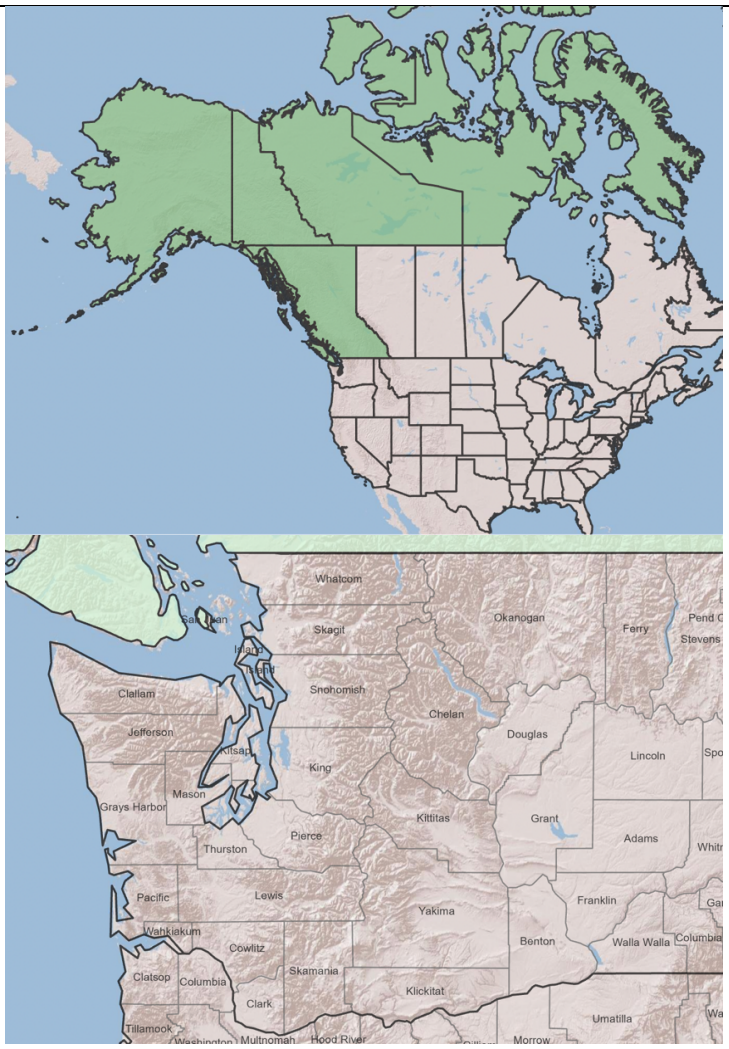
Plant Propagation Protocol for *Salix pulchra*

ESRM 412 – Native Plant Production

URL: https://courses.washington.edu/esrm412/protocols/2023/SAPU15.pdf

TAXONOMY	
Plant Family	
Scientific Name	Salicaceae
Common Name	Willow
Species Scientific Name	
Scientific Name	*Salix pulchra* Cham.
Varieties	*Salix pulchra* Cham. var. *looffiae* C.R. Ball *Salix pulchra* Cham. var. *palmeri* C.R. Ball *Salix pulchra* Cham. var. *yukonensis* C.K. Schneid (1)
Sub-species	None
Cultivar	None
Common Synonym(s)	*Salix arbusculoides* Andersson var. *glabra* (Andersson) Andersson ex C.K. Schneid. *Salix barclayi* Andersson var. *hebecarpa* *Salix fulcrata* Andersson var. *subglauca* *Salix phylicoides* Andersson *Salix phylicifolia* L. ssp. *pulchra* (Cham.) Hultén *Salix phylicifolia* L. var. *subglauca* (Andersson) B. Boivin *Salix planifolia* Pursh ssp. *pulchra* (Cham.) Argus *Salix planifolia* Pursh var. *yukonensis* (C.K. Schneid.) Argus (1)
Common Name(s)	Tealeaf willow Diamond willow Diamondleaf willow Flatleaf willow Flat-leaved willow Paneleaf willow Thin red willow (2)
Species Code	SAPU15
GENERAL INFORMATION	
Geographical range	Western and North Canada, Alaska, Washington (San Juan Islands)

