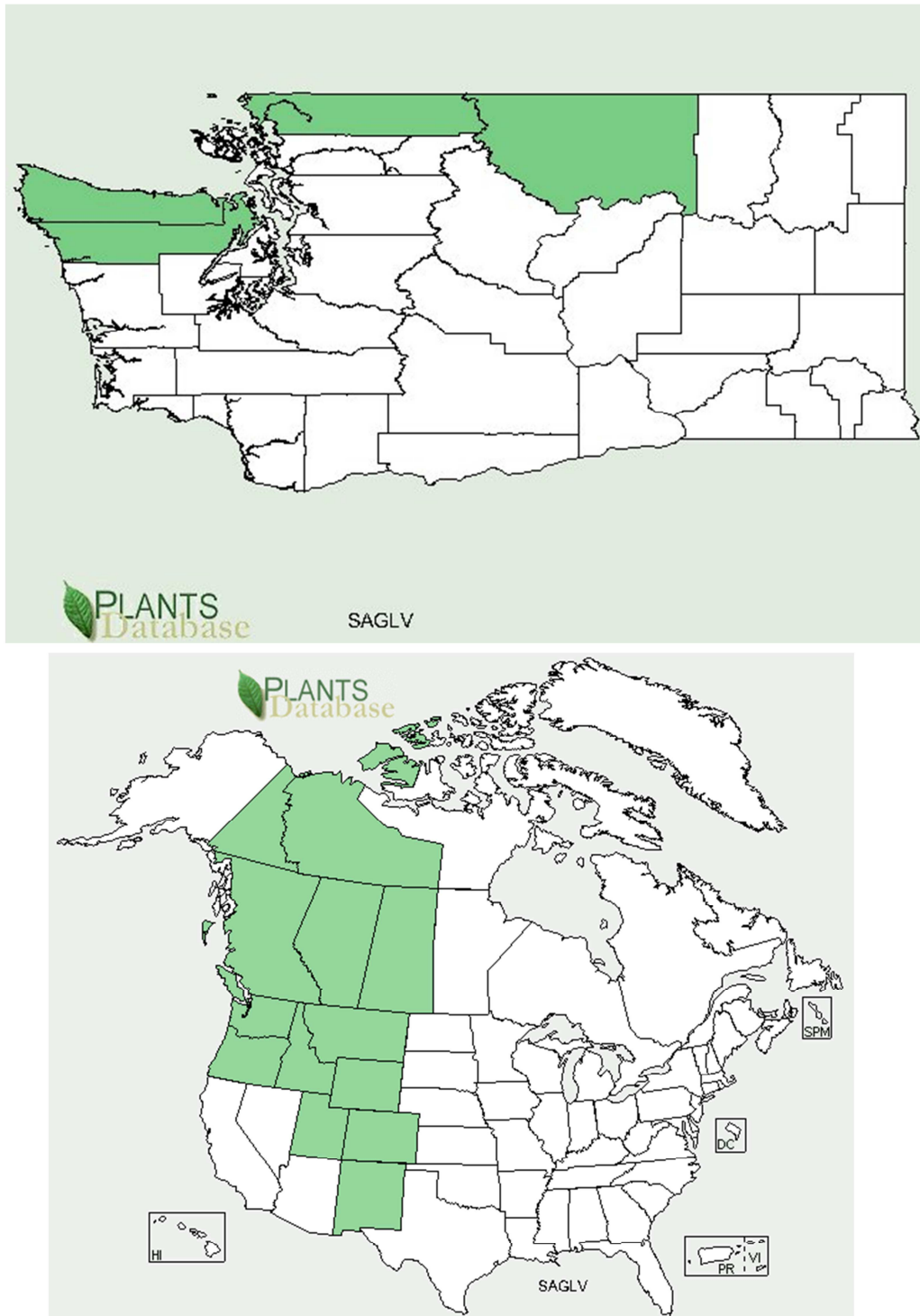


**Plant Propagation Protocol for *Salix glauca* L. ssp. *glauca* var. *villosa* (D. Don ex Hook.)
Andersson
ESRM 412 – Native Plant Production**



Figs. 1 and 2 – Distribution Maps, USDA Native Plant Database. [1]

