

United States
Department of
Agriculture

Soil
Conservation
Service

Corvallis
Plant Materials Center

Corvallis, Oregon



Native Willow Varieties for the Pacific Northwest



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Preface

The use of native plants for restoration and revegetation is receiving renewed popular interest nationwide. This document describes six willow varieties that are suitable for such purposes, if prudently and intelligently applied. They are:

- 'Clatsop' hooker willow
- 'Multnomah' Columbia River willow
- 'Nehalem' Pacific willow
- 'Placer' erect willow
- 'Plumas' sitka willow
- 'Rogue' arroyo willow

These willows were developed and are promoted in response to the need for locally adapted plant materials that can help stabilize eroding streambanks, improve water quality, and enhance or restore degraded wildlife habitat in the Pacific Northwest.

Although the authors have described each willow species "natural range" in general terms, the reader is encouraged to use official publications on local flora and other appropriate botanical references if more specific information on biogeography is desired. More attention is given instead to the concept of "area of adaptation" that, as used herein, encompasses a region of similar climate, soils, and topography within which a variety or strain is known or anticipated to do well. Although all the willows in this publication are considered either native to all or at least a part of western Washington, western Oregon, or northwestern California, "area of adaptation" for some may not be wholly contained within the known distribution of wild populations. For some varieties, the area of adaptation is wider and for others, it is narrower than the species "native" range. Ultimately, the end users of plants must decide whether or not these willow varieties, or any other plants, meet the particular ecological, physical, aesthetic, and legal requirements of a project.

Original sketches of the willows appearing in this publication were created by Gail Lovell, Beaverton, Oregon.

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All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis without regard to race, color, religion, sex, age, marital status, handicap, or national origin.

June 1993

Introduction

The U.S. Department of Agriculture, Soil Conservation Service, Plant Materials Center at Corvallis, Oregon, tests and selects native and introduced plants for conservation use in the Pacific Northwest. Woody plants are evaluated specifically for streambank stabilization, fish and wildlife habitat improvement, and other reclamation and erosion control purposes. After years of screening with public agencies and private landowners, the six willows described in this brochure were approved and released as cultivars (varieties of willows) by the Oregon Agricultural Experiment Station, Corvallis, Oregon, and the Washington Agricultural Research Center, Pullman, Washington. These varieties were not bred or hybridized but rather selected from native populations for certain characteristics such as stem density, form, survival, growth rate, and vigor.

Importance of willows

Riparian willows are valuable for erosion control. Large shrub types that have flexible stems will bend and form effective "bank liners" for streams during spring floods, while the fibrous roots help hold the soil in place year round. Most willows can reroot and resprout readily if broken or damaged by a storm, livestock, or debris flow. By resisting flow and helping to filter or intercept runoff water before it enters a stream, willows reduce sediment loads and improve water quality.

Willows are important for many wildlife species. Deer, elk, and moose browse the twigs and foliage and certain birds and small game eat the catkins and buds. The dense growth provides cover and nesting sites. The pollen is an important source of food for honey bees early in the spring. Willows also enhance aquatic habitat by attracting insects that fish feed on and by shading streams thereby reducing water temperatures.

Although short-lived and not pest free, willows are easy to establish, fast growing, generally hardy, and extremely effective when properly applied. Native species are useful for naturalized landscaping and maintaining or restoring endemic riparian and wetland plant communities. Some can be planted as windbreaks or screens, and others are useful for stabilizing dredge spoils or drawdown zones along the shores of manmade reservoirs. The selection of more vigorous ecotypes means better growth and survival for the intended purpose. Finally, male varieties that regenerate vegetatively, but do not spread by seed, are less likely to become weedy.

'Clatsop' hooker willow

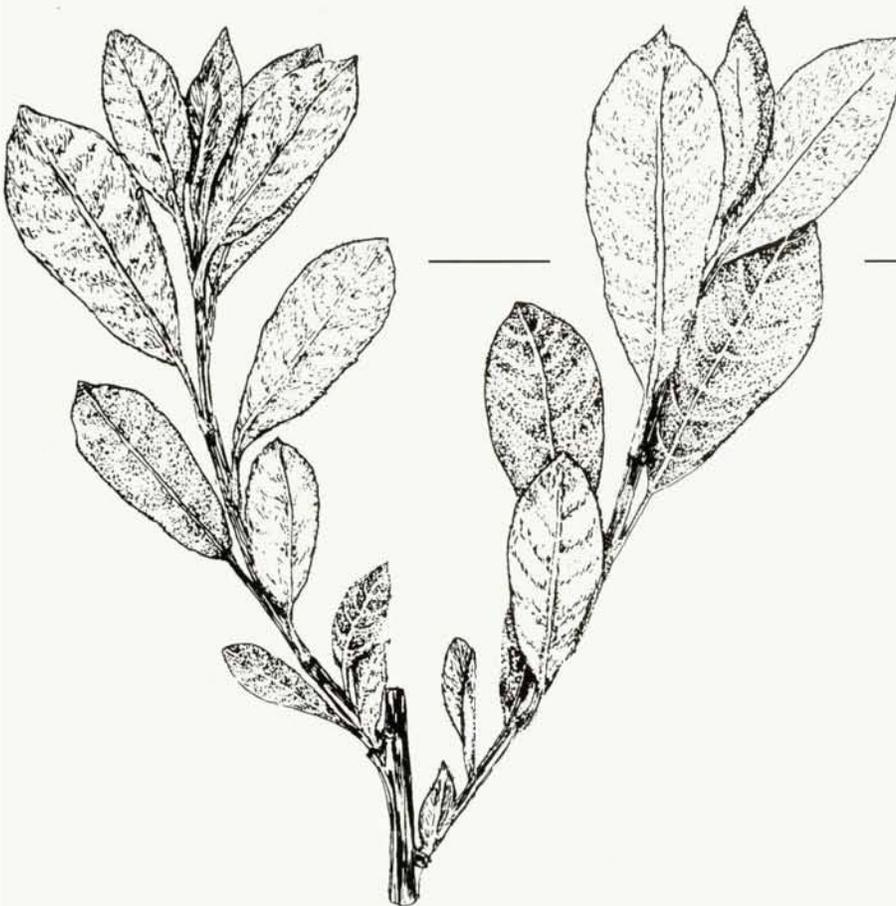
Hooker or coast willow is a medium to large shrub native to the coastal fog belt of northwestern California, Oregon, Washington, and southwestern British Columbia as well as the Yakutat Bay area of Alaska. It most commonly occurs on deflation plains or stabilized dunes, near lagoons, and along streams within 5 miles of the coast.

