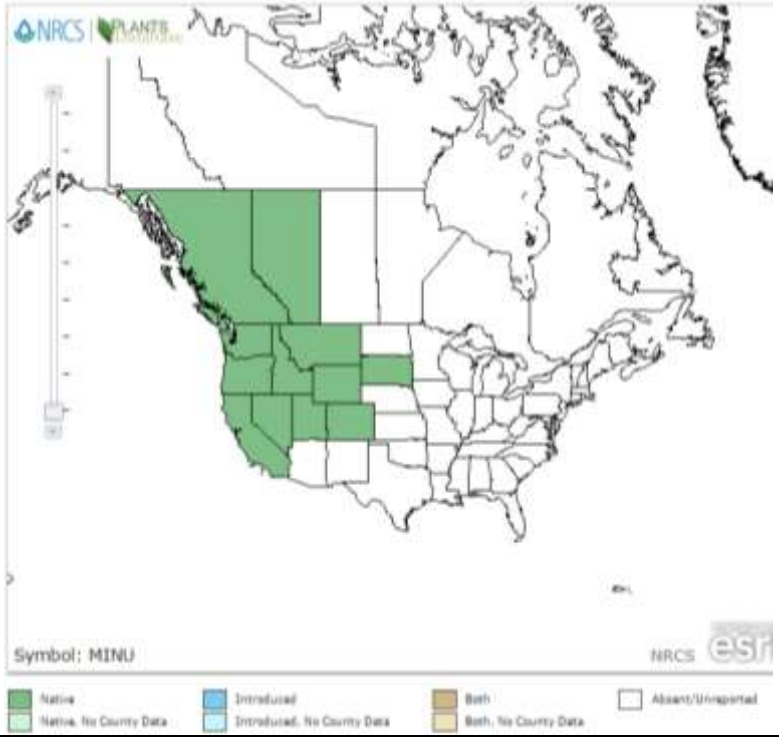
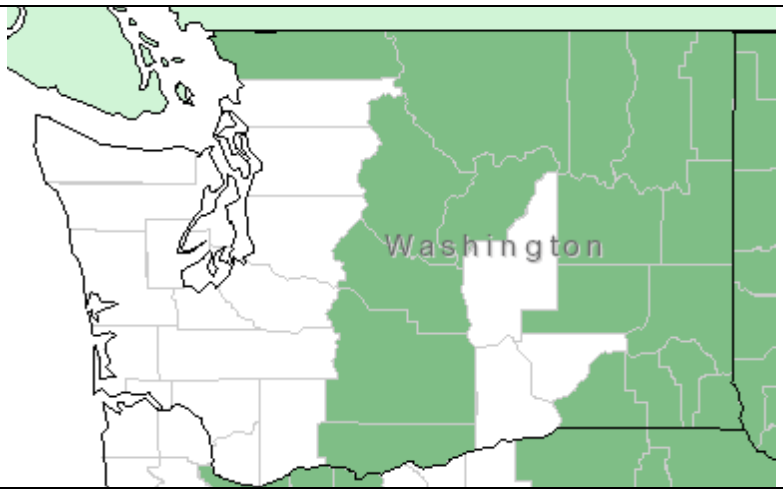
Plant Propagation Protocol for *Microseris nutens*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/MINU.pdf

TAXONOMY	
Plant Family	
Scientific Name	Asteraceae
Common Name	Nodding microseris[1]
Species Scientific Name	
Scientific Name	*Microseris nutans* (Hook.) Sch. Bip.[1]
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	PTNU2- *Ptilocalais nutans* (Hook.) Greene[1] SCNU4- *Scorzonella nutans* Hook.[1] SCNUM- *Scorzonella nutans* Hook. var. *major* (A. Gray) M. Peck[1]
Common Name(s)	Sunflower, Nodding Silverpuffs
Species Code (as per USDA Plants database)	MINU
GENERAL INFORMATION	
Geographical range	

	
Ecological distribution	Mean annual precipitation range 16-60 inches often found in open grassland and open ponderosa pine forest[2].
Climate and elevation range	570- 2074 meter elevation, slope gradient 0-76°.[4]
Local habitat and abundance	Open areas to open forests, prefers slightly moist areas[3]
Plant strategy type / successional stage	
Plant characteristics	Smooth skinned perennial with 1- several thick skinned roots, stem is simple and curved, branching and erect containing milky sap 10-70cm tall.[3,4] Basal leaves have variable morphology, from elongate and narrow, entire or with a few linear teeth, to broader and entire or toothed, stem leaves similar.[3,4] Flowers are solitary heads on long penduncles or few on a branching stem; nodding in bud; involucre 1-2 cm high, the outer bracts shorter than the inner; corollas all ligulate, yellow, pappus of 15-20 narrow scales each bearing a long white plumose bristle.[3] Fruits are achenes 5-8mm long, slightly tapering, glabrous or with fine hairs[3]
PROPAGATION DETAILS	
Ecotype	Paradise Creek drainage near Pullman, Washington[2]
Propagation Goal	Plants[2]
Propagation Method	Seed[2]
Product Type	Container (plug)[2]
Stock Type	
Time to Grow	14 Months[2]
Target Specifications	Tight root plug in container[2]
Propagule Collection Instructions	Fruit is an achene which ripens in June. It is collected when the pappus begins to expand. Seed is brown in color and wind disseminated, so must be collected before it blows away. Seed maturity is indeterminate and daily collections are needed to maximize volume. Seed is stored in paper bags