	 Copyright:(c) 2014 Esri | USDA-NRCS-NGCE & NPDT (1)
Ecological distribution	floodplain terraces arctic and alpine tundra on riverbanks, islands, rivers, terraces, and on rolling uplands dense along riparian areas thickets above timberline sedge-shrub tundra communities shrubby tundra communities (2)
Climate and elevation range	Cold climate species, minimum temperature of -62 °F, with a minimum of 47 frost free days. (1) Can range from low level riparian lands and above alpine timberlines. (2)
Local habitat and abundance	dominant or codominant in numerous sedge-shrub tundra communities: aquatic sedge (Carex aquatilis), Bigelow sedge (C. bigelowii), shortstalk sedge (C. microchaeta), Richardson willow (Salix lanata) netleaf willow (S.reticulata),

	dwarf birches (Betula spp.), numerous huckleberries (Vaccinium spp.), northern Labrador-tea (Ledum palustre), grayleaf willow (S. glauca) (2)
Plant strategy type / successional stage	Early successional plant that colonizes after disturbances such as fire and floods. Will get out competed in shaded environments. Perennial species. Creates thickets in riparian areas and above timber line. (2)
Plant characteristics	Shrub/Tree Mature trees ~6ft Short Lived Yellow catkins in spring on female plants Separate male and female plants Seeds in white cotton mass when matured (1)  Image: Central Yukon Species Inventory Project (2)
SEEDING PROPAGATION DETAILS	
Ecotype	N/a
Propagation Goal	Plants and/or cuttings
Propagation Method	Seed
Product Type	Container (plug)-RNGR (3)
Stock Type	Wild
Time to Grow	No data
Target Specifications	Site Specific Wild versus restoration sites.
Propagule Collection Instructions	Seed production starts in young plants (between 2 and 10 years) (2) Seeds generally mature in late May, June dispersal occurs later with increasing latitude and elevation. (2) Seeds burst out of fruits when ripe, covered in white fluffy down to aid in dispersal. Hard to collect if not right as ripens. Can place bags around fertilized female catkins to capture seeds when they ripen. (5)
Propagule Processing/Propagule Characteristics	Seeds germination generally occurs as soon as the seed is moistened. Germination occurs within 24 hours of dispersal on moist seedbeds. (3)
Pre-Planting Propagule Treatments	Seeds only remain viable for about 1 week. (2) Seeds are non-dormant, no stratification or scarification required.

	Seeds may be cleaned, use 3 soil screens in a series from top to bottom of 250 µm (# 60), 500 µm (# 35), 125 µm (# 120) and a blow dryer or condensed air source to blow off extra fluff chaff. (5)
Growing Area Preparation / Annual Practices for Perennial Crops	In field exposed mineral soils provide the best seedbed, germination is inhibited by litter. (2) Use a good seeding germination mix with these characteristics: high water holding capacity, porous with good drainage, aerated, with necessary nutrients (2) Containers 1GTP containers (based on common willow propagation protocol). (5)
Establishment Phase Details	Germinate in temperatures 41 – 77°F (5-25°C). (3) Keep seed beds moist but not saturated.
Length of Establishment Phase	Majority seeds germinated within 1 to 3 Days (2)
Active Growth Phase	No data
Length of Active Growth Phase	No data
Hardening Phase	No data
Length of Hardening Phase	No data
Harvesting, Storage and Shipping	No data
Length of Storage	No data
Guidelines for Outplanting / Performance on Typical Sites	No data
Other Comments	Seedling propagation is not the common or preferred method of propagation, especially for restoration. This is due to difficulty obtaining ripe and viable seeds in from remote tundra environments, since there are no commercial sellers of seeds. One way to increase seed propagation of *Salix pulchra* is to vegetatively propagate cuttings and use them to create a stock orchard which you can then collect seed from. (4) (5) Propagation protocol based on established and experimented methods for willows in general and synonymous species, *Salix planifolia* Pursh ssp. *pulchra.*
PROPAGATION DETAILS Vegetative	
Ecotype	N/a
Propagation Goal	Plants and/or cuttings
Propagation Method	Vegetative
Product Type	Bareroot (field grown) and/or Container (plug)
Stock Type	Wild
Time to Grow	2 months for adequate out planting root system formation. Or directly out planted in field after cutting in fall season.
Target Specifications	Large stable root system to withstand out planting conditions