'Clatsop' is a cultivar of hooker willow well suited to streambank stabilization and the revegetation of coastal marshes or other moist, sandy areas. It may also be used for wildlife habitat improvement, natural area landscaping, windbreaks and screens in moist environments. Clatsop was cooperatively released in 1988.

Description

Clatsop hooker willow (*Salix hookeriana* Barratt ex Hook.) will grow to a height of 10 to 26 feet (3 – 8 m) depending on the site. Its overall appearance is typical of the species. Mature shrubs grown well spaced and in full sun are dense, multistemmed, and upright to broadly branching in form. The species can be distinguished in part by its stout hairy twigs and oblong shaped leaves that are thick, woolly beneath, and "leathery" to the touch. The broad leaves have margins that are smooth to somewhat wavy. They are alternate and deciduous, falling by mid to late November. Young twigs are green, and the bark of older limbs is dark gray.

The plant collection that led to the release of Clatsop was made in 1978 by the Soil Conservation Service. The original stand was found in Clatsop County, Oregon. Hooker willow, like most willows, bears male and female flowers on separate plants. Clatsop, however, is a female clone and, as such, bears only pistillate (female) catkins in March or April. They are upright, appear before the foliage, and are retained for several weeks.



Performance

Clatsop hooker willow (9004737, PI-508554) was evaluated in an observational row nursery against 105 clones or accessions comprising at least 8 native species. As the best of four clones of hooker willow tested, it was chosen for its attractive foliage, density, stout branching, and fewer observable disease symptoms. This variety demonstrated rapid initial growth the first few years after establishment.

In 40 field plantings along streams, watercourses, and on similar moist, low maintenance sites in western Oregon and Washington, the survival rate averaged 49 percent. Stands varied from 1 to 5 years old. Under severe grass competition, Clatsop rated higher in terms of vigor and was more persistent than six out of seven willows, including 'Bankers' dwarf willow (*Salix x cotetti*). Where proper site selection and planting methods were used, survival has exceeded 80 percent.

Adaptation

Clatsop hooker willow is tolerant of most soil textural types and drainage classes where moisture is not limiting. The species, however, prefers moist, sandy, gravelly, or mucky sites at elevations below 1,500 feet (460 m). It is best suited to streambanks, moist coastal meadows, stabilized dunes, and marshes where sunlight is abundant.

Known areas of adaptation for Clatsop include valleys, sloughs, and riparian areas west of the Cascade Mountain ridge in western Oregon, western Washington, and northwestern California. On upland sites the average annual precipitation should exceed 40 inches (101.6 cm). Potential areas of adaptation include the species native range as well as regions of similar climate and soils within USDA plant hardiness zones 7a to 9b.

Uses

Clatsop hooker willow is recommended for stabilizing the banks of low velocity streams, improving wildlife habitat, and restoring native plant communities along lakes, marshes, and older dunes near the coast. Deer, moose, and rabbits browse the stems; catkins are food for small game and songbirds. The shade created by willows along a stream reduces water temperatures and improves conditions for many fish.

This variety may also be used for certain stream and slope protection measures such as wattling, brush matting, or branch packing; it may be used alone or with traditional mechanical treatments such as rock riprap. It has excellent potential for natural area landscaping, screens, and windbreaks on moist sites. The large female catkins, thick leathery leaves, and stout branches add ornamental value. The wood has no commercial use.



'Multnomah' Columbia River willow

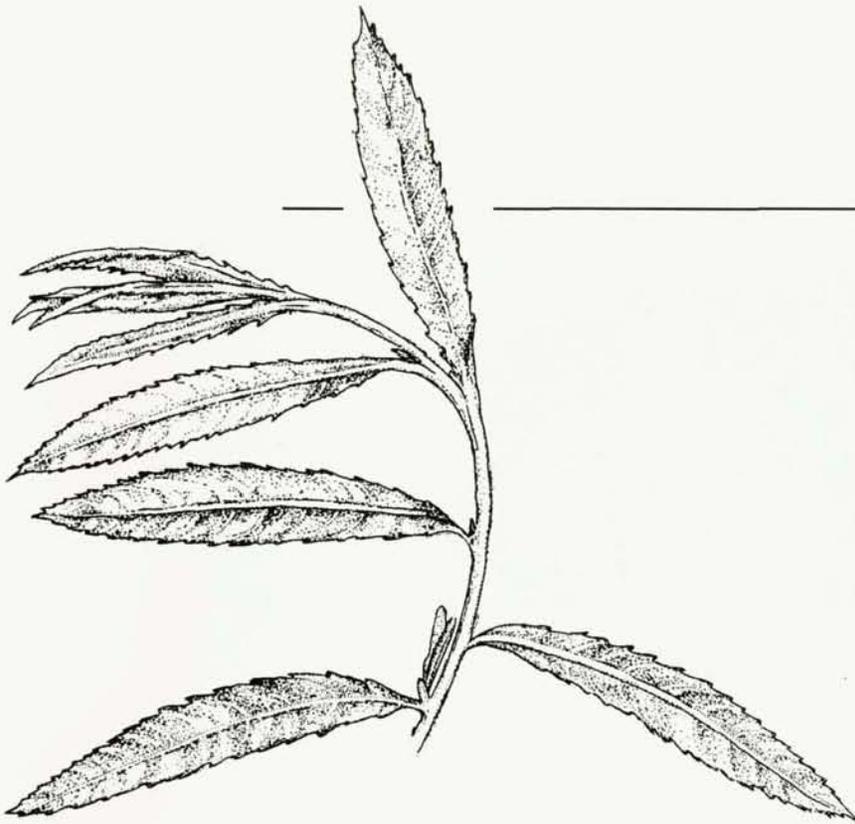
Columbia River willow is a suckering shrub or small tree native only to the shores of the lower Columbia River and related tributaries in western Oregon and Washington. This once threatened species has one of the smallest natural distributions of all North American willows.

