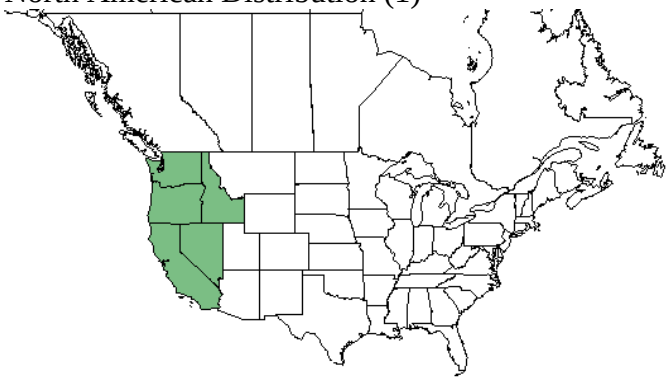
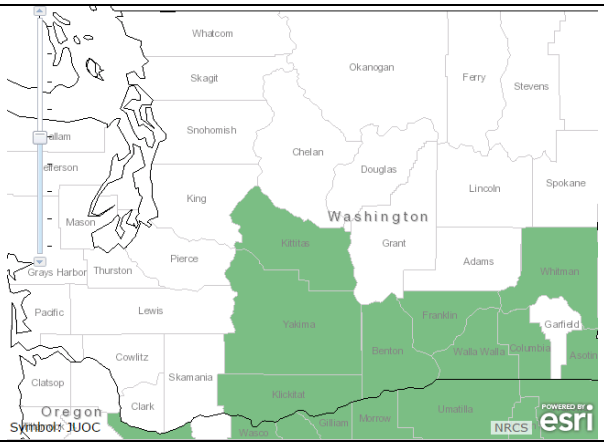
Plant Propagation Protocol for *Juniperus occidentalis*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/JUOC.pdf

TAXONOMY	
Plant Family	Cypress family
Scientific Name	Cupressacea (1)
Common Name	Cypress family (1,2)
Species Scientific Name	
Scientific Name	*Juniperus occidentalis Hook. (1)*
Varieties	Information not available on USDA plants database
Sub-species	Information not available on USDA plants database.
Cultivar	
Common Synonym(s)	*Juniperus californica* Carrière var. *siskiyouensis* L.F. Hend. (1) *Juniperus occidentalis* Hook. var. *occidentalis (1)* *Sabina occidentalis* (Hook.) A. Heller (1)
Common Name(s)	Western Juniper (1) Sierra Juniper (2)
Species Code (as per USDA Plants database)	JUOC
GENERAL INFORMATION	
Geographical range	North American Distribution (1)  Washington State Distribution (1)

	
Ecological distribution	Western juniper is distributed dry forested or woodland ecosystems that receive 9 to 14 inches of rainfall every year (9). Soil tends to be characterized as rocky which this plant does very well in (2). Ecosystems that have rare natural fires are also a common characteristic in which western juniper ecosystem thrive. They are highly flammable and suppressed fire in ecosystems facilitates their expansion (10).
Climate and elevation range	Western juniper occurs in continental climates which are semiarid with hot summers and cold winters, very similar to the intermountain regions (2)
Local habitat and abundance	In many northern stands such as those found in Oregon and Washington western juniper is a single species overstory. In ecosystem transition zones the most common associated plant species are ponderosa pine and curlleaf mountain-mahogany. Shrub associates include Big sagebrush which is commonly found along the western juniper range. (2)
Plant strategy type / successional stage	In areas of high elevations, shade, and precipitation it is a minor species and isn't able to develop extensive stands as it is able to in the 9 to 14 inch precipitation range. Although it is not able to compete in very wet conditions this allows for a niche in dry conditions where most trees cannot tolerate. (2) Rocky and dry sites where competitors such as ponderosa pine and coast Douglas-fir are less able to establish provide western juniper a habitat in which it can colonize and develop wide cover.
Plant characteristics	Western juniper is a tree species that is part of the gymnosperm group and is defined as a perennial (1). The height of a mature tree ranges from 13 to 33 feet depending on environmental conditions, although on occasions the tree can grow to 87 feet (3).
PROPAGATION DETAILS	