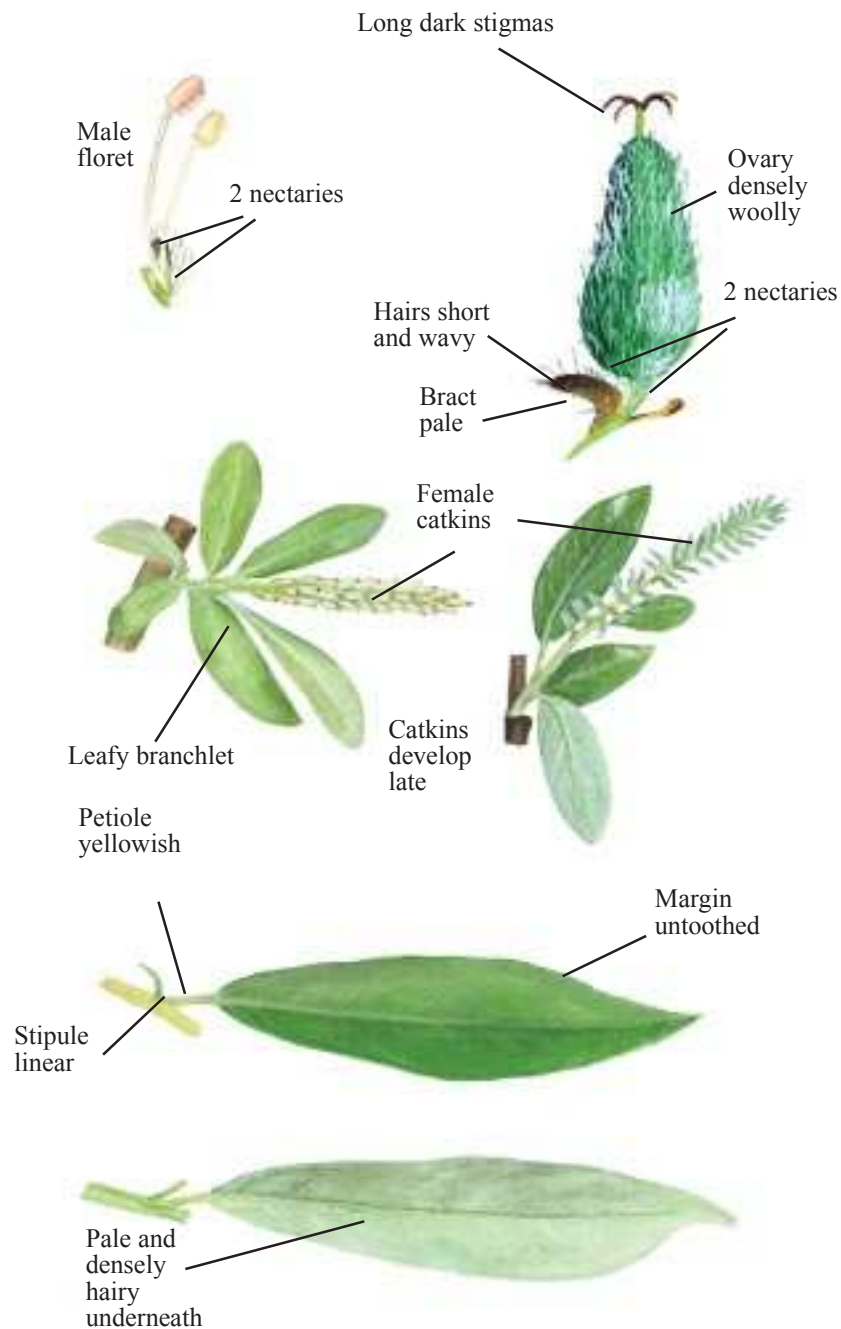


Figure 3. Summer description from Colette, D. "Willows of Alaska." 2004. [18]

Note: Subspecies of *S. glauca* are difficult to differentiate and often hybridize naturally. Therefore, this protocol includes information at the species and sub-species level.