'Multnomah' is a cultivar of Columbia River willow well suited to streambank, shoreline, sandbar, and dredge spoil stabilization in the Pacific Northwest. It may also be used for wildlife habitat improvement, windbreaks, or natural area landscaping in moist environments.

Description

Multnomah Columbia River willow (*Salix fluviatilis* Nutt.) will grow to a height of 10 to 20 feet (3 – 6 m), depending on the site. Its overall appearance is typical of the species. Usually multistemmed and compact with upright, slender branches, this species is noted for its spreading or suckering habit. The leaves are alternate and deciduous, falling by late November. They are relatively long and narrow with many scattered teeth along the margins. The young twigs are brown or green; the bark of older limbs becomes grayish-brown and scaly with age. Both the leaves and twigs are sparsely to moderately hairy.

The plant collection that led to the release of Multnomah was made in 1980 by the Soil Conservation Service. The original stand was found along the banks of the Sandy River in Multnomah County, Oregon. Columbia River willow, like most willows, bears male and female flowers on separate plants. Multnomah, however, is a male clone and therefore bears only staminate (male) catkins in May or early June. They appear well after the tree has leafed out in spring, much later than most Northwest willows.



Performance

Multnomah Columbia River willow (9019469, PI-508553) was the best of 6 surviving clones of Columbia River willow from an original assembly of 24. It was chosen for its survival, male sex, ability to spread from underground stems, attractive foliage, and compact form. In field tests, Multnomah demonstrated rapid initial growth during the first few years after establishment. It had an overall survival rate of 63 percent in moist environments under low maintenance conditions.

Adaptation

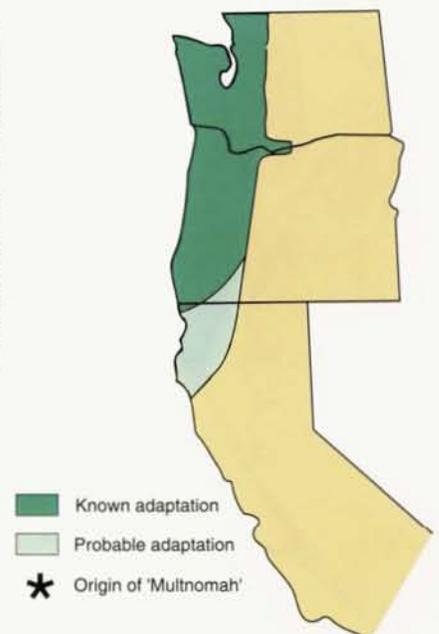
Multnomah Columbia River willow is tolerant of most soil textural types and drainage classes where moisture is not limiting. However, it prefers moist sand, gravel, or silt. It is best suited to sandbars and the banks of streams, lakes, and ponds at elevations below 1,500 feet (460 m). On upland sites, the average annual precipitation should exceed 40 inches (101.6 cm). This is a pioneer species. It cannot tolerate shade nor excessive plant competition.

Known areas of adaptation include the lower Columbia River drainage as well as valleys and riparian areas west of the Cascade Mountain ridge in Oregon and Washington. Potential areas of adaptation, however, may extend to those regions of similar climate and soils within USDA plant hardiness zones 7a to 9b.

Uses

As an erosion control plant, Multnomah Columbia River willow is particularly well suited to stabilizing sandbars and dredge spoils because of its ability to sucker and colonize open, sandy areas. It can also be used for wetland and riparian area restoration, screens, wind-breaks, bank stabilization along low velocity streams, reservoir shoreline plantings, and natural area landscaping.

This variety enhances wildlife habitat. Deer and rabbits browse the stems and foliage; catkins and buds are food for small game and songbirds. Shade from mature willow trees reduces water temperatures and improves fisheries. Multnomah may also be used for certain stream and slope protection measures such as wattling, brush matting, and branch packing; it may be used alone or with traditional mechanical treatments such as rock riprap.



'Nehalem'

Pacific willow

Pacific willow is a large shrub or small tree native to western North America from California to Alaska, including the Rocky Mountain states, Alberta, and British Columbia. It most commonly occurs along lakeshores, in stream corridors, and on moist sites throughout its natural range. Ecotypes of this species appear more flood tolerant than other native willows.

'Nehalem', a cultivar of Pacific willow, is suited to streambank stabilizing if it is planted along the shorelines of lakes and manmade reservoirs. It may also be useful for wildlife habitat improvement, natural area landscaping, or screens in moist environments. Nehalem was

cooperatively released in 1988.

