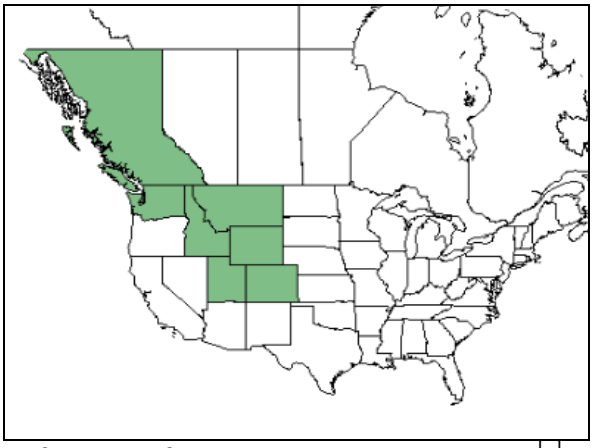
Plant Propagation Protocol for *Salix cascadensis*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/SACA6.pdf



Left: Image from USDA Plants Database [1]
Right: Image from Burke Museum of Natural History & Culture [2]

TAXONOMY	
Plant Family	
Scientific Name	Salicaceae
Common Name	Willow family
Species Scientific Name	
Scientific Name	*Salix cascadensis* Cockerell.
Varieties	N/A
Sub-species	N/A
Cultivar	N/A
Common Synonym(s)	*Salix brownie* (Andersson) Bebb var. tenera (Andersson) M.E. Jones, *Salix cascadensis* Cockerell var. thompsonii Brayshaw, *Salix tenera* Andersson [1].
Common Name(s)	Cascade willow
Species Code (as per USDA Plants database)	SACA6
GENERAL INFORMATION	
Geographical range	USA (CO, ID, MT, UT, WA, WY), CAN (BC) [1]. *See Distribution Maps
Ecological distribution	*S. cascadensis* is found on rocky bluffs, barren slopes, high subalpine meadows, and alpine tundra [3].
Climate and elevation range	Cascade willow grows in dry alpine environments between 2,220 and 3,900 meters in elevation [4].
Local habitat and abundance	This shrub occurs from Pemberton south in the Cascades to Mount Rainier [6].
Plant strategy type / successional stage	Cascade willow is drought tolerant, sun tolerant, and grows well in sandy soils [11].

Plant characteristics	This low growing shrub reaches a maximum height of 15 cm and forms thick rhizomatous mats with stems erect or trailing [5]. Leaves are pea-green, 2.5 cm long, alternate, lance-shaped with short petioles [6]. Dioecious flowers. Forms light pink spikes at the tips of lateral branches. Bloom time is early July through early August [7]. Fruits are lance shaped capsules 4-5 mm in length[7].
PROPAGATION DETAILS	
Propagation of *Salix* by seed, as explained by David Dreesen [8]	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug).
Stock Type	N/A
Time to Grow	1 year
Target Specifications	Consolidated root mass sufficient to prevent root ball disintegration during out-planting.
Propagule Collection Instructions	The most critical factor in collecting viable *Salix* seed is observation of catkin development. Catkin harvest should coincide with the appearance of cotton emerging from partially opened capsules. Place female catkins in paper sacks as soon as possible to prevent moisture buildup and promptly dry them to allow seed to be captured as they emerge from capsules.
Propagule Processing/Propagule Characteristics	*Salix* seed can be cleaned using an air stream and soil screens.
Pre-Planting Propagule Treatments	Seeds exhibited physiological dormancy. Seeds are placed in cold moist stratification for 30 days. Germination occurs at 25° C
Growing Area Preparation / Annual Practices for Perennial Crops	"Mini-plug" trays containing 512 cells. In the case of species with poor germination percentages, the use of mini-plugs can save space, but in the case of Salix seed, which generally has high germination percentages, the space saving advantage is minimal. Media: sphagnum peat moss (Sunshine #1) and perlite. The very small size of Salix seed (about 1 mm in length and 0.3 to 0.5 mm in width) makes precise seed