TAXONOMY	
Family Names	
Family Scientific Name:	Salicaceae
Family Common Name:	Willow
Scientific Names	
Genus:	Salix
Species:	Glauc
Species Authority:	Linnaeus
Variety:	Villosa
Sub-species:	Glauc
Cultivar:	
Authority for Variety/Sub-species:	D. Don ex Hook
Common Synonym(s) (include full scientific names (e.g., <i>Elymus glaucus</i> Buckley), including variety or subspecies information)	SAARS <i>Salix arctica</i> Pall. var. <i>subcordata</i> (Andersson) C.K. Schneid. SADE7 <i>Salix desertorum</i> Richardson SADEE <i>Salix desertorum</i> Richardson var. <i>elata</i> Andersson SAGLD <i>Salix glauca</i> L. ssp. <i>desertorum</i> (Richardson) Hultén SAGLG3 <i>Salix glauca</i> L. ssp. <i>glabrescens</i> (Andersson) Hultén SAGLG5 <i>Salix glauca</i> L. var. <i>glabrescens</i> (Andersson) C.K. Schneid. SAGLK <i>Salix glauca</i> L. var. <i>kenosha</i> (L. Kelso) L. Kelso SAGLP2 <i>Salix glauca</i> L. var. <i>pseudolapponum</i> (Seemen) L. Kelso SAGLS3 <i>Salix glauca</i> L. var. <i>sericea</i> Hultén SAGLS4 <i>Salix glauca</i> L. var. <i>subincurva</i> (E.H. Kelso) L. Kelso SAGL10 <i>Salix glaucops</i> Andersson SAGLG4 <i>Salix glaucops</i> Andersson var. <i>glabrescens</i> Andersson SAGLV2 <i>Salix glaucops</i> Andersson var. <i>villosa</i> (D. Don ex Hook.) Andersson SANU7 <i>Salix nudescens</i> Rydb. SAPS4 <i>Salix pseudolapponum</i> Seemen SAPSK <i>Salix pseudolapponum</i> Seemen var. <i>kenosha</i> L. Kelso SAPSS <i>Salix pseudolapponum</i> Seemen var. <i>subincurva</i> E.H. Kelso SASU10 <i>Salix subcordata</i> Andersson SAVI10 <i>Salix villosa</i> D. Don ex Hook. SAWOP <i>Salix wolfii</i> Bebb var. <i>pseudolapponum</i> (Seemen) M.E. Jones SAWY <i>Salix wyomingensis</i> Rydb.
Common Name(s):	Grayleaf Willow

Species Code (as per USDA Plants database):	SAGLV
GENERAL INFORMATION	
Geographical range (distribution maps for North America and Washington state)	<p>For var. Villosa: L48 (WA, OR, ID, MT, WY, UT, CO, NM) CAN (YT, NT, BC, AB, SK) [1]</p> <p>For all subspecies of S. Glauca: “Grayleaf willow grows throughout most of Alaska except from the Aleutian Islands and along the southeastern coast. [2] It grows through much of northern Canada from Newfoundland northwest to the northern Yukon Territory, and south to southern British Columbia and Alberta. In the contiguous United States, it grows in alpine and subalpine habitats in Montana, Wyoming, eastern Idaho, Colorado, Utah, and northern New Mexico. [3]” [4]</p>
Ecological distribution (ecosystems it occurs in, etc):	<p>For all subspecies of S. Glauca: “In Alaska and northern Canada, grayleaf willow grows on both uplands and lowlands. In arctic tundra it often grows along river and streambanks, on sandy and gravelly floodplains, and on old benches [5, 2]. In boreal environments, it grows as scattered shrubs in white and black spruce (Picea mariana) woodlands, in black spruce muskegs, and on river floodplains [5, 2].</p> <p>In the Rocky Mountains grayleaf willow is restricted to open, alpine and subalpine habitats that commonly have rocky, well-drained soils [3, 6].” [4]</p>
Climate and elevation range	<p>For var. Villosa: “Elevation 8500-12,500 feet.” [14]</p>
Local habitat and abundance; may include commonly associated species	<p>For var. Villosa: “Alpine and subalpine meadows and slopes. Walford et al. (1997) describe a Salix glauca vegetation type composed of a low shrub layer of S. glauca and S. planifolia on subalpine benches and glacial moraines.” [14]</p> <p>For all subspecies of S. glauca. “In Alaska and northwestern Canada, grayleaf willow dominates or codominates numerous seral willow (Salix spp.) and mixed-shrub floodplain communities. Riparian community associates include Alaska willow (S. alaxensis), littletree willow (S. arbusculoides), Richardson willow (S. lanata), diamondleaf willow (S. planifolia), and green alder (Alnus crispa) [10]. It also codominates in some mixed-shrub tundra communities with birches (Betula spp.), alders (Alnus spp.), and other willows [10].</p> <p>In the Rocky Mountain States, grayleaf willow/tufted hairgrass (Deschampsia cespitosa) communities occupy well-drained, open alpine</p>