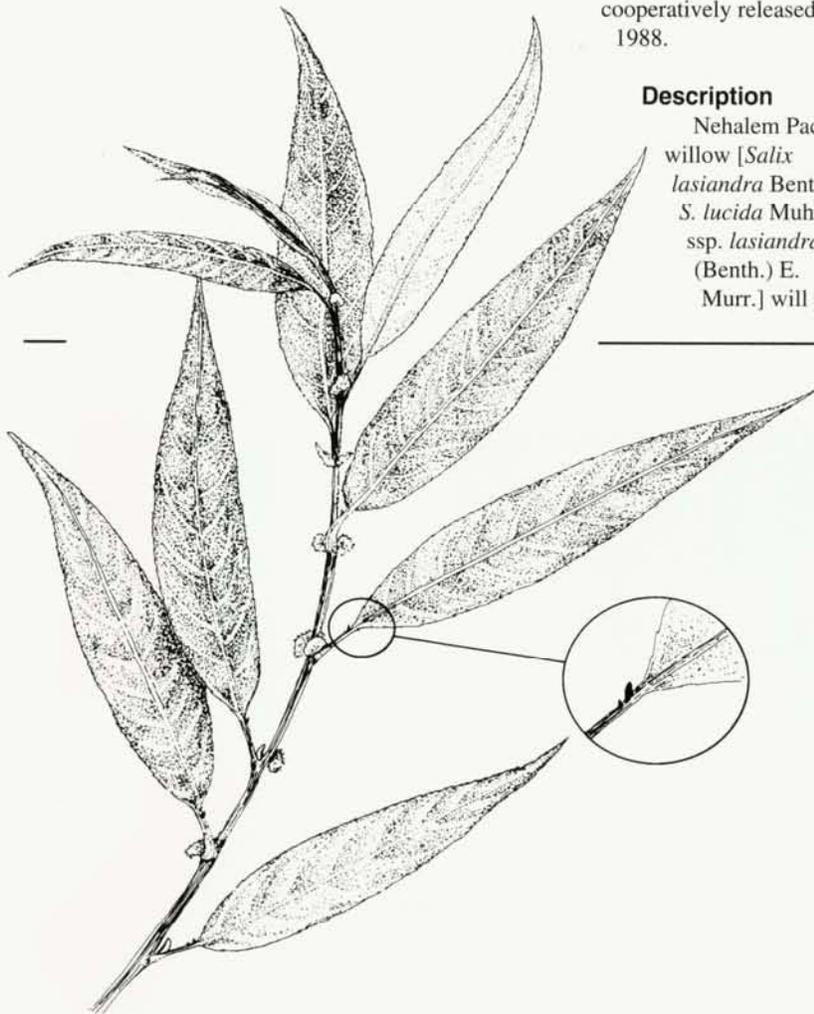
Description

Nehalem Pacific willow [*Salix lasiandra* Benth. or *S. lucida* Muhl. ssp. *lasiandra* (Benth.) E. Murr.] will grow

to a height of 6 to 30 feet (1.8 – 9.1 m) depending on the site. Its appearance is typical of the species and includes the presence of a whitish bloom on the underside of the leaves. The foliage is relatively long-pointed, finely toothed along the margins, and similar in shape to the leaves of a peach tree. Also indicative of the species are tiny glands or protrusions at the base of the leaf blade or tip of the leaf stalk. Alternate and deciduous, the leaves fall by late November.

Easily recognizable are the shiny, orange or distinctly yellow twigs of Nehalem. Both the leaves and young stems are smooth and lack hairs. The bark of the limbs and trunk will become dark gray or brown in color and fissured with age. Mature trees grown in a well spaced environment with full sun are usually multistemmed with a rounded crown.

The plant collection that led to the release of Nehalem was made in 1978 by the Soil Conservation Service. The original stand was found near the Nehalem River in northwestern Oregon. Pacific willow, like most willows, bears male and female flowers on separate plants. Nehalem, however, is a male clone and as



such, bears only staminate (male) catkins in late April or May. They appear after the foliage expands in the spring.

Performance

Nehalem Pacific willow (9004814, PI-508555) was evaluated in an observational row nursery against 105 accessions or clones comprising at least 8 native species. As 1 of 24 Pacific willow sources tested, it was chosen for its higher basal stem density, attractive foliage, and male sex. This variety, like the species in general, is susceptible to such common pests as leaf rust, poplar borer, and willow canker.

In 41 field plantings along streams, watercourses, and on similar moist, low maintenance sites in western Oregon and Washington, the survival rate averaged 45 percent. Stands varied in age from 1 to 5 years. Where better site selection and planting methods were employed, survival exceeded 80 percent. Nehalem grows more slowly than other native willow varieties.

Adaptation

Pacific willow is tolerant of most soil textural types and drainage classes where moisture is not limiting. The species, however, prefers moist, well drained sandy loams to gravelly or rich, rocky soils. It is naturally suited to riparian areas, sandbars, lakeshores, and riverbanks. In addition, ecotypes of Pacific willow are known to survive to a depth 40 feet (12 m) below the high water mark of reservoir drawdown zones. Testing Nehalem for maximum flood tolerance is not yet complete.

Areas of adaptation include valleys and riparian areas west of the Cascade Mountain ridge in Oregon, Washington, and northwestern California below 1,500 feet (460 m) elevation. On upland sites, the average annual precipitation should exceed 45 inches (114.3 cm). Potential areas of adaptation for Nehalem extend to other regions of similar climate and soils within USDA plant hardiness zones 7a to 9b.

Uses

Nehalem Pacific willow can be used for stabilizing the banks of low velocity streams, restoring riparian areas, and improving shoreline and aquatic habitat for fish and wildlife. As a male clone, it will not spread by seed but will resprout from the base if broken or clipped. Deer, elk, and rabbits browse the stems; catkins are food for small game and songbirds. The shade created by willows along a stream will reduce water temperatures and improve conditions for many fish. Like other ecotypes of Pacific willow, Nehalem may be more flood tolerant than other willows and suitable for planting along reservoir drawdown zones.

Nehalem may also be used for certain stream and slope protection measures such as wattling, brush matting, and branch packing. It may be used alone or with traditional mechanical treatments such as rock riprap. It has the potential for natural area landscaping and screens on moist soils. The yellow twigs add ornamental value, especially in winter.



'Placer' erect willow

Erect willow is a medium sized shrub native to California and other parts of the western United States. It is most commonly found along watercourses and in moist meadows. 'Placer' is a variety of erect willow released as *Salix ligulifolia* (Ball) ex Schneider. The species has been renamed *S. eriocephala* Michx. ssp. *ligulifolia* (Ball) Argus.

