

Willows of Interior Alaska

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Any errors or omissions are solely the responsibility of the author.

Disclaimer

This publication is designed to provide accurate information on willows from interior Alaska. If expert knowledge is required, services of an experienced botanist should be sought.

Contents

Acknowledgements	2
Introduction	6
Biology	6
Ecology	6
Glacier-fed river gravel bars	6
Flood plains	7
Uplands	7
Bogs	7
Treeline shrubs	7
Alpine tundra	8
Human-modified habitats	8
Variations	8
Hybrids	9
Usages	9
Herbivores	10
How to use this guide	11
Identification keys	11
Species descriptions	12
Insects and diseases	12
Maps	13
Winter	17
Winter identification keys	18
Winter description of willow shrubs and trees	21
Felt-leaf willow, <i>Salix alaxensis</i>	21
Little-tree willow, <i>Salix arbusculoides</i>	22
Barclay's willow, <i>Salix barclayi</i>	23
Bebb's willow, <i>Salix bebbiana</i>	24
Gray-leaf willow, <i>Salix glauca</i>	25
Halberd willow, <i>Salix hastata</i>	26
Sandbar willow, <i>Salix interior</i>	27
Pacific willow, <i>Salix lasiandra</i>	28
Barren ground willow, <i>Salix niphoclada</i>	29
Park's willow, <i>Salix pseudomonticola</i>	30
Diamond-leaf willow, <i>Salix pulchra</i>	31
Richardson's willow, <i>Salix richardsonii</i>	32
Scouler's willow, <i>Salix scouleriana</i>	33
Sitka willow, <i>Salix sitchensis</i>	34

Summer	35
Flowering keys	36
Vegetative key	39
Summer description of willow shrubs and trees	43
Felt-leaf willow, <i>Salix alaxensis</i>	44
Little-tree willow, <i>Salix arbusculoides</i>	46
Arctic willow, <i>Salix arctica</i>	48
Northern willow, <i>Salix arctophila</i>	50
Athabasca willow, <i>Salix athabascensis</i>	52
Barclay's willow, <i>Salix barclayi</i>	54
Barratt's willow, <i>Salix barrattiana</i>	56
Bebb's willow, <i>Salix bebbiana</i>	58
Silver willow, <i>Salix candida</i>	60
Chamisso willow, <i>Salix chamissonis</i>	62
Alaska bog willow, <i>Salix fuscescens</i>	64
Gray-leaf willow, <i>Salix glauca</i>	66
Halberd willow, <i>Salix hastata</i>	68
Sandbar willow, <i>Salix interior</i>	70
Pacific willow, <i>Salix lasiandra</i>	72
Blueberry willow, <i>Salix myrtilifolia</i>	74
Barren-ground willow, <i>Salix niphoclada</i>	76
Skeleton-leaf willow, <i>Salix phlebophylla</i>	78
Polar willow, <i>Salix polaris</i>	80
Park's willow, <i>Salix pseudomonticola</i>	82
Tall blueberry willow, <i>Salix pseudomyrsinites</i>	84
Diamond-leaf willow, <i>Salix pulchra</i>	86
Net-veined willow, <i>Salix reticulata</i>	88
Richardson's willow, <i>Salix richardsonii</i>	90
Least willow, <i>Salix rotundifolia</i>	92
Scouler's willow, <i>Salix scouleriana</i>	94
Setchell's willow, <i>Salix setchelliana</i>	96
Sitka willow, <i>Salix sitchensis</i>	98
Comparison of female catkins and pistils	102
Bibliography	108
Useful information	110
Glossary	111

Introduction

Introduction

This guide is written for biologists who need to identify willows used by wildlife, for landowners and landscaping contractors who harvest willows for riverbank erosion control projects, and for the naturalist in all of us who are simply curious about the diversity of the environment.

Worldwide, 330 to 350 willow species have been described, mostly from temperate and cold regions of the northern hemisphere. Of the 40 willow species known to occur in Alaska, 29 species are found growing in the interior of Alaska, in the area covered by this guide.

Willows are an important element of the vegetation above timberline and in disturbed sites in the boreal forest or the floodplains. They are also an important source of food for beaver, ptarmigan, moose and other herbivores.

The ease of propagation of some willows makes them ideal for environmental rehabilitation projects in disturbed zones, such as roadsides and stream banks. Restoration methods using willows and other plants are discussed at length in Streambank Revegetation and Protection: a Guide for Alaska (Muhlberg and Moore 1998).

Biology

Willows are unisexual, each individual plant bearing either male or female flowers. These minute flowers, reduced to an ovary or a set of anthers adorned with a scale and one or two nectaries emerging from their base, are crowded into catkins. Fertilization is done by the wind or by visiting insects attracted to the sweet secretions of the nectaries.

Riverine willows *S. interior* and *S. setchelliana* propagate mostly vegetatively by producing shoots from roots and buried stems or by rooting severed twigs buried in alluvium.

Ecology

Willows require full sun exposure to thrive. They colonize newly exposed sediments of river alluvions, or sites where the original vegetation cover has been removed, exposing the mineral soil, like the vast expanses of kindling-dry boreal forest consumed every year by fires in interior Alaska. The minute willow seeds, outfitted with long soft hairs that keep them aloft in the slightest breeze, disperse over a broad area but carry few nutrients. Under the best conditions, they remain viable only a few weeks and require moist bare mineral soil in full sunlight for germination since they cannot compete against established plants. *Salix scouleriana* in particular is quick to recolonize burned sites. Dwarf willows are found only in sites where the general vegetation remains low to the ground such as in subalpine and alpine sites.

Glacier-fed braided rivers

In the southern regions of the Alaskan interior, the volume of glacier-fed rivers fluctuates greatly over time. Most of the year, the barren river floodplain appears oversized for the trickle contained within narrow channels. But at flood stage, swollen by the summer snowmelt at the headwaters, the silt-laden river overflows the narrow channels and floods the whole breadth of the valley flats. The

poorly vegetated gravel bars offer little mechanical resistance to the rushing current that churns the mud, undercuts banks, shuffles gravel and silt, and reorganizes channels, uprooting any vegetation that stands in the way. Soon, the river recedes back to the main channel, leaving the banks high and dry. The gravel bars are colonized by resilient species, always on the move: shrubs and trees are uprooted and rafted downstream. *Salix alaxensis* and *S. setchelliana* thrive in this habitat with little competition except from cottonwoods (*Populus balsamifera*) and yellow mountain avens (*Dryas drummondii*) mats and river beauty (*Epilobium latifolium*).

Flood plains

Rivers originating from the remainder of the Alaskan interior drain extensive basins exhibiting a continental climate characterized by low annual precipitation. High water usually peaks in early spring when the high waters fed by local snowmelt, which are sometimes exacerbated by an ice blockage downstream, temporarily spread onto the floodplain. Seasonal fluctuations of the water flow is buffered by the delayed release of the water stored in remote wetlands. The cresting waters do not have the destructive behavior of ephemerally rushing glacier-fed rivers. Lush willows such as *S. interior*, *S. alaxensis*, and *S. lasiandra* dominate on the freshly deposited sediments in this floodplain. These early colonizers are followed by alders (*Alnus viridis*), birches (*Betula papyrifera*) and poplars intermixed with extensive thickets of *S. barclayi*, *S. richardsonii*, *S. pseudomonticola*, *S. alaxensis*, *S. arbusculoides*, *S. glauca* or its diminutive *S. niphoclada*.

Uplands

Few willows survive the low light conditions under the dense canopy of the mature boreal forest dominated by white spruce (*Picea glauca*) and paper birch on well drained lands, above the floodplain and river terrace. Where enough light reaches the shrub layer, either in disturbed sites or at the edge of the forest, shrubby willows are well represented by *S. bebbiana*, *S. scouleriana*, *S. glauca*, *S. alaxensis*, and *S. arbusculoides*. But when the forest canopy is disturbed by a catastrophic event such as a fire, the same willows, along with alders, fireweeds, legumes, and grasses, are quick to get established. Over time, hardwoods and conifers overshadow the willow shrubs unless recurrent disturbances or poor growing conditions prevent trees from establishing.