Propagation by Seed	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Propagules
Stock Type	Due to the low germination rates and viability of western juniper seeds they are not very uncommon to nurseries and therefore have limited information on propagation techniques and information.
Time to Grow	N/A
Target Specifications	N/A
Propagule Collection Instructions	Fruits can be collected after they naturally fall off of a tree. They can also be picked by hand when they are mature. Caution must be taken when handpicking in order to avoid obtaining an unripe fruit instead of the two year old ripe fruit.
Propagule Processing/Propagule Characteristics	N/A
Pre-Planting Propagule Treatments	For best results, collected fruits should be stored in shallow piles or thinly laid out on trays in order to prevent over heating prior to seed extraction. Seeds can be extracted from fruit using a macerator or hammermill with water. Presoaking techniques with lye solution containing 1.25 grams sodium hydroxide per liter for 1 to 2 days can help remove resinous pulp from the seeds before storage. After soaking, the seeds should be washed to remove any residual solution and then stored dry in sealed containers at -2 ° to 4 ° C with a moisture content of 10% (3). Dormancy of seeds is due seed coat or embryo dormancy, the latter is currently unknown in the scientific community. In order to overcome seed coat dormancy imbibing techniques on the seed are used to allow inhibitors to leach out. Seeds can be scarified by soaking in acid or bases and then placed in moist and cool conditions (5, 8).
Growing Area Preparation / Annual Practices for Perennial Crops	N/A
Establishment Phase Details	
Length of Establishment Phase	
Active Growth Phase	Germination requires a continuous period of unknown cool temperature. As the plant germinated it send a long tap root deep into the soil. At about 10 years, is when the lateral root system begins to expands (7).
Length of Active Growth Phase	Growth rates actively increase in rate at about 15 years

	until full maturity which usually occurs at 90 years of age when the tree near maximum height of 30 to 40 feet (7).
Hardening Phase	N/A
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	N/A
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	N/A
INFORMATION SOURCES	
References	(1) Plants Database. USDA Natural Resrouces Conservation Service, 20 May. 2015. Web. (2) Western Juniper. Volume 1. Silvics Manual, 20 May. 2015. Web. (3) Sowder, James E., and Edwin L. Mowat. 1965. Western juniper (Juniperus occidentalis Hook.). In Silvics of forest trees of the United States. p. 223-225. H. A. Fowells, comp. U.S. Department of Agriculture, Agriculture Handbook 271. Washington, DC. (4) Johnsen, Thomas N., Jr., and Robert A. Alexander. 1974. Juniperus L. Juniper. In Seeds of woody plants in the United States. p. 460-469. C. S. Schopmeyer, tech. coord. U.S. Department of Agriculture, Agriculture Handbook 450. Washington, DC. (5) Masamba, Chris. 1994. Presowing seed treatments on four African Acacia species: appropriate technology for use in forestry for rural development. Forest Ecology and Management 64: 105-109. (6) Lee, S.; Cregg, C.M.; Fleege, C. 1995. Propagation of Juniperus: Challenges to Propagation and Opportunities for Improvement In: Landis, TD.; Cregg, B., tech. coords. National Proceedings, Forest and Conservation Nursery Associations. Gen. Tech. Rep. PNW-GTR-365. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific NorthwestResearch Station: 47-51. Available http://www.fcnanet.org/proceedings/1995/lee.pdf (7) Western juniper its impact and management in Oregon rangelands. Oregon State University, 20

	May. 2015. Web. (8) Van Haverbeke, D. F. and Comer, C. W. 1985. Effects of treatment and seed source ogermination of eastern redcedar seed. USDA Forest Service, Research Paper RM-263,1- 7 (9) Belsky, A.J. 1996. Viewpoint: Western juniper expansion: Is it a threat to arid northwestern ecosystems? J. Range Manage. 49:53-59 (10) Eddleman, L.E., R.F. Miller, P.M. Miller, and P.L. Dysart. 1994. Western juniper woodlands (of the Pacific Northwest): science assessment. Unpublished scientific contract report solicited by and on file with the Interior Columbia Basin Ecosystem Management Project, Walla Walla, Washington. 131 pp.
Other Sources Consulted	N/A
Protocol Author	Don Rollolazo
Date Protocol Created or Updated	Created 5/20/15