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Index of Species Information

SPECIES: Salix lucida subsp. lasiandra

Introductory

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ABBREVIATION :
SALLUCL

SYNONYMS :
Salix caudata (Nutt.) Heller
Salix lancifolia Anderss.
Salix pentandra L. var. caudata Nutt.
Salix lasiandra Benth. [25]

SCS PLANT CODE :
SALA5

COMMON NAMES :
Pacific willow
whiplash willow
red willow
yellow willow
golden willow
caudate willow
black willow
western black willow

TAXONOMY :

The currently accepted scientific name of Pacific willow is Salix lucida Muhlenb. subsp. lasiandra (Benth.) E. Murray [48].

LIFE FORM :
Tree

FEDERAL LEGAL STATUS :
No special status

OTHER STATUS :
NO-ENTRY

DISTRIBUTION AND OCCURRENCE

SPECIES: Salix lucida subsp. lasiandra

GENERAL DISTRIBUTION :
Pacific willow is distributed from the interior of Alaska and the Yukon Territory southeast to Saskatchewan and the Black Hills, southward along the coast to southern California, and south through the Rocky Mountains to New Mexico [7,25]. It is mostly absent from the dry interior country of eastern Washington, Oregon, southern Idaho, Nevada, and Utah [36].

ECOSYSTEMS :

FRES20	Douglas-fir
FRES21	Ponderosa pine
FRES23	Fir - spruce
FRES26	Lodgepole pine
FRES28	Western hardwoods
FRES29	Sagebrush

STATES :

AK	CA	CO	ID	MT	NV	NM	ND	OR	SD
UT	WA	WY	AB	BC	SK	YT			

BLM PHYSIOGRAPHIC REGIONS :

1	Northern Pacific Border
2	Cascade Mountains
3	Southern Pacific Border
4	Sierra Mountains
5	Columbia Plateau
6	Upper Basin and Range
7	Lower Basin and Range
8	Northern Rocky Mountains
9	Middle Rocky Mountains
10	Wyoming Basin
11	Southern Rocky Mountains
12	Colorado Plateau

KUCHLER PLANT ASSOCIATIONS :

K002 Cedar - hemlock - Douglas-fir forest
K003 Silver fir - Douglas-fir forest
K004 Fir - hemlock forest
K005 Mixed conifer forest
K007 Red fir forest
K008 Lodgepole pine - subalpine forest
K011 Western ponderosa forest
K012 Douglas-fir forest
K014 Grand fir - Douglas-fir forest
K023 Juniper - pinyon woodland
K024 Juniper steppe woodland
K025 Alder - ash forest
K026 Oregon oakwoods
K028 mosaic of K002 and K026
K029 California mixed evergreen forest
K030 California oakwoods
K055 Sagebrush steppe

SAF COVER TYPES :

207 Red fir
210 Interior Douglas-fir
221 Red alder
222 Black cottonwood - willow
227 Western redcedar - western hemlock
229 Pacific Douglas-fir
230 Douglas-fir - western hemlock
243 Sierra Nevada mixed conifer
244 Pacific ponderosa pine - Douglas-fir

SRM (RANGELAND) COVER TYPES :

NO-ENTRY

HABITAT TYPES AND PLANT COMMUNITIES :

Pacific willow typically occurs in early seral communities along river banks or on moist alluvium [8,18]. In the Rocky Mountains these riparian communities are often adjacent to zones of big sagebrush (Artemisia tridentata), Douglas-fir (Pseudotsuga menziesii), or ponderosa pine (Pinus ponderosa) [8,18]. In California it occurs in riparian forests as a codominant with red alder (Alnus rubra), black cottonwood, and Oregon ash (Fraxinus latifolia) [35]. Published classification schemes listing Pacific willow as an indicator or dominant in community types (cts), habitat types (hts), riparian site types (rst), or dominance types (dts) are presented below:

Area	Classification	Authority
sw US	Riparian hts	Szaro & Patton 1987
sw MT	Riparian veg. rst,hts,cts	Hansen & others 1988
MT	Riparian veg. dts	Hansen & others 1988

MANAGEMENT CONSIDERATIONS

SPECIES: Salix lucida subsp. lasiandra

WOOD PRODUCTS VALUE :

IMPORTANCE TO LIVESTOCK AND WILDLIFE :
Pacific willow provides food and cover for many wildlife species [17]. Willows (Salix spp.) in general are a preferred food of moose, and Pacific willow occurs in riparian and floodplain habitats which these animals frequent [5,32]. It is a fairly important browse for mule deer [43]. In Oregon, it is consumed heavily by beaver in the winter [20]. Although cattle will eat it, stands provide limited value for livestock overall, as forage production of grasses and shrubs is often low due to frequent flooding [18].