Bogs

Most willows favor moist sites, and the genus is well represented by *S. pulchra*, *S. fuscens* and *S. myrtilifolia* in wetlands, both at the margin of acidic muskegs and in more productive sites, such as lake shores and riverbanks. Many species of willows favor sites that are seasonally flooded. Plants living in muskegs and fens remain stunted, barely topping the grasses and sedges.

Treeline shrubs

In the mountains above treeline, *S. barclayi* south of the Alaska Range, *S. pulchra*, *S. niphoclada*, *S. richardsonii*, *S. glauca*, and *S. arctica* everywhere form extensive treeline thickets. Willows are especially lush in hollows drained

by creeks. Thick snow cover protects these willows from the rigors of winter and heavy browse by moose.

Alpine tundra

The treeline thicket species described above also occupy higher sheltered pockets of the alpine zone, as long as reliable sources of moisture and protection from the elements are available. Exposed mountain ridges are home to dwarf willows such as *S. arctica*, *S. polaris*, *S. phlebophylla*, and *S. rotundifolia* whose stems and leaves hug the rocky substrate.

Human-modified habitats

Under natural conditions, open habitats result from disturbance events like forest fire, avalanche, flood, and insect infestation, or the retreat of a glacier. Modification of the landscape by humans creates new opportunities for willows to invade sites that otherwise would be densely forested. On highway right-of-ways regularly cleared by Hydroaxe™ tractors, colonizing willow thrive. The ubiquity of these willow thickets along right-of-ways is due to the repeated mowing that prevents the establishment of trees, including arborescent willows.

Willow seedlings readily establish also in lawns not treated with dicot-specific herbicides: a few leaves close to the ground survive repeated mowing and feed a root system that will give the plants a head start, should the mowing be interrupted.

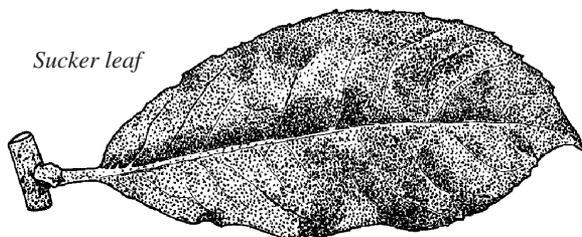
Variations

Most willow species vary greatly according to their growing conditions. This variation can be so great that, at first glance, distinct species within a thicket resemble each other more than specimens of their own species growing under different conditions. Leaf shape, size, plant stature, color, and texture can vary greatly, whereas catkin and pistil characteristics remain fairly constant. Slow growing, undisturbed, and unbrowsed “mature” willows usually have small, stiff leaves and show reduced yearly stem elongation.

The branchlets develop nodes at the site of leaf attachments and appear knobby.

Vigorous growth of willows in disturbed habitats, on the other hand, typically produce long annual stems with leaf buds widely separated.

Willow species that reach tree-size at maturity, such as



Salix scouleriana

S. scouleriana, *S. lasiandra* or *S. alaxensis*, first produce long unbranched stems that later develop into single or multiple trunks. With maturity, the yearly elongation slows down and branching increases to form the canopy.

In muskegs, the acidic nature of the soil limits the availability of nutrients and allows only stunted growth. Slow-growing muskeg willows tend to branch at ground level and be intertwined with the grasses and sedges that share the habitat.

Snow cover protects the branches of alpine willow thickets from winter abrasion and desiccation. The new annual growth is mostly limited to the replacement of dieback and browsed branches. Individual stems die off after a few years and are replaced by new shoots emerging from the root crown.

Plants rooted in rich soil whose above-ground parts have been trimmed produce vigorous compensatory growth shoots, bearing large leaves. The fast-growing *S. barclayi*, which thrives on highly disturbed road right-of-ways at low elevations, appears quite different from its slow-growing kin at treeline.

Hybrids

Willows are infamous for hybridizing. The hybrid plant, besides having characteristics intermediate between parent species, can also be noticed by misshapen or aborted catkins. Hybridization appears to be more common in regions where habitats have been extensively modified by human activities. In Alaska, this does not (yet) appear to be a major problem for identification, because only a very small percentage of specimens appear to be hybrids. In my experience, less than 1% of the willows collected showed evidence of hybridization.

Usages

Because so many species are well adapted to human-modified habitat, willows have always been an important part of the human landscape in North America, Europe, and northern Asia. Willow foliage is good fodder for cattle, goats, and horses, as well as for wildlife.

“Wickers” or “osiers,” the previous year’s growth of one-to-four meter long willow suckers, are prime material for the manufacture of utilitarian objects. Amerindian craftsmen in North America and gypsies in Europe wove willow baskets, furniture, and other items, such as beehives, crab pots, snowshoes, and fish traps. At the beginning of the industrial age, upward to 350 cultivars had been developed in France, each with their own mechanical and esthetic properties. Today, although mostly replaced by objects molded out of plastics and other synthetic materials, wickerworks are still manufactured for specialty items, such as hot air balloon baskets, and to some extent, specialty baskets and outdoor furniture.

The soft wood of willow is good for carving and makes good quality artist’s charcoal. In Alaska, diamond willows (see p. 14) are carved into beautiful walking sticks, furniture, decorative balusters, and posts. For fuel, *S. bebbiana* is preferred to *S. scouleriana*.

Salicin, the chemical that preceded acetylsalicylic acid (aspirin), was first isolated from willow. The bark of some willow species is rich in tannin used for the processing of leather. The primary use of willows today, however, is for reclamation of disturbed sites and stabilization of riverbanks.

In Great Britain and Scandinavia, where fossil fuels are expensive, there is a

developing interest in willows as a source of renewable energy; the fast growing shoots are coppiced (harvested) every few years, and the dried chips are sent to electric power plants. This fuel burns clean, leaves little ash, and emits carbon less than or equal to that absorbed from the atmosphere by the willow during growth.

Known usage of specific willows is mentioned in each species description that follows in this guide.

It should be mentioned that in Australia, where they are not native, willows introduced for their abilities to stabilize riverbanks for bank stabilization, have spread unchecked and locally displace the native vegetation. It was observed there that seeds can be carried by the wind for more than 1 km and some travel 50 or even 100 km. Dispersion occurred also through rooting of broken twigs in favorable habitats.

Herbivores

The foliage of most willow contain salicin, a chemical (phenolic glycoside) that deters browsing by most generalist herbivorous insects and mammals. Only a small fraction of the diet of these herbivores, such as the snowshoe hare (*Lepus americanus*) can consist of willows because the salicin distresses the digestive tract just as aspirin (methyl salicylate) does when taken on an empty stomach. A few generalist herbivores, like the moth *Orgia antiqua*, are able to complete their development on willow alone.

Specialized herbivores, like moose (*Alces alces*) and to a lesser degree caribou (*Rangifer tarandus*), cope well with these chemicals in their browse and are able to tap this otherwise little used resource. For a few specialist herbivorous insects such as sawflies (Tenthredinidae) and leaf beetles (Chrysomelidae), the volatile phenolic glycoside even serves as feeding and oviposition cues.

Herbivores that do not feed on willow may still depend on the plants for shelter or for the microhabitat they create. This results in a compartmentalization of the fauna in willow-rich habitats: a majority of herbivorous species avoids feeding on willows while a small fraction is totally dependent on them.

Only a few species of willows found in Alaska have been tested for their salicin content. *Salix scouleriana*, *S. arbusculoides*, and *S. lasiandra* contain the secondary compound, while *S. sitchensis* does not. *Salix barratiana* is one of the most bitter tasting, while *S. alaxensis* and *S. pulchra* are the least bitter. The young leaves of the last two species can even be harvested for human consumption in the spring.