Placer is well suited to streambank stabilization, wet sites and low maintenance plantings where weed competition may be too severe for other willows. It may also be used for wildlife habitat improvement, natural area landscaping, windbreaks or screens in moist environments. This variety was cooperatively released in 1988.

Description

Placer erect willow will grow to a height of 8 to 18 feet (2.4 – 5.5 m) depending on the site. The typical mature shrub is open at the base, upright to broadly branching, and multistemmed with a rounded crown. The leaves are relatively long, narrow, light green above and whitish below with small scattered teeth along the margins. Although the young twigs are yellowish green, the bark of older limbs become dark gray. Both the foliage and twigs generally lack pubescence. Alternate and deciduous, the leaves fall by late November or December.

The plant collection that led to the release of Placer was made in 1978 by the Soil Conservation Service. The origin is Placer County, California. Erect willow, like most willows, bears male and female flowers on separate plants. Placer, however, is a single male clone and as such, bears only staminate (male) catkins in late February or March.



Performance

Placer (9004765, PI-508556) was evaluated in an observational row nursery against 105 accessions or clones comprising at least 8 native species. It was the only clone of erect willow tested. Although short-lived, Placer was chosen for its high basal stem density, male sex, attractive foliage, shrub form, and good outplanting survival. Vigorous shoots branch quickly and more readily than other willows. As with many willows, this variety is susceptible to different pests of which willow canker may be the most serious.

In 35 field plantings along streams, watercourses, and on similar moist, low maintenance sites in western Oregon and Washington, the survival rate averaged 55 percent. Stands varied from 1 to 5 years old. Where better site selection and planting methods were used, the rate exceeded 85 percent. Compared to seven other willows including 'Bankers' dwarf willow (*Salix x cotetti*), Placer demonstrated the greatest ability to compete with grasses at an early age.

Adaptation

Placer erect willow is tolerant of soils that vary from moist sand to wet clay in all drainage classes from well drained to poorly drained. It is best suited to riparian areas, moist meadows, and streambanks at elevations below 1,500 feet (456 m). Area of adaptation includes valleys and stream corridors west of the Cascade Mountain ridge in Oregon and Washington, as well as northwestern California, the Sierra Nevada Mountains, and adjacent foothills. On upland sites, the average annual precipitation should exceed 35 inches (88.9 cm). Potential areas of adaptation may extend to other parts of the species native range or regions of similar climate and soils within USDA plant hardiness zones 7b to 9b.

Uses

Placer erect willow is recommended for stabilizing the banks of low velocity streams, renovating riparian areas, and improving shoreline and aquatic habitat for fish and wildlife. As a male clone, it will not spread by seed but will resprout readily from the base if broken or damaged. Deer and rabbits browse the stems; catkins and buds are food for small game and songbirds. The shade created by willows along a stream will reduce water temperatures and improve conditions for many fish.

Placer may also be used for certain stream and slope protection measures such as wattling, brush matting, and branch packing; it may be used alone or with traditional mechanical treatments such as rock riprap. Other potential uses include natural area landscaping, screens, and windbreaks on moist sites. This variety is more tolerant of grassy weed competition in low maintenance settings than other native and non-native willows. The narrow leaves and yellowish-green twigs add ornamental value.



'Plumas' sitka willow

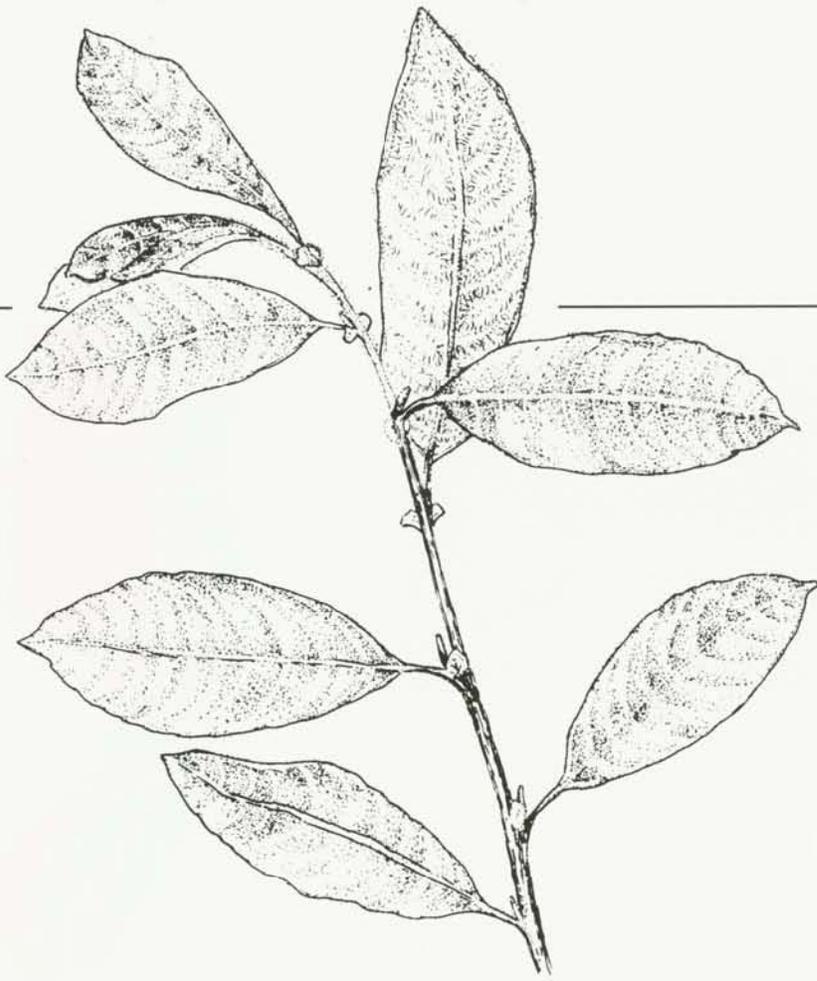
Sitka willow is a medium to large shrub native to western North America from California to the panhandle of Alaska. Its natural range also extends to parts of the inland Northwest, Idaho, Montana, and British Columbia. This species commonly occurs along streams and beaches as well as the borders of meadows and forest clearings.