PALATABILITY :
In the West, willows are generally considered to be more palatable to sheep than to cattle, but cattle may make greater use of willow because they tend to frequent riparian areas [41]. The palatability of Pacific willow to livestock and wildlife species in California and Oregon has been rated as follows [20,38]:

	CA	OR
Cattle	poor	----
Sheep	poor	----
Horses	poor	----
Deer	fair	----
Beaver	----	good

NUTRITIONAL VALUE :
NO-ENTRY

COVER VALUE :
Pacific willow provides cover for numerous wildlife species [3]. It is especially important for deer and nongame birds [2,4]. In California, nests of the endangered Least Bell's Vireo are commonly found in Pacific willow branches [15].

VALUE FOR REHABILITATION OF DISTURBED SITES :
Pacific willow's ability to rapidly colonize disturbed sites makes it very useful for streambank stabilization projects. Cuttings are used for revegetating disturbed riparian areas. Unrooted willow stem cuttings (slips) should be planted on sites that provide sufficient moisture to start and maintain growth through the growing season [44]. Slips should be obtained from local native stands. Since willows are sensitive to competition and shading, dense tall grasses will reduce transplant survival [33] and may need to be removed by cutting or by

herbicide application [30]. Although harder to plant, rooted stock is recommended for use because it has higher survival rates [33,44]. Cuttings should should be planted to a depth of 12 inches (30 cm), with 8 inches (20 cm) left above ground [33]. This deep planting allows for more rooting surface to extract soil moisture, and higher amounts of carbohydrates as stored food reserves [33,44]. Pacific willow cuttings root along the entire length of the stem, with roots appearing in about 10 days [33]. If streambank erosion has created a nearly vertical cut bank, slope reshaping may be needed to enhance success of transplants. Reshaping is not necessary if, through protective measures, existing vegetation is able to stabilize the site [33,44]. High density willow plantings (cuttings planted on 18 inch [45 cm] centers) used to stabilize eroded stream banks in the Pacific Northwest cost about $6,000/acre ($14,800/ha) in 1979 [24]. This was a considerable savings compared to a 20-foot (6 m) high rock riprap at about $40,000/acre ($98,800/ha). Under any method of revegetation, sites should be fenced to protect them from grazing and trampling.

The Alaska Plant Materials Center has released the cultivar 'Roland' for revegetation and landscape projects [29].

OTHER USES AND VALUES :
All willows produce salicin, which chemically is closely related to acetylsalicylic acid, commonly known as aspirin. This is probably why Native Americans used various preparations from willows to treat toothache, stomach ache, diarrhea, dysentery, and dandruff [38]. Native Americans also used the stems for basketry and bow making, and the bark for tea and fabric making [29]. Pacific willow is excellent for use in screening, windbreaks, and landscaping [29].

OTHER MANAGEMENT CONSIDERATIONS :
In Montana, overuse by livestock causes Pacific willow to lose vigor and causes soil compaction problems. Loss of vigor is indicated by uneven stem age distribution, highlining, clumped appearance, or dead clumps. With continued overuse, plants may be replaced by Woods rose (Rosa woodsii) and Kentucky bluegrass (Poa pratensis). Bare ground resulting from livestock overuse may be vulnerable to erosion during flooding [18]. Pacific willow stands helps stabilize streambanks and protect them from erosion and therefore should be maintained.

BOTANICAL AND ECOLOGICAL CHARACTERISTICS

SPECIES: Salix lucida subsp. lasiandra

GENERAL BOTANICAL CHARACTERISTICS :
Pacific willow is larger than most other willows, reaching 20 to 60 feet (6-18 m) in height at maturity [7]. Main stems reach 2.5 to 7.5 inches (10-30 cm) in diameter [8], with very brittle wood [2]. In Montana and

Idaho Pacific willow reaches tree size at lower elevations but is found as a short, several-stemmed shrub at higher elevations [8,18]. Staminate and pistillate flowers occur on separate plants in catkins. Staminate and pistillate catkin lengths vary greatly, ranging from 0.6-2.7 inches (1.5-7 cm) for staminate catkins, and 0.8-2.7 inches (2-7 cm) for pistillate catkins [6,8,31,45]. The fruit is a glabrous capsule 0.15-0.3 inch (4-8 mm) long and turn from green to yellowish at maturity [6,7].

Due to their morphological similarities, Pacific willow may be mistaken or confused with peachleaf willow (Salix amygdaloides). Differences in their bud scales may be used to distinguish them [18]. Pacific willow has bud scales without free overlapping margins and are rounded at the tip, while peachleaf willow has bud scales with free overlapping margins, and are pointed at the tip.

RAUNKIAER LIFE FORM :

Undisturbed State: Mesophanerophyte
Undisturbed State: Microphanerophyte
Undisturbed State: Nanophanerophyte

REGENERATION PROCESSES :

The dispersal of thousands of small windblown seeds is Pacific willow's primary mode of reproduction. It can also reproduce vegetatively. Broken pieces of stem are transported and deposited on moist alluvium by floodwaters, and later sprout [2]. Pacific willow has very brittle branches, making this form of reproduction important in initial colonization of some disturbed areas, but seeding still seems to be more important [47]. Pacific willow is unable to produce sucker shoots from lateral roots but will probably sprout from its root crown or stem base following fire or cutting [2,17,47].