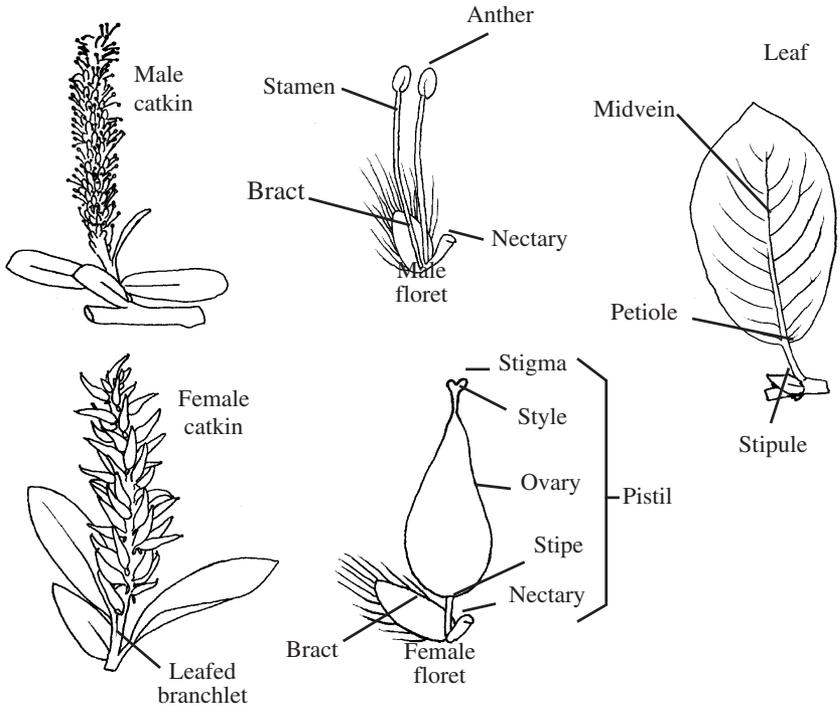
The sweet nectar of the early flowering willows provide most of the needed energy for the bumblebees that are active before the snow has melted away. Among vertebrates, several species of ptarmigan (*Lagopus*) and grouse feed on the buds during winter, and mammals like beaver (*Castor canadensis*), musk oxen (*Ovibos moschatus*), Arctic ground squirrel (*Spermophilus parryii*), lemmings, and voles incorporate some willow, possibly species with low phenolic content, into their diet.

The structure of particular willows determines the potential use of the plant by specific herbivores: the dense woolly hairs covering the underside of leaves of *Salix alaxensis* provide protective cover for *Phratora* leaf beetle larvae, but prevent the willow leafblotch miner moth (*Micrurapteryx salicifoliella*) from depositing her eggs. During the years 1991-1993 and 1998-1999, the willow leafblotch miner infested hundred of thousands of acres in the Yukon and Kuskokwim drainages (USDA Forest Service 2000). The 1998-1999 outbreak was centered on the Yukon Flats National Wildlife Refuge. All willows but *S. alaxensis* were heavily infested.

How to use this guide

Descriptions of willow catkins and leaves requires the use of specialized names. The usage of technical terms has been kept to a minimum in this guide:

Identification keys



During the growing season, willows with catkins can best be identified using the flowering keys. If no catkins can be found on the plants, the vegetative key based on stem and leaf characters can be used.

Because much research on wildlife browse and revegetation projects require that willow be identified during the winter, an additional winter identification key to willow shrubs is also provided.

To identify a willow using the keys, e.g. page 36 read the first pair of statements (**1.a** & **1.b**) and choose which of the two best applies. For example if the willow is a tall shrub, **1.b** is chosen. The number **12** at the end the statement **1.b** leads to the pair of statements (**12.a** & **12.b**). Repeating the process will lead to a willow species by elimination. Look up the species description, check the habitat, and the distribution map provided to confirm the identity of that willow species.

A hand lens magnifying 10 times or a dissecting microscope is required to examine small structures of the catkins or leaves.

Species descriptions

Scientific and common name

All plants and animals are given a unique scientific name composed of two words written in *italics*. The first word, the genus name, is common to closely related species. For example, both the domestic dog and the coyote have the same genus name *Canis*, and the genus name of all the true willows is *Salix*. The second word designates the species. Thus *Canis familiaris* is the domestic dog, *Canis latrans* is the coyote, and *Salix alaxensis* is the felt-leaf willow. Common names often vary regionally and are thus not reliable. For instance, *Salix alaxensis*' common name can be either "Alaska willow" or "felt-leaf willow." Sometimes the common name "willow" is used for non-willow species which adds to the confusion. The fireweed, *Epilobium angustifolium*, is sometimes referred to as the "willow herb." For this reason, scientific names are used throughout the guide, although a common name is given with the descriptions.

Identification

A brief description of the species is given with more details than the keys. The most important diagnostic characteristics are written in **bold**.

Similar species

Diagnostic characters are compared with those of similar species.

Habitat

This information can help for identification because certain species are restricted to well-defined habitat.

Wetland Indicator Status

The National Wetland Inventory (U.S. Fish and Wildlife Service) publishes the "National List of Plant Species That Occur in Wetlands, www.nwi.fws.gov/bha that assigns a wetland indicator status to each plant species found in wetlands. This describes the frequency of occurrence of an individual species in wetlands versus non-wetlands. Only willows species that are considered wetland indicators in Alaska have been rated here:

Obligate Wetland (OBL): Almost always occurs in wetlands.

Facultative Wetland (FACW): Usually occurs in wetlands, but occasionally found in non-wetlands.

Facultative (FAC): Equally likely to occur in wetlands or non-wetlands.

Facultative Upland (FACU): Usually occurs in non-wetlands, but occasionally found in wetlands.

Phenology

This section describes the sequence in the development of the willow organs. Usually, whether or not catkins and leaves develop at the same time is consistent for each willow species. The timing of the development of the willow as a whole is usually delayed with increased elevation. In mountain habitats, it is not unusual to observe a willow with fully developed leaves and catkins a few feet away from another willow of the same species still in winter bud, because it was covered by a late melting snow drift.

Notes

General notes about the biology.

Uses

Traditional or modern use of the species.

Insects and diseases

Numerous insects species and diseases are known to be associated with willows. A few common galls and diseases are illustrated pp. 14 -15.

Leaf skeletonizers and browsers

Chrysomelidae: leaf beetles (Coleoptera). Adults and larvae skeletonize the leaves of willow. (See p.14). *Gonioctena* spp. and *Chrysomela* spp. adults look like lady bugs, orange with black spots or the reverse, black with orange spots. *Phratora* spp. are dark metallic, black, green or purple.

Orgyia antiqua: tussock moth. (Lymantriidae: Lepidoptera). The hairy caterpillars feed on leaves of willows and other shrubs. The reddish-brown male moths fly during the day. The female moths are unable to fly because their wings are much reduced.

Trichiosoma triangulum: cimbicid sawfly (Cimbicidae: Hymenoptera). The caterpillar-like larvae feed on willow leaves; the adults resemble black bumblebees.

Stem borers

Dorytomus: snout beetle (Cucurliionidae: Coleoptera). The minute larvae bore willow buds or stems.

Saperda concolor: Long-horned beetle (Cerambycidae: Coleoptera). The larvae bore galleries in large stems.

Thrypophleus striatulus: willow bark beetle (Scolytidae: Coleoptera). The minute larvae bore under the bark of stems and trunks.

Gall inducers

Rabdophaga: gall midge (Cecidomyiidae: Diptera). Small flies that induce “pinecone,” “beaked,” stem and “willow rose” galls on willow stems or buds.

Eriophyiidae: minute mites that induce “pouch galls” on willow leaves.

Iteomyia: gall midge (Cecidomyiidae: Diptera). Small flies that induce small “nipple galls” on willow leaves.

Phyllocolpa: sawfly (Tenthredinidae: Hymenoptera). Small wasp whose larvae develop inside the fold of willow leaf margin.