	<p>and upper subalpine habitats [11, 12]</p> <p>Grayleaf willow occurs as scattered individuals in many boreal forests and woodlands. It is seldom an understory dominant, except in early seral stages. Douglas [13], however, described a 130- to 160-year-old white spruce (<i>Picea glauca</i>)/grayleaf willow community in southwestern Yukon Territory.” [4]</p>
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	<p>For all sub-species of <i>S. glauca</i>:</p> <p>“Grayleaf willow is an early seral species. It pioneers freshly deposited river alluvium, glacial outwash, and disturbed areas with exposed mineral soil, such as road cuts and mine tailings [2]. It is also common in spruce woodlands following fire, especially in stands about 20 to 30 years old [7, 8]. It has been found in 160-year-old open spruce woodlands [9], but it is usually displaced in densely forested stands because of its shade intolerance.”[4]</p>
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	<p>For var. <i>Villosa</i>:</p> <p>“Low to medium shrub, mostly less than 1 (2) m high; twigs mostly densely hairy, (occasionally sparsely so), dark gray, yellow, or reddish; leaves with blades mostly elliptic to oblanceolate, 3-8 cm long, 0.7-3.5 cm wide, the upper surface green, lower surface glaucous, both surfaces glabrous to sparsely hairy at maturity; margins entire or with shallow, occasionally glandular teeth; petioles 3-10 (16) mm long, yellowish to brownish; stipules less than 1 mm long and deciduous; pistillate catkins 2-5 (6) cm, appearing with the leaves on densely-pubescent, leafy flowering branchlets 0.5-3.5 mm long; capsules pubescent, 4-8 mm on 0-1.5 mm stalks; styles 0.3-1.5 mm; staminate catkins 12-30 mm long with 2 stamens per flower; flowering bracts light brown to black, hairy, persistent in fruit.” [14]</p> <p>For all sub-species of <i>S. glauca</i>:</p> <p>“Grayleaf willow commonly grows as an erect shrub 3 to 4 feet (0.9-1.2 m) tall. On exposed tundra sites it grows as a low, semiprostrate shrub, and on favorable sites it sometimes grows up to 20 feet (6 m) in height and 5 inches (12 cm) in diameter [2]. The bark is gray and smooth but may become rough and furrowed on larger individuals. Male and female flowers occur on separate plants in 3/4- to 2-inch-long (2-5 cm) catkins that persist over the summer. The fruit is a 1/32- to 1/16-inch-long (0.8-1.6 mm) two-valved capsule [2].</p> <p>Two growth forms occur in the Rocky Mountains. In somewhat sheltered locations in subalpine environments, plants are upright and taller, while semiprostrate plants that are often difficult to distinguish from arctic willow (<i>S. arctica</i>) grow in more exposed, alpine situations [3].” [4]</p>
PROPAGATION DETAILS	
Ecotype (this is meant primarily for	

experimentally derived protocols, and is a description of where the seed that was tested came from):	
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Plants [15] “Winter cuttings do not root well and are not recommended for revegetation projects.” [18]
Propagation Method (Options: Seed or Vegetative):	Seed [15]
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container (plug) [15]
Stock Type:	
Time to Grow (from seeding until plants are ready to be outplanted):	
Target Specifications (size or characteristics of target plants to be produced):	
Propagule Collection (how, when, etc):	
Propagule Processing/Prop	“Seeds exhibit physiological dormancy.” [15]