	dispersal difficult. The addition of perlite of similar size might be of some benefit in achieving more precise sowing by hand. The plug medium surface must be kept continuously moist. Thinning is usually performed at the time of mini-plug transplanting or after transplanting into the next container size.
Establishment Phase Details	Once established, transplant to Ray Leach Super Cell - 164 ml volume. Growing Media: 2 parts Sunshine #1 or #2 with 1 part perlite. 6 lb (2.7 kg) of controlled release fertilizer (CRF) Osmocote Plus 15-9-12 (3-4 month release)
Length of Establishment Phase	Unknown
Active Growth Phase	Unknown
Length of Active Growth Phase	Unknown
Hardening Phase	Watering frequency is reduced in late September to early October to promote hardening-off.
Length of Hardening Phase	Unknown
Harvesting, Storage and Shipping	Unknown
Length of Storage	Unknown
Guidelines for Outplanting / Performance on Typical Sites	Unknown
Other Comments	N/A
PROPAGATION DETAILS	
Propagation of *Salix* by vegetative cutting, as explained by Tara Luna[9] and Roseann Barnhill[10].	
Ecotype	Talus slopes, Siyeh Pass, 2362m elev., Glacier National Park, Glacier Co., MT.
Propagation Goal	Plants.
Propagation Method	Vegetative.
Product Type	Container (plug).
Stock Type	N/A
Time to Grow	1 year.
Target Specifications	Firmly rooted plug.
Propagule Collection Instructions	Hardwood or softwood stem cuttings collected after snowmelt at high elevation [9]. Collect hardwood tip cuttings before lead bud break dormancy while softwood tip cuttings should be collected when stems are fully leafed [9]. Cuttings should be 3-5 cm in length and 4 mm in caliper.
Propagule Processing/Propagule Characteristics	Keep cuttings moist and refrigerated until ready for propagation [9, 10].

Pre-Planting Propagule Treatments	Treat with 1000 ppm IBA, then stick cuttings in a misted tray with bottom heat for 2-4 weeks [9].
Growing Area Preparation / Annual Practices for Perennial Crops	Frequent, short duration misting in propagation tents with bottom heat maintained at 21°C [9]. Growing medium: 50% perlite and 50% sand [10].
Establishment Phase Details	Approximately 2 to 4 weeks from rooting to transplanting outside [9].
Length of Establishment Phase	4 weeks.
Active Growth Phase	After successful rooting, pot cuttings into 800 ml containers using a medium composed of 70% 6:1:1 peat, perlite, and vermiculite and 30% sand with Osmocote and Micromax fertilizer [9]. 4 week growth period in shade house then placed outside in full sun exposure [9, 10].
Length of Active Growth Phase	6 weeks.
Hardening Phase	Irrigation gradually reduced from September to October [9].
Length of Hardening Phase	4 weeks.
Harvesting, Storage and Shipping	Harvest time is one year. Overwintered in outdoor nursery under insulation foam and snow [9].
Length of Storage	5 weeks.
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	N/A

INFORMATION SOURCES

References	*See below
Other Sources Consulted	Argus, G.W. *The Genus Salix in Alaska and the Yukon*. National Museum of Natural Sciences Publications in Botany, No. 2. Canada. Densmore, R. and Zasada, J. C. (1983). Seed dispersal and dormancy patterns in northern willows: Ecological and evolutionary significance. Can. J. Bot. 61, 3207-3216 Lauron-Moreau, A., Pitre, F. E., Argus, G. W., Labrecque, M., & Brouillet, L. (2015). Phylogenetic Relationships of American Willows (*Salix* L., Salicaceae).*PLoS ONE*, *10*(4), e0121965. http://doi.org/10.1371/journal.pone.0121965
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References

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[3] NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [Internet]. Version 7.1 Arlington, Virginia. Available from: http://explorer.natureserve.org. [Cited 21 May 2016].

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[5]Lyons, C., W. Merilees. *Trees and Shrubs to Know in Washington and British Columbia.* Lone Pine Publishing. Page 106.

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[7]Dorn, R.D. 2010. The genus Salix in North America. Cascade Willow -Salix cascadensis. Montana Field Guide [Internet]. Montana Natural Heritage Program. Available from: http://FieldGuide.mt.gov/speciesDetail.aspx?elcode=PDSAL020N0. [Cited 21 May 2016]

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[9]Luna, Tara; Evans, Jeff; Wick, Dale. 2008. Propagation protocol for production of Container (plug) *Salix reticulata* L. plants 800 ml containers; USDI NPS - Glacier National Park West Glacier, Montana. US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. Available from: http://NativePlantNetwork. [Cited 21 May 2016].

[10]Barnhill, R. (12 May 2016). Nursery manager at Msk Nursery, Shoreline, WA. Personal interview.