Pontania: sawfly (Tenthredinidae: Hymenoptera). Small wasps that induce pear or bean-shaped galls on willow leaves.

Leaf miners

Micrurapteryx salicifoliella: (Gracillariidae: Lepidoptera). The minute willow leafblotch miner larva tunnels inside the willow leaves. At low population density, it causes browning or blotches on the leaves. During an outbreak, most of the leaves are covered with these blotches and the damage is visible from an aircraft.

Diseases caused by microorganisms

Diamond willow: scarring of willow stem or trunk, following prior infection by the fungus *Valsa sordida*, causes sharp contrasted coloration in the heartwood. These diamond willows are highly prized for handicraft.

Powdery mildew: fungus *Uncinula* spp.

Rust fungus: fungus *Melampsora epitea*. Orange powder masses on the leaves.

Tar spot: fungus *Rhytisma salicinum*. Black shiny spot on leaves.

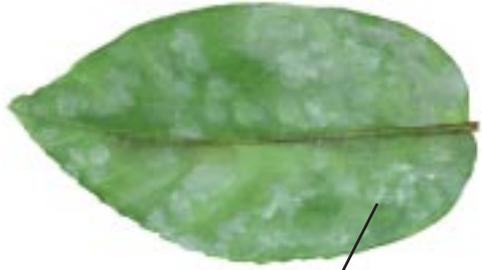
Maps

The distribution maps cover the area characterized by a continental climate and, for our purpose, defined as the area of Alaska north of the Alaska Range, south of the Brooks Range, and east of the Nulato Hills. Each location on the maps are based on specimens identified by botanists experienced with willows and include the following collections: National Herbarium of Canada, Ottawa; University of Alaska Museum Herbarium, Fairbanks; University of Alaska Anchorage Herbarium, and the author’s collection.

“Diamond willow.” Heartwood scarring following an infection by the fungus *Valsa sordida*



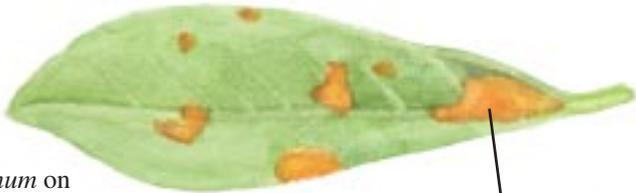
Bark peeled showing decorative color pattern



Powdery mildew *Uncinula* sp. on *Salix barclayi* leaf



Salix lasiandra leaf skeletonized by leaf beetles (Chrysomelidae)



Tar spot fungus *Rhytisma salicinum* on *Salix barclayi* leaf



Rust fungus *Melampsora* sp. on underside of *Salix bebbiana* leaf



Rabdophaga rosaria
gall midge adult (4 mm)



"Pinecone gall"
induced by
Rabdophaga
strobiloides on
Salix pulchra



Beaked gall induced by
Rabdophaga rigidae

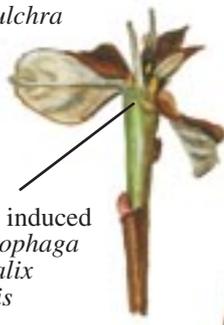
Cross section
showing the
orange larva



"Willow rose"
induced by
Rabdophaga
rosaria on *Salix*
barclayi



Cross section
showing the
orange larva



Bud gall induced
by *Rabdophaga*
sp. on *Salix*
sitchensis



Stem
swelling
induced by
Rabdophaga
salicis on
Salix barclayi



Euura sp. sawfly adult
(4.5 mm)



Spindle gall
induced by
an unidentified
cecidomyiae on
Salix bebbiana



Cross section
showing
hollow cavity



Leaf bean galls induced
by *Pontania* sp. (sawfly)
on *Salix barclayi*



Pouch galls induced by eriophyiid
mites on *Salix barclayi* leaf

Winter

Winter key to the willow shrubs and trees of interior Alaska

This key is designed for the field identification of willows for wildlife browse surveys and harvest of dormant stems used in revegetation projects. Only willows reaching at least 1 meter in height are included in this key. Leaves and catkins from the previous season often remain on dwarf shrub willows protected under the snow cover and can often be identified with the summer or vegetative keys.

The best technique for identifying willows at an unfamiliar site is to first look for the obvious: dried catkins, leaves, petioles, or galls still attached to the plants. Dried leaves or catkins found on the ground under a willow can be used but with caution as they could come from other shrubs. Once a willow shrub is positively identified, a voucher specimen should be collected, dried between newspapers and labeled. A tag with the plant name should be left on the willow from which the identified cutting was harvested and left in the field for future reference. Confirmation of the identity can be done by rechecking the tagged plant left in the field later in the season when the leaves or catkins are developed, using the summer identification keys in this guide.

- 1.a Shrubs or trees with leaves shed or brown in winter; leaf scars arranged alternately on the stems, winter bud covered by a single scale (see p.36).....2
- 1.b Not as above.....**not a willow.**
- 2.a Dried leaves, stipules, and/or catkins remaining on the plant.....3
- 2.b No leaf, stipule or catkin remaining on the plant.....15
- 3.a Persistent stipules (sometimes only a few) on either side of the previous year's leaf scar.....4
- 3.b No persistent stipule.....8
- 4.a Stipules large, broad, leaflike, often numerous, giving the shrub a scraggly appearance.....*S. richardsonii*, p. 32.
- 4.b Stipules elongated, not leaflike.....5
- 5.a Leaves underside woolly, young stems either covered with yellowish dense hairs or coated with a bluish bloom such as found on grapes or plums.....*S. alaxensis*, p. 21.
- 5.b Leaves underside not woolly.....6
- 6.a Catkin buds large, black and shiny with elongated tip, opening early in the spring; leaf buds small, not shiny, more or less hairy; when present, rosette gall with scales pointed at the tip and long white silk toward the center, "pinecone gall" scales hairless.....*S. pulchra*, p. 31.
- 6.b Catkins and leaf buds small, obscured under dense hairs, dried catkins often present; "pinecone gall" scales white hairy7

- 7.a Catkins remaining on the plant.....8
- 7.b No catkins, but dried leaves on the plant9

- 8.a Stipes long, catkins loose, pale yellow or light brown, curled.....
..... *S. bebbiana*, p. 24.
- 8.b Stipe absent or minute, catkins compact,.....10

- 9.a Shrubs usually less than 2 m, female catkins to 50 mm long, capsules to 6
mm long, male catkins often remain on the shrub overwinter. Rosette galls
up to 18 mm long..... *S. niphoclada*, p. 29.
- 9.b Shrubs to 6 m, catkins to 80 mm long, capsules to 9 mm long, male catkin
rarely present on the shrub in winter. Rosette galls 10-40 mm long.....
..... *S. glauca*, p. 25.