Propagule Collection Instructions	Collection in spring or fall seasons when *Salix pulchra* is dormant. Cuttings can be taken from established mature (2 to 10-year-old) tree/shrubs. (2)
Propagule Processing/Propagule Characteristics	Can be cuttings or bundles of cuttings.
Pre-Planting Propagule Treatments	If collecting in fall or spring and not directly out planting, then cuttings must be stored dormant over the winter. Can be stored using a moist and water retaining medium such as moss or vermiculite around the proximal end of the cutting and wrapping in a tarp or plastic. These should be stored at 0-4 °C freezer or cooler, or outside in snowbank in shade. If collecting in fall can also directly outplant in field. Once removed from storage give 2-4 days of acclimation before planting. Soak cuttings for 24-48 hours in water before propagating. (4)
Growing Area Preparation / Annual Practices for Perennial Crops	Growing media should have the following characteristics: Moist, high-water retention, good drainage, good structural support, available nutrients. An example of this medium would be 50:50 peatmoss and potting mix. Placed on. Mist bench until root formation to prevent desiccation. Can be started in smaller containers until roots developed then should be transplanted into larger gallon containers to avoid spiraling roots.
Establishment Phase Details	Advantageous root growth on section of cutting under medium. Can be callused to promote root growth.
Length of Establishment Phase	Should root easily and quickly. (2)
Active Growth Phase	No data
Length of Active Growth Phase	No data
Hardening Phase	No data
Length of Hardening Phase	No data
Harvesting, Storage and Shipping	N/a
Length of Storage	N/a
Guidelines for Outplanting / Performance on Typical Sites	Should be out planted in the fall season when the ground is still moist but not frozen. (4)
Other Comments	Vegetative propagation is the easiest and most common method or propagation of *Salix pulchra.* The plant readily vegetatively grows in nature and is very easy to root as part of its life strategy. (1)

	Propagation protocol based on established and experimented methods for willows in general and synonymous species, *Salix planifolia* Pursh ssp. *pulchra.*
INFORMATION SOURCES	
References	[1] *Salix pulchra Cham.* USDA plants database. (n.d.). Retrieved May 2023, from https://plants.usda.gov/home/plantProfile?symbol=SAPU15 [2] Uchytil, Ronald J. 1991. Salix pulchra. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: https://www.fs.usda.gov/database/feis/plants/shrub/salpul/all.html [2023, May] [3] Baskin, Jerry M.; Baskin, Carol C.. 2002. Propagation protocol for production of Container (plug) *Salix planifolia* Pursh plants University of Kentucky Lexington, Kentucky. In: Native Plant Network. URL: https://NativePlantNetwork.org (accessed 2023/05/03). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. [2023, May] [4] Ficko, S. A. (2022). *Development of shrub and lichen-dominated biocrust propagation and establishment techniques for reclamation in Northern Environments* (thesis). University of Alberta, Alberta. https://doi.org/10.7939/r3-v3xt-ta78 [2023, May] [5] Dreesen, D. R. (2003). *Propagation protocol for container willows* . Retrieved May 2023, from https://npj.uwpress.org/content/wpnpj/4/2/118.full.pdf.
Other Sources Consulted	- Roseann Densmore and John Zasada. 2011. Seed dispersal and dormancy patterns in northern willows: ecological and evolutionary significance. *Canadian Journal of Botany*.**61**(12): 3207-3216. https://doi.org/10.1139/b83-358 - Bliss, L. C. (1958). Seed Germination in Arctic and Alpine Species. *Arctic*, *11*(3), 180–188. http://www.jstor.org/stable/40506786
Protocol Author	Sophie Garcia
Date Protocol Created	05/03/2023