'Plumas' is a cultivar of erect willow well suited to streambank stabilization, wildlife habitat improvement, and the restoration of riparian areas. It may also be used for windbreaks, natural area landscaping, borders, or screens in moist environments. This variety was cooperatively released in 1988.

Description

Plumas sitka willow (*Salix sitchensis* Sanson ex Bong.) will grow to a height of 10 to 23 feet (3 – 7 m) depending on the site. Its appearance is typical of the species. Mature shrubs that are well spaced and grown in full sun are multistemmed, open, and predominately upright in form. The leaves are smooth or slightly wavy along the margins, two to four times as long as they are wide, dull green above, and covered with dense, silvery hairs beneath. They are alternate and deciduous, falling by mid- to late November. Although young twigs are colored red, brown, or green and slightly hairy, the bark of older limbs is gray and smooth.

The plant collection that led to the release of Plumas was made in 1978 by the Soil Conservation Service. The origin is the Plumas region of California near Susanville. Sitka willow, like other willows, bears male and female flowers on separate plants. Plumas, however, is a male clone and as such bears only staminate (male) catkins in March or April. They appear about the same time as the foliage.



Performance

Plumas sitka willow (9004795, PI-508558) was evaluated in an observational row nursery against 105 accessions or clones comprising at least 8 native species. As 1 of 22 sources of sitka willow tested, it was chosen for its higher basal stem density, rapid initial growth rate, and male sex. Vigorous shoots branch less freely than other willows, lending to an upright and open appearance when young. As with most willows, Plumas can host certain insects and diseases. During the evaluation period, however, none were considered a limiting factor for the intended use.

In 42 field plantings along streams, watercourses, and on similar moist, low maintenance sites in western Oregon and Washington, the survival rate averaged 51 percent. Stands varied in age from 1 to 5 years. In one study, initial growth rates were the highest of seven select willow clones. Where proper site selection and planting methods were used, survival exceeded 85 percent.

Adaptation

Sitka willow is tolerant of most soil textural types and drainage classes where moisture is not limiting. The species, however, prefers moist, sandy or mucky sites. It naturally does well along riparian areas, freshwater beaches, the banks of rivers, and the edge of forest clearings where sunlight is abundant.

Known areas of adaptation for Plumas include the valleys of western Oregon and Washington, from the Cascade Mountains to the coast, as well as low to mid-elevation (4,000 ft. (1,216 m)) sites in the Sierra Nevada Mountains and northwestern California. On upland sites, the average annual precipitation should exceed 35 inches (88.9 cm). Potential areas of adaptation may extend into other parts of the species natural range or regions of similar climate and soils within USDA plant hardiness zones 6a to 9b.

Uses

Plumas is recommended for stabilizing the banks of low velocity streams, improving wildlife habitat, and renovating riparian areas. Deer, elk, moose, and rabbits browse the stems; the catkins are food for small game and songbirds. The shade created by willows along a stream will reduce water temperatures and enhance conditions for fish. Plumas is a male clone and cannot spread by seed. When damaged or pruned, however, plumas will readily resprout from the base. Long, unbranched shoots develop which are excellent for making cuttings.

Along with traditional planting methods, Plumas can be used for certain stream and slope protection measures such as wattling, brush matting, and branch packing, alone or in combination with traditional mechanical treatments such as rock riprap. This variety has been successfully employed for natural area landscaping, windbreaks, screens, and borders on moist soils. The flexible twigs of sitka willow are used for basket weaving.



'Rogue' arroyo willow

Arroyo willow is a large shrub or tree that occurs naturally from Baja, California to Washington and east to New Mexico, Idaho, and Utah. Typical habitats include moist soils along streams as well as gullies and gulches (arroyos) in valleys and foothills.

'Rogue' is a cultivar of arroyo willow suitable for streambank stabilization and improvement of freshwater fisheries. It is also useful for windbreaks, naturalized landscaping, and native screens or shade. Rogue was cooperatively released in 1990.

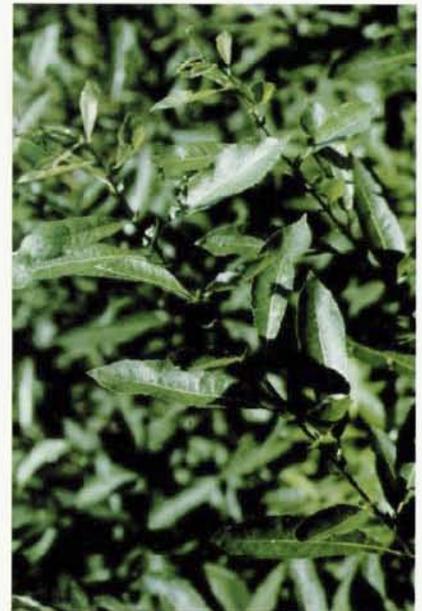
Description

Rogue arroyo willow (*Salix lasiolepis* Benth.) is a large, multi-stemmed, occasionally single-trunked specimen that grows to a height of 15 to 35 feet (4.6 – 10.6 m). The form is upright with a broad, irregular or rounded, spreading crown. In the open, this plant will grow about as wide as it does tall. With age, the thin,

smooth gray bark becomes fissured into broad ridges.

The foliage is broadly lance shaped, widest beyond the middle, smooth or occasionally toothed along the margins, dark green above, and whitish below. This variety is composed of two clones which differ primarily in stem color and degree of pubescence. One has darker reddish-brown twigs and more pubescence on the stems and underside of the leaves than the other. In both cases, the leaves are alternate and deciduous, falling by late November.