- 10.a Stem tips thin, whiplike, leaves long and narrow, often curled lengthwise,
margin finely toothed, underside covered with short stiff reddish hair
.....*S. arbusculoides*, p. 22.
- 10.b Stem tip thicker, leaves broader, no short red hairs covering the leaf under
sides.....11

- 11.a Leaf underside woolly, petioles sometimes inflated, young stems either covered
with yellowish dense hairs or coated with a bluish bloom such as
found on grapes or plums.....*S. alaxensis*, p. 21.
- 11.b Leaf underside not woolly, stems different than above.....12

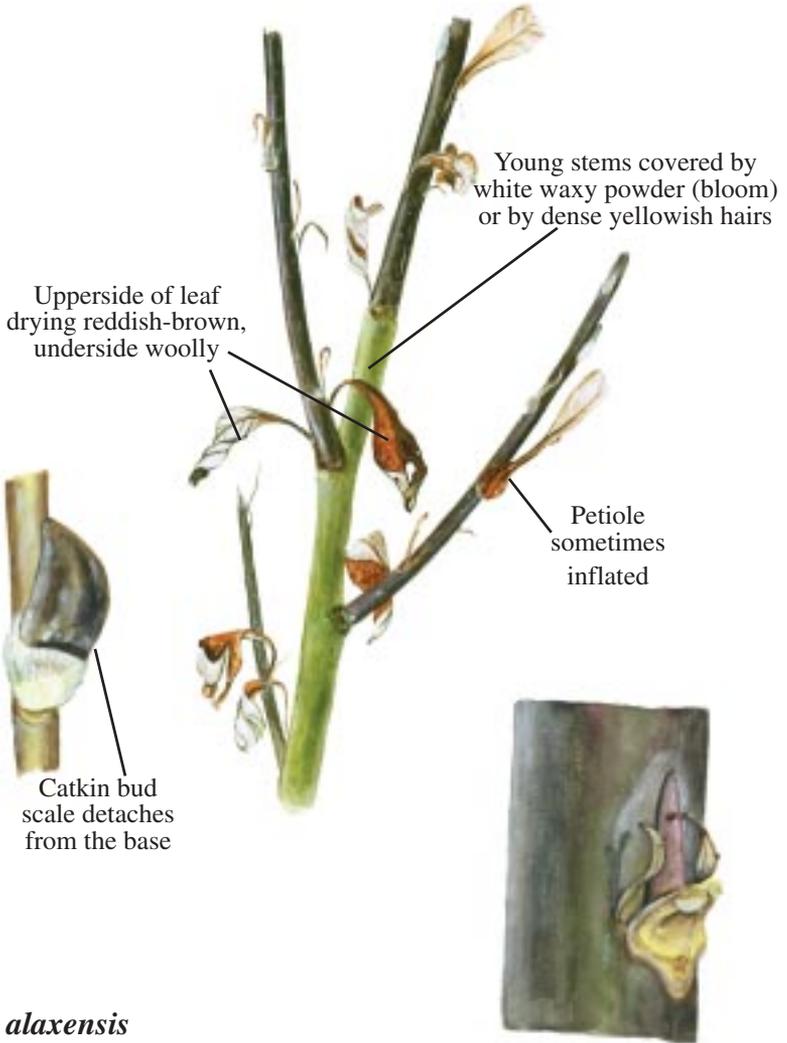
- 12.a Leaf margin toothed, leaves pale underneath and dark above.....
.....*S. pseudomonticola*, p. 30.
- 12.b Leaf margin untoothed, leaf color variable.....13

- 13.b Buds scale visible, basal sections of some of leaf petioles remain attached to
the stem,.....*S. hastata*, p. 26.
- 13.a Bud scale obscured by dense hairs.....14

- 14.a Shrubs usually less than 2 m. Leaves narrow, rounded at the tip, petiole to
3 mm long. Rosette galls up to 18 mm long.....*S. niphoclada*. p. 29.
- 14.b Shrubs to 6 m, leaves broader, tip often pointed, petioles 3-10 mm long.
Rosette galls 10-40 mm long..... *S. glauca*, p. 25.

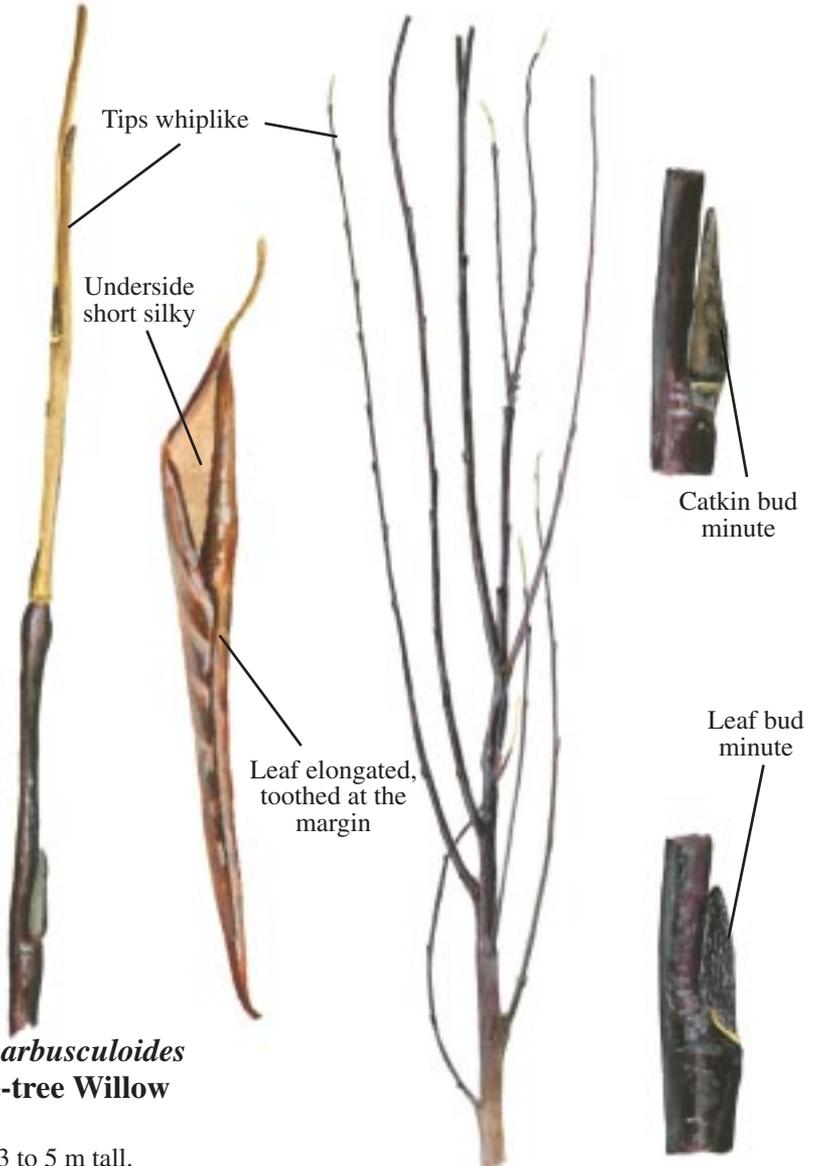
- 15.a Stem tips thin, whiplike.....*S. arbusculoides*, p. 22.
- 15.b Stem tips thicker.....16

- 16.a** Young stems either covered with yellowish dense hairs or coated with a bluish bloom such as found on grapes or plums.....*S. alaxensis*, p. 21.
- 16.b** Not as above.....17
- 17.a** Stem erect, newly established sandbars or disturbed habitat near major stream or river. Early pioneer.....*S. interior*, p. 27.
- 17.b** Stem branched. Various habitats.....18
- 18.a** Tree with distinct trunk and canopy; when still young, shoots with long annual growth.....19
- 18.b** Shrub branching from the base.....20
- 19.a** Catkin buds black, not shiny, roundish and pointed at the tip, much larger than leaf buds, developing in late winter, exposing the white catkin silk; stems often branching at right angle, trunk bark grey, smooth*S. scouleriana*, p. 33.
- 19.b** Catkins and leaf buds alike, waxy to the touch, yellow or brown, oval, shiny, developing in the spring; young stem waxy, branching at sharp angles, trunk bark rough, deeply furrowed*S. lasiandra*, p. 28.
- 20.a** Young stems reddish-brown.....21
- 20.b** Young stems not reddish brown. Mostly south of the Alaska Range.....*S. barclayi*, p. 23.
- 21.a** Catkin buds flattened dorsoventrally (duckbill shaped) in the winter, fuller but with a lateral pleat in the spring. Rosette gall with few deformed leaves. Only south of the Alaska Range.....*S. sitchensis*, p. 34.
- 21.b** Not as above..... 22
- 22.a** Catkin buds much larger than leaf buds.....*S. pseudomonticola*, p. 30.
- 22.b** Catkin buds almost the same size as leaf buds.....23
- 23.a** Stems branching often at wide angle, common in disturbed sites, heavily browsed by moose, catkin bud minute, pointed at the tip, minute rosette.....*S. bebbiana*, p. 24.
- 23.b** Stem branching at sharper angles, catkin buds not as above.....24
- 24.a** Basal sections of some of leaf petioles remain attached to the stem;..... stem densely hairy.....*S. hastata*, p. 26.
- 24.b** Basal section of petiole does not remain attached to the stem.....*S. pseudomyrsinites*, p. 84.