agule Characteristics (including seed density (# per pound), seed longevity, etc):	
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	“Seeds are placed in cold moist stratification for 30 days. Germination occurs at 25 C.” [15]
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	
Establishment Phase (from seeding to germination):	
Length of Establishment Phase:	
Active Growth Phase (from germination until plants are no longer actively growing):	
Length of Active Growth Phase:	
Hardening Phase (from end of active growth phase to end of growing season; primarily related to the development of cold-hardiness and preparation	

for winter):	
Length of Hardening Phase:	
Harvesting, Storage and Shipping (of seedlings):	
Length of Storage (of seedlings, between nursery and outplanting):	
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	
Other Comments (including collection restrictions or guidelines, if available):	
INFORMATION SOURCES	
References (full citations):	<ol style="list-style-type: none"> 1. USDA, NRCS. 2012. The PLANTS Database (http://plants.usda.gov, 11 May 2012). 2. Viereck, Leslie A.; Little, Elbert L., Jr. 1972. Alaska trees and shrubs. Agric. Handb. 410. Washington, DC: U.S. Department of Agriculture, Forest Service. 265 p. (for distribution) 3. Dorn, Robert D. 1977. Willows of the Rocky Mountain States. Rhodora. 79: 390-429. [6000] 4. Uchytel, Ronald J. 1992. Salix glauca. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2012, May 12]. 5. Argus, George W. 1973. The genus Salix in Alaska and the Yukon. Publications in Botany, No. 2. Ottawa, ON: National Museums of Canada, National Museum of Natural Sciences. 279 p. [6167] 6. Padgett, Wayne G.; Youngblood, Andrew P.; Winward, Alma H.

	<p>1989. Riparian community type classification of Utah and southeastern Idaho. R4-Ecol-89-01. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Region. 191 p. [11360]</p> <p>7. Foote, M. Joan. 1983. Classification, description, and dynamics of plant communities after fire in the taiga of interior Alaska. Res. Pap. PNW-307. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 108 p. [7080]</p> <p>8. Lutz, H. J. 1956. Ecological effects of forest fires in the interior of Alaska. Tech. Bull. No. 1133. Washington, DC: U.S. Department of Agriculture, Forest Service. 121 p. [7653]</p> <p>9. Douglas, George W. 1974. Montane zone vegetation of the Alsek River region, southwestern Yukon. Canadian Journal of Botany. 52: 2505-2532. [17283]</p> <p>10. Viereck, L. A.; Dyrness, C. T.; Batten, A. R.; Wenzlick, K. J. 1992. The Alaska vegetation classification. Gen. Tech. Rep. PNW-GTR-286. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 278 p. [2431]</p> <p>11. Komarkova, Vera. 1986. Habitat types on selected parts of the Gunnison and Uncompahgre National Forests. Final Report Contract No. 28-K2-234. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 270 p. [1369]</p> <p>12. Padgett, Wayne G.; Youngblood, Andrew P.; Winward, Alma H. 1989. Riparian community type classification of Utah and southeastern Idaho. R4-Ecol-89-01. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Region. 191 p. [11360]</p> <p>13. Douglas, George W. 1974. Montane zone vegetation of the Alsek River region, southwestern Yukon. Canadian Journal of Botany. 52: 2505-2532. 17283]</p> <p>14. Fertig, W. and S. Markow. "Guide to the Willows of Shoshone National Forest: A Component of the Ecological Types of the Shoshone National Forest Publication." June 1999. Available at http://www.uwyo.edu/wyndd/_files/docs/reports/wynddreports/n01fer01wyus.pdf. Accessed on May 12, 2012.</p> <p>15. Baskin, Carol C.; Baskin, Jerry M. 2002. Propagation protocol for production of container <i>Salix glauca</i> L. plants; University of Kentucky, Lexington, Kentucky. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 12 May 2012). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.</p> <p>16. 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.</p> <p>17. Baskin, C.J. and Baskin, J.M. Seeds: Ecology, Biogeography and</p>
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Other Sources Consulted (but that contained no pertinent information) (full citations):	
Protocol Author (First and last name):	Evan Henrich
Date Protocol Created or Updated (MM/DD/YY):	May 12, 2012

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