Vulpia octoflora* is unavailable. However, related grasses native to the Pacific Northwest (*Vulpia myurus, Festuca roemerii)* can take 3-5 weeks from planting until establishment, and 5-6 additional weeks for roots and shoots to develop, for a total of 9-11 weeks from seeding until the plant is ready for outplanting. (NCRS, 2018)
Target Specifications	Well-developed crowns and roots filling soil profile and container. Plants will be ready for outplanting before they set to seed. (NCRS, 2018)
Propagule Collection Instructions	Seeds are produced on panicles, and can be collected by stripping or shaking the seeds off the parent plants. This should be done after the seeds mature, in June-August. Seeds may also be purchased commercially. (Howard, 2006; Granite Seed, 2018)
Propagule Processing/Propagule Characteristics	Estimated number of seeds per pound is 965,000 seeds/lb. (Granite Seed, 2018)
Pre-Planting Propagule Treatments	Until seeds are ready to be planted, the seeds should be stored in a cool, dry environment. *Vulpia octoflora* seeds undergo seed dormancy and do not sprout until moisture levels are appropriate for germination. Moist stratification will break dormancy and begin the germination phase. 14 days of moist stratification of *Festuca roemeri* seeds was effective at inducing germination of seeds, and may indicate that a similar interval of time may apply to *Vulpia octoflora*. (Howard, 2006; Darris, 2005)
Growing Area Preparation / Annual Practices for Perennial Crops	Individuals grow best in separate cone-tainers, as they do not separate easily. Coarse soils hold *Vulpia octoflora* seeds more securely, and seeds require sufficient soil moisture to germinate even though they are drought tolerant later in their life cycle. The best nursery germination rates (93%-96% seeds germinated per seeds planted) have occurred at 68 ^{o}F.

	Creosote bushes can also act as nurse plants, to help *Vulpia octoflora* establish in particularly arid and dry climates. (Flores, 2003)
Establishment Phase Details	Cold moist stratification is necessary to germinate *Vulpia octoflora*. After germination, seedlings should be allowed to establish for a minimum of 3 weeks in nursery conditions to allow the roots to develop. Setting the grasses through a hardening phase before outplanting in March will increase the survival rate of the grasses. Also, thinning established seedlings will promote new grass germinants if there are additional ungerminated seeds in the soil. (Howard, 2006; NRCS, 2018)
Length of Establishment Phase	3-5 weeks (NCRS, 2018)
Active Growth Phase	*Vulpia octoflora* grasses grow for several months from late winter to early summer, depending on the climate of the region it is grown in. In the Pacific Northwest, *Vulpia octoflora* grows from March-August before releasing seeds and dying. (Howard, 2006)
Length of Active Growth Phase	5-6 months (Howard, 2006)
Hardening Phase	As *Vulpia octoflora* is an annual, it does not experience a hardening phase.
Length of Hardening Phase	N/A (see above)
Harvesting, Storage and Shipping	*Vulpia octoflora* are relatively small and delicate when they are young enough to be outplanted. Handle with care when transporting these plants. *Vulpia octoflora* survive best when transported in the original plugs that they are grown in. (NRCS, 2018)
Length of Storage	*Vulpia octoflora* can be stored easily for the length of their lifespan, as they do not grow very large. However, for restoration purposes they should be planted before they set seed in the 4th month of their growth. (Howard, 2006)
Guidelines for Outplanting /	Nurse plants, such as Creosote bushes, help *Vulpia octoflora* establish out in the field. Population numbers have been found to vary from year to year, and population dynamics are closely

Performance on Typical Sites	related to climate. Best establishment occurs during the years with highest springtime precipitation. Thus, it is recommended to water *Vulpia octoflora* after planting. (Flores, 2003; Howard, 2006)
Other Comments	*Vulpia octoflora* is listed as an endangered species in Vermont and New Hampshire. Be aware of rules applying to endangered plants in each state before collecting spores from these states. As a general practice, it is best to collect seeds from plant populations in a similar region to their ultimate planting location. (USDA, 2018)
INFORMATION SOURCES	
References	CNPS. "Six Weeks Fescue, *Festuca Octoflora*." *California Native Plant Society.* (2018). Available online at: calscape.org/Festuca-octoflora-(Six-Weeks-Fescue)?srchcr=sc58e60e0bc5ded "Collecting Native Seed." *USDA Forest Service.* (2018). Available online at: www.fs.fed.us/wildflowers/Native_Plant_Materials/developing/collecting.shtml Darris, Dale. "Seed production and establishment of western Oregon native grasses" *National proceedings: Forest and Conservation Nursery Associations*. (2005) Available online at: https://www.fs.fed.us/rm/pubs/rmrs_p035/rmrs_p035_119_128.pdf Defalco, L. "Are Mojave Desert Annual Species Equal? Resource Acquisition and Allocation for the Invasive Grass *Bromus Madritensis* subsp. *Rubens* (Poaceae) and Two Native Species." *American Journal of Botany*, vol. 90, no. 7. (2003). doi:10.3732/ajb.90.7.1045. Flores, Joel. "Are Nurse-Protege Interactions More Common among Plants from Arid Environments?" *Journal of Vegetation Science*, vol. 14, no. 6. (2003). doi:10.1111/j.1654-1103.2003.tb02225.x. Howard, Janet. "*Vulpia Octoflora*." *US Forest Service- Fire Effects Information System.* (2006). Available online at: www.fs.fed.us/database/feis/plants/graminoid/vuloct/all.html "ITIS Standard Report Page: *Vulpia octoflora." Integrated Taxonomic Information System.* (2017). Available online at:

	https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=42264#null "Native Seed Production Manual for the Pacific Northwest." *Natural Resource Conservation Service.* (2018). Available online at: https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/orpmcpu12767.pdf "Plants Profile for *Vulpia Octoflora* (Sixweeks Fescue)." *United States Department of Agriculture Plants Database.* (2018). Available online at: plants.usda.gov/core/profile?symbol=VUOC. Thacker, H. "*Vulpia octoflora,* Six Weeks Fescue." International Union for Conservation of Nature. (2008). Available online at: www.iucnredlist.org/pdflink.44493019 TWC Staff. "Plant Database." *Lady Bird Johnson Wildflower Center - The University of Texas at Austin.* (2007). Available from: www.wildflower.org/plants/result.php?id_plant=VUOC. "*Vulpia octoflora*- Sixweeks Fescue." *Granite Seed and Erosion Control.* (2018). Available online at: graniteseed.com/products/vulpia-octoflora/ "*Vulpia octoflora*: six-weeks fescue." WTU Burke Museum. (2018). Available online at: http://biology.burke.washington.edu/herbarium/imagecollection.php?&Genus=Vulpia&Species=octoflora
Other Sources Consulted	Franklin, Jerry. "Natural Vegetation of Oregon and Washington." *Oregon State University Press*. (1988). Pojar, Jim. "Plants of The Pacific Northwest Coast." *Partners Publishing*. (2014). Rose, Robin. "Propagation of Pacific Northwest Native Plants." *Oregon State University Press.* (1998).
Protocol Author	Victoria Fox
Date Protocol Created	5/14/2018