Salix alaxensis
Felt-leaf Willow

Tall shrub or tree up to 10 m tall. Stems elongate up to 1.5 m in one season, coated with whitish bloom or woolly; often a few persisting leaves, upper side reddish-brown glossy contrast with densely woolly off-white underside; stipules elongated; petioles sometimes inflated enveloping a winter bud; catkin buds start developing in winter; bud scale does not split at the tip but detaches from the base, revealing the white silk catkin, leaf buds much smaller than catkin buds. Wetlands, alpine meadows, and young forest.



Salix arbusculoides
Little-tree Willow

Shrub 3 to 5 m tall.

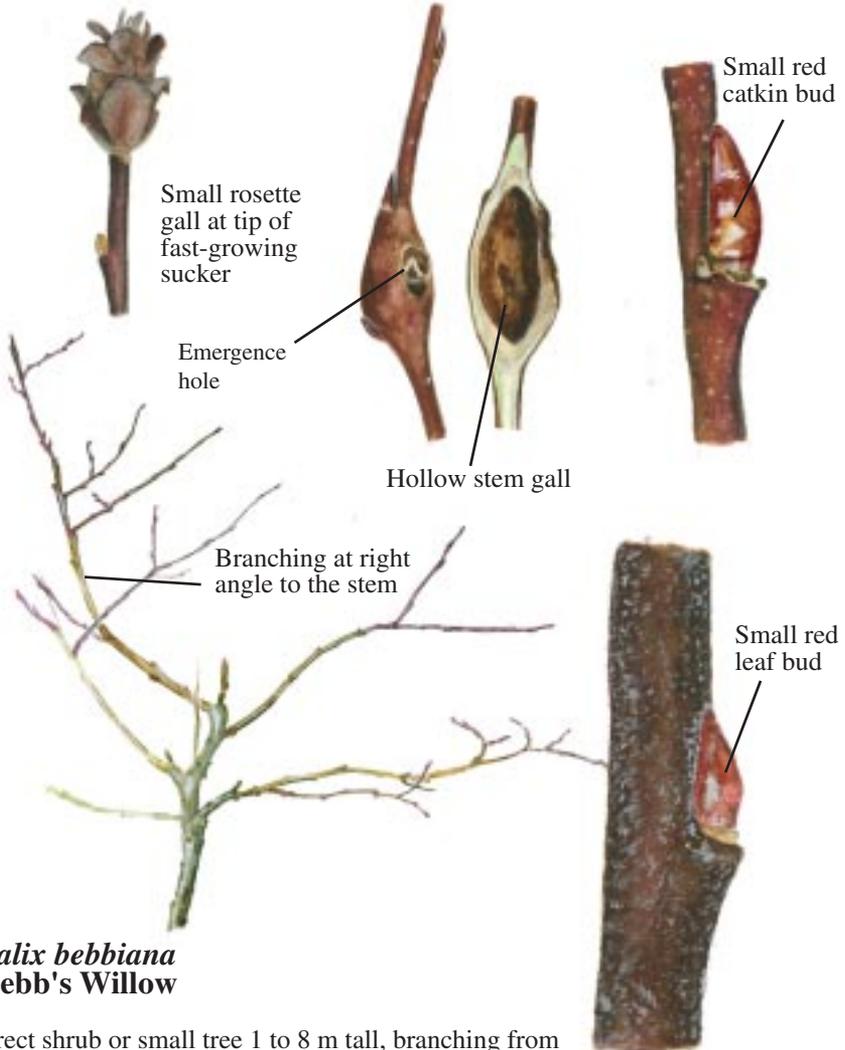
Thin whiplike twig tips; catkin buds and leaf buds minute; dried leaves elongated, curled, finely toothed at the margin, hairy underneath. The leaves dry reddish brown and tend to curl up tightly. Large reddish brown “pinecone” galls often develop on fast-growing shoots in disturbed habitat. Thin stem below the pinecone gall sometimes twists. Openings in the boreal forest, muskegs, and willow thickets.



Salix barclayi
Barclay's Willow

Shrub 1 to 2 m tall, many-branched from the base. Leaves dry gray-black above, pale grey underneath; catkin buds conical, elongate, diverging from the stem, slightly larger than leaf buds; large dark gray-brown "willow rose" galls often numerous on fast-growing shoots. Similar but reddish-brown "rose" galls also on *S. commutata*, and *S. richardsonii*.

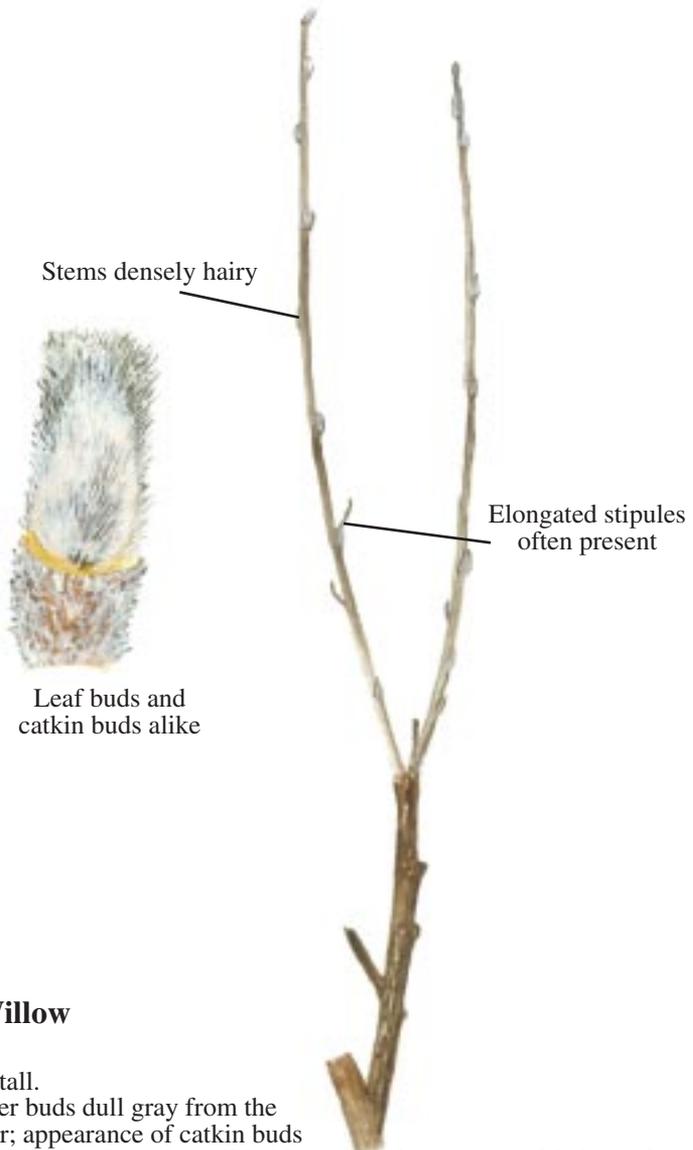
Very common shrub in moist sites along highways and disturbed sites south of the Alaska Range. Also in drainage and gullies a higher elevations. Forms extensive coastal and subalpine thickets associated with other willows.