	at room temperature until cleaned. Seed should be stored loosely in bags. Compressing the seed with the attached pappus increases difficulty during cleaning.[2]
Propagule Processing/ Propagule Characteristics	Seed is rubbed lightly, then passed thru a hand screen and rubbed again to separate the pappus, then cleaned with an air column separator. Clean seed is stored in controlled conditions at 40 degrees Fahrenheit and 40% relative humidity.[2] Determined 215,692 seeds/lb for ecotype.[2]
Pre-Planting Propagule Treatments	Some germination occurs without pretreatment, but 90 or more days of cool, moist stratification maximizes germination. Seed can germinate in cool temperatures.[2] Unpublished data from trials conducted at the Pullman Plant Materials Center revealed that 22.5% germination occurred without stratification. 45 days of cold, moist stratification resulted in 55% germination. 90 days of cold, moist stratification resulted in 75% germination. 92.5% germination was obtained from seeds sown in containers in early November and left outside under cool, fluctuating spring temperatures. Seedlings which germinated in the greenhouse thrived in the constant warmth, so it is likely the longer stratification time and not the cool, fluctuating temperature was the factor in the increased germination.[2] Germination in containers remaining outside began 10 days later than that in containers moved to the greenhouse after 90 days stratification.[2]
Growing Area Preparation / Annual Practices for Perennial Crops	In early November seed is sown in 10 cu. in. Ray Leach Super cell containers filled with Sunshine #4 and covered lightly. A thin layer of pea gravel is applied to prevent seeds from floating. Containers are watered deeply and placed outside. Alternately, seed can be moist stratified in a refrigerator for 90+ days before sowing in the greenhouse.[2]
Establishment Phase Details	Containers are moved to the greenhouse in early February. Germination usually begins in 3 days and is complete in 10 days, although a few seeds may germinate 2-3 weeks later.[2]
Length of Establishment Phase	10-14 days[2]
Active Growth Phase	Plants are watered deeply every other day and fertilized once per week with a complete, water soluble fertilizer containing micro-nutrients.[2] Plants are moved to the cold frame in late March or early April, depending on weather conditions, then moved to the lath house in June.[2] Plants will not attain tight root plugs by early May and are held in the lath house until the following spring. They are watered every other day if the weather is cool, and every day

	during hot, dry spells. Plants make little further growth after June, and may senesce in late summer. Senescent plants are given only enough water to prevent the medium from drying completely.[2] Starting stratification earlier possibly will result in field ready plants by the first planting season.[2]
Length of Active Growth Phase	
Hardening Phase	Since the plants are grown outside, additional hardening is not needed.[2]
Length of Hardening Phase	
Harvesting, Storage and Shipping	Plants are stored in the lath house over winter. They should be afforded some protection from extreme cold temperatures. Mulch or foam sheets provide sufficient protection. The protection should be removed in late winter or early spring as temperatures begin to rise.[2] Regrowth will begin in early March as soon as temperatures begin to warm and plants will be field ready in late April.[2]
Length of Storage	Transplanting is done in early May by using an electric drill and portable generator to drill 1.5 inch diameter holes at the planting site.[2] Survival in seed increase plantings without competing vegetation averages 90%. Transplanting into sites with existing vegetation may reduce survival and vigor depending on weather conditions following planting. Most plants will flower and produce seed the season following outplanting. Plants will go dormant during the warm parts of the summer.[2]
Guidelines for Outplanting / Performance on Typical Sites	
Other Comments	No insect or disease problems have been noted.[2]
INFORMATION SOURCES	
References	[1]USDA Natural Resources Conservation Service. (n.d.). *Microseris nutans*. Retrieved May 18, 2015, from plants.usda.gov: http://plants.usda.gov/core/profile?symbol=MINU [2] Network, U. N., & Skinner, D. M. (2006). *Propagation protocal for production of container Microseris nutans (Hook.) Schulz-Bip.plants*. Retrieved May 18, 2015, from Nativeplantnetwork.org: http://www.nativeplantnetwork.org/Network/ViewProtocols.aspx?ProtocolID=3137 [3] Wa Native Plant Society. (2015). *Microseris nutans*. Retrieved May 18, 2015, from Burke Museum of Natural

	History and Culture: http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Microseris&Species=nutans [4] eFloras.org. (n.d.). *Flora of North America: Microseris nutans*. Retrieved May 18, 2015, from eFloras.org: http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=250067187
Other Sources Consulted	Consortium of Pacific Northwest Herbaria. (2013). *Microseris species*. Retrieved May 18, 2015, from pnwherbaria.org: http://www.pnwherbaria.org/data/results.php?DisplayAs=WebPage&ExcludeCultivated=Y&GroupBy=ungrouped&SortBy=Year&SortOrder=DESC&SearchAllHerbaria=Y&QueryCount=1&IncludeSynonyms1=Y&Genus1=Microseris&Species1=nutans&State1=Washington&Zoom=4&Lat=55&Lng=-135&P Department of Geography, Univeristy of British Columbia, Vancouver. (2014). *E-Flora BC: Electronic Atlas of the Plants of British Columbia*. (B. In Klinkenberg, Editor) Retrieved May 18, 2015, from eflora.bc.ca: http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Microseris%20nutans Lady Bird Johnson Wildflower Center. (2015). *NPIN: Native Plant Database: Microseris nutans*. Retrieved May 18, 2015, from Wildflower.org: http://www.wildflower.org/plants/result.php?id_plant=MINU
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