Plants are dioecious. After fertilization, a capsule develops which eventually splits open during spring or summer, dispersing numerous tiny seeds [7]. Seeds are transported by wind and water. The seeds are not dormant and germinate rapidly, usually within 12 to 24 hours of dispersal if a moist seedbed is reached [10]. The seeds contain significant amounts of chlorophyll, and photosynthesis generally occurs as soon as the seed is moistened. Germination rates increase with increased amounts of light [10].

SITE CHARACTERISTICS :

Pacific willow is typically found at low to mid elevations and immediately adjacent to a stream's or river's edge [8,17,18,]. Sites typically have a high water table year-round.

Soils: Soils are normally coarse-textured alluvial deposits of sand or gravel [8,17,18] but textures range from sandy to clayey.

Associates: In the Rocky Mountains Pacific willow is commonly found with black cottonwood, yellow willow (Salix lutea), sandbar willow (S. exugua), Woods rose, and redosier dogwood (Cornus sericea) at lower elevations [8,18]. At middle elevations it is commonly found with Booth willow (Salix boothii), Drummond willow (S. drummondiana), and thinleaf alder (Alnus incana subsp. tenuifolia) [8,18].

Elevation: Elevational ranges for several western states are given below [1,18,31,45]:

below 8,000 feet (2,438 m) in CA
below 6,500 feet (1,980 m) in east central ID
from 3,000 to 5,400 feet (914-1,646 m) in sw MT
from 5,000 to 7,000 feet (1,525-2,650 m) in UT
from 4,500 to 8,500 feet (1,372-2,590 m) in WY

SUCCESSIONAL STATUS :
Pacific willow is a pioneer or early seral species commonly found on fresh alluvium [2,18]. Repeated flooding allows stands to persist [18]. Stands help stabilize the sand or gravel deposit, and in the absence of disturbance other communities of cottonwoods (Populus spp.) and willows establish and eventually replace it [18]. In California Pacific willow was a pioneer on mine spoils deposited along dredged streams [146].

SEASONAL DEVELOPMENT :
Pacific willow is a deciduous tree. Flowers in the spring appear with the leaves. After fruits ripen, seeds are dispersed from spring to early summer [7].

FIRE ECOLOGY

SPECIES: Salix lucida subsp. lasiandra

FIRE ECOLOGY OR ADAPTATIONS :
Most willows in all stages of vigor resprout from the root crown or stem base following fire [16,26,37,47]. However, the specific sprouting capabilities of Pacific willow are not known [17]. Its numerous wind dispersed seeds are important in revegetating areas following fire [28,47].

Fires usually occur infrequently in the streamside habitats occupied by Pacific willow [9].

POSTFIRE REGENERATION STRATEGY :
off-site colonizer; seed carried by wind; postfire years one and two
off-site colonizer; seed carried by animals or water; postfire yr 1&2

FIRE EFFECTS

SPECIES: Salix lucida subsp. lasiandra

IMMEDIATE FIRE EFFECT ON PLANT :
Severe fires can completely remove organic soil layers leaving willow roots exposed and charred, thus eliminating basal sprouting [26,47]. However, severe fires probably occur infrequently in the moist habitats occupied by Pacific willow. Specific information regarding the effects of fire on Pacific willow is lacking.

DISCUSSION AND QUALIFICATION OF FIRE EFFECT :
NO-ENTRY

PLANT RESPONSE TO FIRE :
The postfire sprouting capabilities of Pacific willow are not known [17]. However, most willows sprout following fire [26]. Pacific willow is a prolific seeder, and off-site plants are important as a seed source for revegetating burned areas [47].

DISCUSSION AND QUALIFICATION OF PLANT RESPONSE :
Vegetative sampling following three summer wildfires in the North Cascades National Park complex showed that Pacific willow frequency and cover increased dramatically due to the establishment of numerous seedlings. Values were as follows [28]:

	Postfire year 1		Postfire year 2		Postfire year 4	
	% Freq	% Cover	% Freq	% Cover	% Freq	% Cover
Burn #1	0	0	44	trace	92	2.8
Burn #2	0	0	34.8	.4	86.9	5.1
Burn #3	0	0	97	8.9	97	16.2

Maximum height of these Pacific willow seedlings was 18 inches (45 cm) during postfire year 2, 49 inches (125 cm) during postfire year 3, and 79 inches (200 cm) during postfire year 4 [28].

FIRE MANAGEMENT CONSIDERATIONS :
Pacific willow usually occurs along streambanks which frequently act as natural firebreaks [9].

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SPECIES: Salix lucida subsp. lasiandra

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