Salix bebbiana
Bebb's Willow

Erect shrub or small tree 1 to 8 m tall, branching from low near the base, long unbrowsed stems and trunks bowed, leaning, branches thin, drooping heavily; browsed stems short, erect, contorted and knobby. Branches often inserted at right angles to the stem as for *S. scouleriana* and *S. commutata*; bark of older trunk deeply furrowed. A few characteristic catkins, light tan, loose because each capsule hangs from a long stipe; often remain on female shrubs during winter. Winter buds small, shiny red, or densely covered with white hair; catkin buds 3.5-5 mm long, only slightly larger than the leaf buds 2.5-4 mm long; rosette gall very small, about 10 mm long and diagnostic for the species; hollow stem gall sometimes on tips of fast growing shoots, single-chambered with hole through the leaf petiole scar from which the gall-inducing insect emerged.

Disturbed sites, open forest, in dry sites as understory, in wetlands and along riverbanks. Fast-growing dark-red sucker shoots are very conspicuous in early spring in cleared power line and road right-of-ways on well-drained soil.



Salix glauca
Gray-leaf Willow

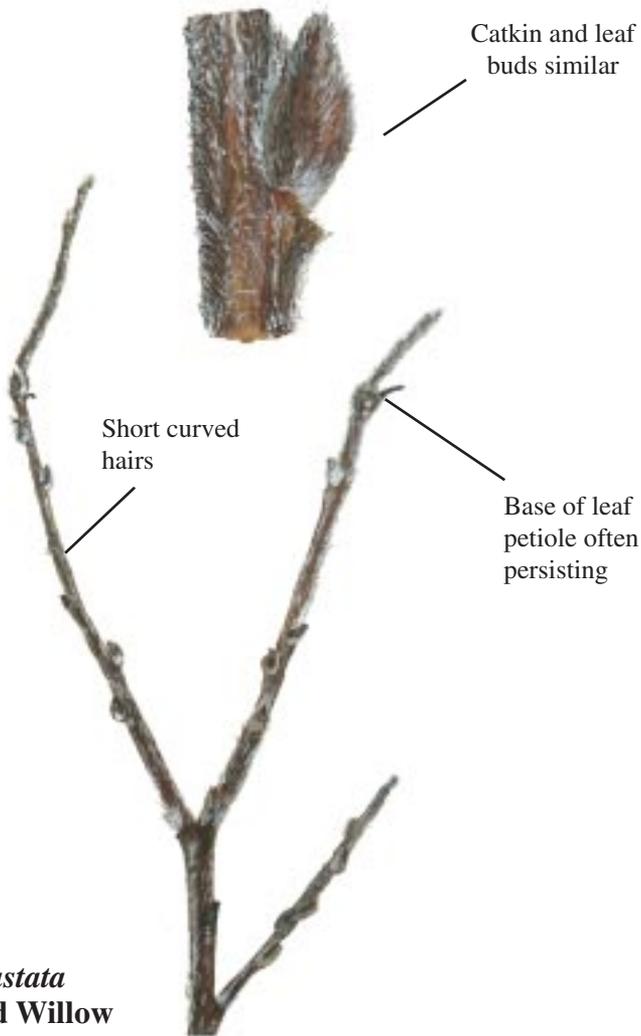
Shrub 1 to 2 m tall.

Twigs and winter buds dull gray from the dense hair cover; appearance of catkin buds similar to leaf buds; female catkins, dried leaves, and sometimes dried stipules remain on the shrub over winter; dried leaves tend to be curled end to end.

Pinecone gall, when present, with long white hairs on the scales.

Treeline thickets, lake shores, spruce-birch forest.

Salix niphoclada is very similar to *S. glauca*.



Salix hastata
Halberd Willow

Shrub up to 4 m tall.

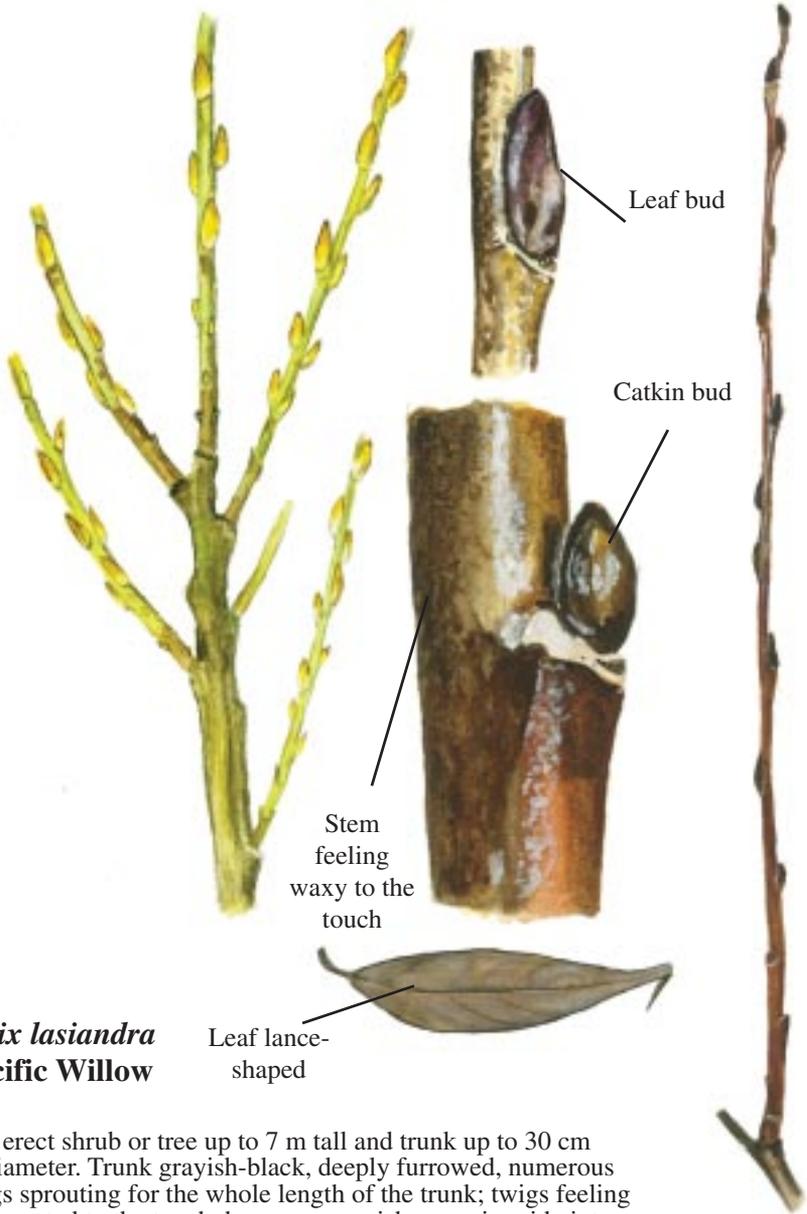
Branches flexible at the base with short, curved hairs. Catkin winter buds no larger than leaf winter buds.

Willow thickets on floodplain, along creeks and lake shores and sand dunes, dry tundra.