The plant collection that led to the release of Rogue arroyo willow was made in 1978 by the Soil Conservation Service. Vegetative material originated from a stand growing on the north bank of the Rogue River in Curry County, Oregon. Arroyo willow, like most willows, bears male and female flowers on separate plants. Rogue, however, is a male variety and as such, bears only staminate (male) catkins in March. The catkins appear before the leaves.



Performance

Rogue arroyo willow (9004818, PI-508557) was evaluated in an observational row nursery against 105 accessions or clones comprising at least 8 native species. It was selected for its high survival, male sex, rapid early growth rate, and density. Growth rates without irrigation on an upland site (40-inch annual precipitation zone) averaged 2 to 4 feet (6 – 1.2 m) per year the first 4 years at Corvallis, Oregon. Compared to most willows tested, fewer insect and disease pests were observed during the evaluation period.

Survival in 42 field plantings along streams, ditches, and on other moist, low maintenance sites in Oregon and Washington averaged 52 percent. Stands varied in age from 1 to 7 years. Where proper site preparation and planting techniques were employed, however, survival exceeded 90 percent.

Adaptation

Rogue arroyo willow is broadly adapted to coastal and inland drainageways, riparian areas, and mountain valleys west of the Cascade Mountain ridge in Oregon, Washington, and northern California at elevations below 1,500 feet (456 m). In addition, it will perform well on moist upland sites where the average annual precipitation exceeds 35 inches (88.9 cm). Although arroyo willow tolerates poorly drained clay loam soils, it prefers coarser textured, moist, well drained sites and full sun. Potential areas of adaptation for Rogue include its native range and regions with similar climate and soils within USDA plant hardiness zones 7a to 9b.

Uses

Rogue is recommended for stabilizing the banks of low velocity meandering streams, naturalized landscaping, and improving wildlife habitat. Its large size benefits fisheries by providing shade that reduces stream temperatures. On moist upland sites this variety may perform as well or better than other willows as a windbreak or screen. Native species such as this are useful in restoring riparian and wetland plant communities.

This variety can also be used for certain stream and slope protection measures such as wattling, brush matting, and branch packing; or in combination with traditional mechanical treatments such as rock riprap. Deer and other animals browse the foliage and many songbirds nest in the branches. Arroyo willow has been used for basket weaving.

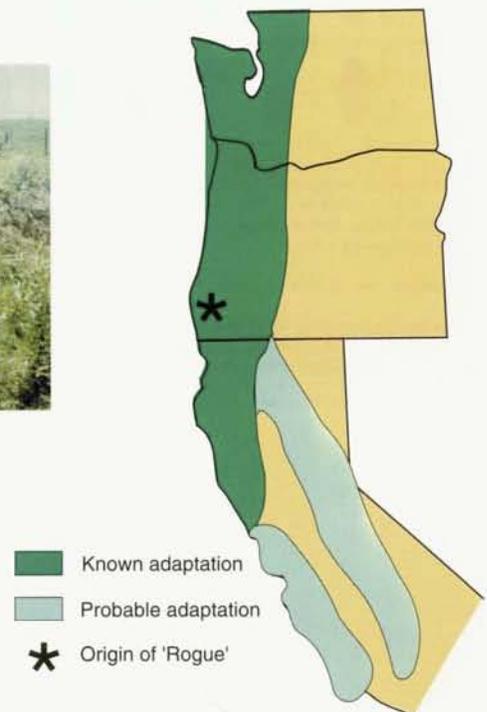


Table.— *Adaptation and use of willows in the Pacific Northwest, United States of America*

Key: = adapted (or good); = probably adapted (or fair); = potential limitations (or poor); = adaption or use unknown. Note good, fair, or poor refers to uses.

| Variety/species | Area of adaptation ¹ | | | | Streambank stabilization | Windbreaks | Reservoir drawdown zones | Wildlife food ² | Wildlife cover and/or nesting | Naturalized landscaping | Screens | Coastal marshes/dunes | Dredge spoils | Remarks ³ |
|-----------------------------------|---------------------------------|------------|-----------------|--|--------------------------|------------|--------------------------|----------------------------|-------------------------------|-------------------------|---------|-----------------------|---------------|---|
| | Western WA | Western OR | Northwestern CA | Sierra Nevada Mts. (foothills and w. slopes) | | | | | | | | | | |
| 'Clatsop' hooker willow | | | | | | | | | | | | | | Female with large catkins. Fast growth rate. Thick, leathery leaves. Dense foliage. Broadly branching. |
| 'Multnomah' Columbia River willow | | | | | | | | | | | | | | Male (seedless). Fast growth rate. Compact, upright form. Suckering habit. Late flowering. |
| 'Nehalem' Pacific willow | | | | | | | | | | | | | | Male (seedless). Moderate growth rate. Bright yellow twigs. Susceptible to leaf rust and willow canker. |
| 'Placer' erect willow | | | | | | | | | | | | | | Male (seedless). Fast growth rate. Upright, broadly branching. Competes well with grasses. Susceptible to willow canker. Early flowering. |
| 'Plumas' sitka willow | | | | | | | | | | | | | | Male (seedless). Fast growth rate. Upright, open form. Susceptible to powdery mildew. Adapted to 4,000 ft. elevation in CA. |
| 'Rogue' arroy willow | | | | | | | | | | | | | | Male (seedless). Very fast growth rate. Large specimen (to 35 ft.). Upright, broadly branching. Upland or lowland sites. |

¹Local soil moisture, microclimate, and other factors significantly affect plant survival and growth. Do not assume that these willows will grow anywhere they are planted. Elevation range is from 0 to 1,500 ft. unless otherwise noted. Potential altitude may be somewhat higher in California. Some recommendations are based on the species' natural range, origin, and/or regional climatic similarities rather than actual testing. Adaptation to areas outside the Pacific Northwest, especially within USDA plant hardiness zones 7a-9b, is possible but not known.

²Browse for deer, elk, or moose. Catkins and buds eaten by certain song and game birds. Pollen consumed by honey bees in spring.

³Unique or special attributes. Refer to text for more details. Note that willows are susceptible to many diseases and insect pests and are naturally short-lived. Only those disease symptoms most commonly observed are listed. Although those clones expressing the greater level and number of disease infections were avoided in the selection process, no special claim of resistance can be made for these varieties.

Propagation and establishment

Rogue, Plumas, Placer, Clatsop, Nehalem, and Multnomah are vegetatively propagated cultivars. Six to eight-inch cuttings (15 – 20 cm), 1/4- to 3/8-inch- diameter (6 – 10 mm), will root readily in moist potting medium under greenhouse conditions. Slightly larger calipers (3/8 to 1/2 inch (10 – 13 mm)) and longer lengths can be adapted to bareroot nursery culture. Twelve to twenty-four-inch (30 – 60 cm) cuttings or slips planted directly into a streambank will grow if adequate moisture is present and proper site preparation and planting techniques are employed. Where existing grassy vegetation is tall or water levels are low and receding, the use of unrooted 4- to 5-foot (1.2 – 1.5 m) “whips” may increase survival. They should have a 3/4- to 1-inch-diameter (19 – 25 mm).

Carefully weeded, fertilized, and irrigated mother plants or “cutting blocks” are the best source of healthy ramets. Cuttings and whips should be taken in the winter and stored in a cooler at 35 to 38 °F (2 – 4 °C) until outplanted in spring. The top 2 to 3 inches (5– 8 cm) can be dipped in white latex paint or paraffin wax to identify the aerial end and reduce moisture loss. With these six varieties, there is no advantage to treating the cuttings with a rooting hormone.

Another option is to establish a densely spaced, permanent willow plantation and manage it to produce pole size stems and large branches by coppicing (hardwood stand regeneration through natural resprouting). This method could be used to supply readily available, high quality material for such slope protection measures such as wattling, brush-layering, and brush matting.

Conventional riparian plantings should be done as early in the spring as possible using dormant stock: either fresh, hardwood cuttings, 1-year old rooted cuttings, or bareroot stock. The larger whips can be planted in winter as early as November. Competing vegetation should be minimized by localized scalping or scarification of the soil surface. Another site preparation option for planting is to spot treat with an

approved herbicide. This should only be done according to label instructions and in areas where the contamination of surface water and wildlife are not threatened.

Rooted cuttings can be easily placed into a hole or slit formed by a dibble, hoe, auger, shovel, or planting bar. When unrooted cuttings are inserted, no more than one-third to one-half the length should remain above ground. It is preferable to leave only two shoot buds exposed. Tamping the soil firmly around each slip removes air pockets.

Willow plantings are best applied to those stream types or shorelines where stands would naturally occur if the site were not degraded or disturbed. They require careful, site specific planning and will be not be effective in all circumstances. For example, where stream velocities are more than 10 feet per second or the toe of the slope is unstable, revegetation may only work in combination with structural measures. Certain unstable slopes may also be suitable for wattling or other quasi-vegetative treatments. In all cases, riparian plantings should be part of a comprehensive stream corridor management plan.

For traditional vegetative streambank stabilization, high density plantings on a 2- by 2-foot (60 by 60 cm) spacing are generally recommended, beginning at waterline and proceeding to the top of the bank. Total width on each side of the stream should be no less than 10 feet (3 m) for erosion control. The wider the shrub lining, however, the less vulnerable the site is to the scouring action of flood waters. In addition, many indigenous wildlife populations require wider stream corridors for good habitat. As a rule of thumb, the zone should be at least 160-foot wide (49 m) (80 ft on each side).

For Class I streams, the Oregon Forest Practices Act requires that a buffer zone three times the width of the body of water must be maintained for protection. This zone cannot be less than 25 feet (8 m) wide per side, but it does not need to be more than 100 feet (30 m).

Consider establishing an understory of less competitive grasses and legumes and using several willow varieties along with other riparian shrubs such as redosier

dogwood, Sitka alder, and vine maple for floral diversity. Such stands not only create better habitat but may be less susceptible to insect and disease pests. For maximum survival, weed control and exclusion of livestock are essential the first 2 or 3 years. All new plantings should be inspected regularly the first several years to assess the need for replacement stock or additional bank repair.

Availability

The Soil Conservation Service, Plant Materials Center, Corvallis, Oregon, maintains foundation stock of 'Rogue' arroyo willow, 'Plumas' sitka willow, 'Placer' erect willow, 'Clatsop' hooker willow, 'Nehalem' Pacific willow, and 'Multnomah' Columbia River willow for distribution to commercial nurseries, arboretums, wetland scientists, and other researchers. Planting stock for conservation use is available from commercial nurseries in the Pacific Northwest.

Related references

“*Propagation of Willows and Poplars.*” Plant Materials Technical Note No. 1. USDA, Soil Conservation Service, Portland, Oregon. March 1989. 3 p.

“*Wattling for Hard-to-Stabilize Slopes.*” Plant Materials Technical Note. No. 5. USDA, Soil Conservation Service, Portland, Oregon. March 1989. 4 p.

“*Streamside Revegetation.*” Plant Materials Technical Note No. 6. USDA, Soil Conservation Service, Portland, Oregon. March 1989. 8 p.

“*Identification of Ten Willows Used for Streambanks in the Pacific Northwest.*” Plant Materials Technical Note No. 11. USDA, Soil Conservation Service, Portland, Oregon. January 1990. 17 p.

“*Streambank Rehabilitation in Washington Using Willow Species and Hybrid Cottonwood.*” Plant Materials Technical Note No. 21. USDA, Soil Conservation Service, Spokane, Washington. September 1990. 3 p.