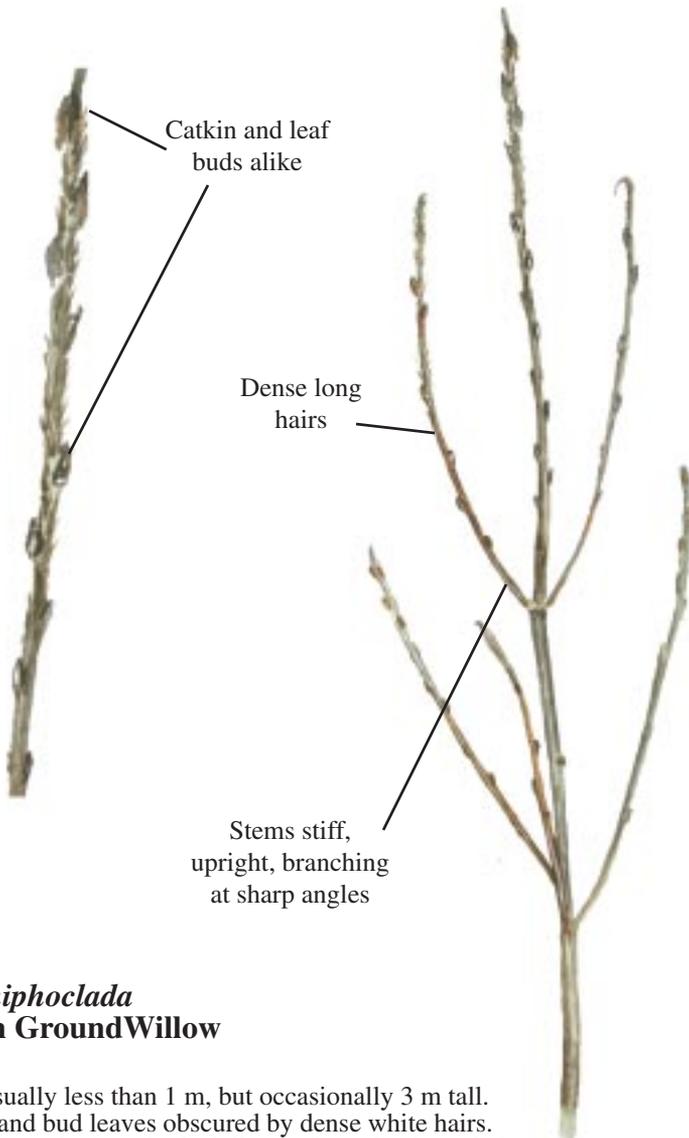
Salix interior
Sandbar Willow

Erect shrub up to 6 m tall, forming dense thickets on newly deposited alluvium. Branches flexible at the base, branchlets yellow to brown. Catkin winter buds no larger than leaf winter buds.



Salix lasiandra
Pacific Willow

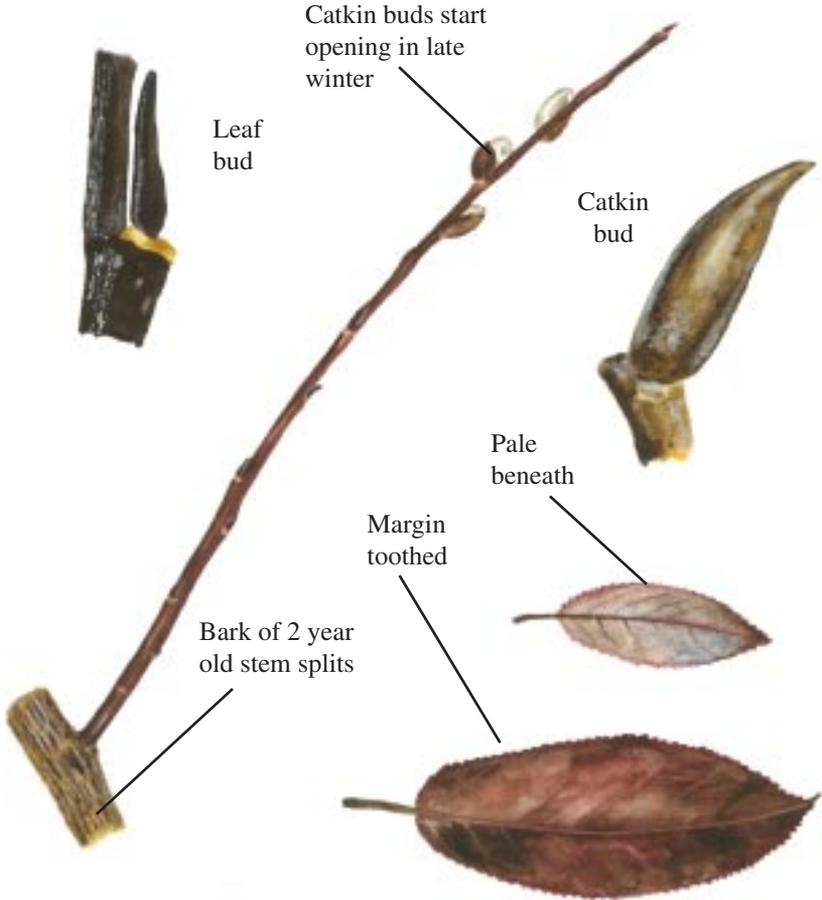
Tall erect shrub or tree up to 7 m tall and trunk up to 30 cm in diameter. Trunk grayish-black, deeply furrowed, numerous twigs sprouting for the whole length of the trunk; twigs feeling wax-coated to the touch, brown or grayish green in midwinter, yellow-green in spring; catkin buds slightly larger than leaf buds; dried leaves grey, lance-shaped. Banks of fast moving creeks, wetlands, and disturbed sites.



Salix niphoclada
Barren Ground Willow

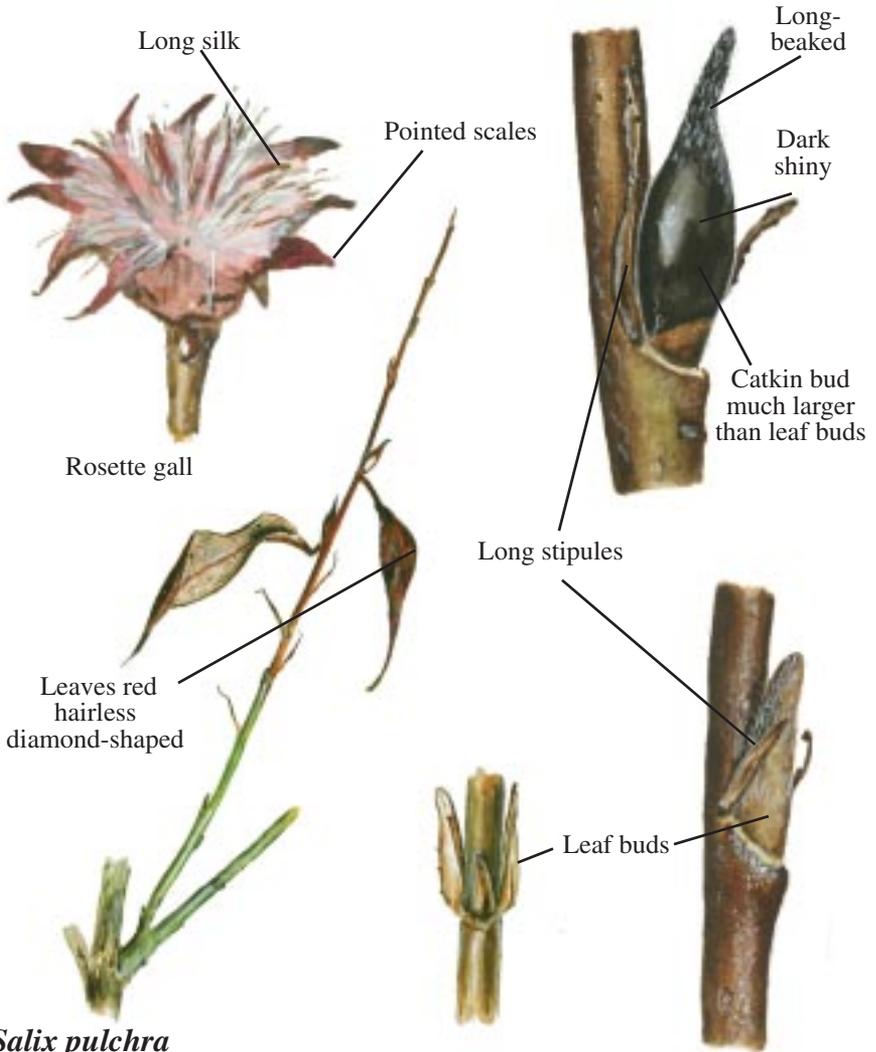
Shrub usually less than 1 m, but occasionally 3 m tall.
 Catkins and bud leaves obscured by dense white hairs.
 Stiff twigs and winter buds dull gray from the dense hair cover;
 appearance of catkin buds similar to leaf buds; female catkins up to 50 mm long,
 emptied in late winter.

Salix glauca is very similar to *S. niphoclada*.
 Early successional on riverbanks.



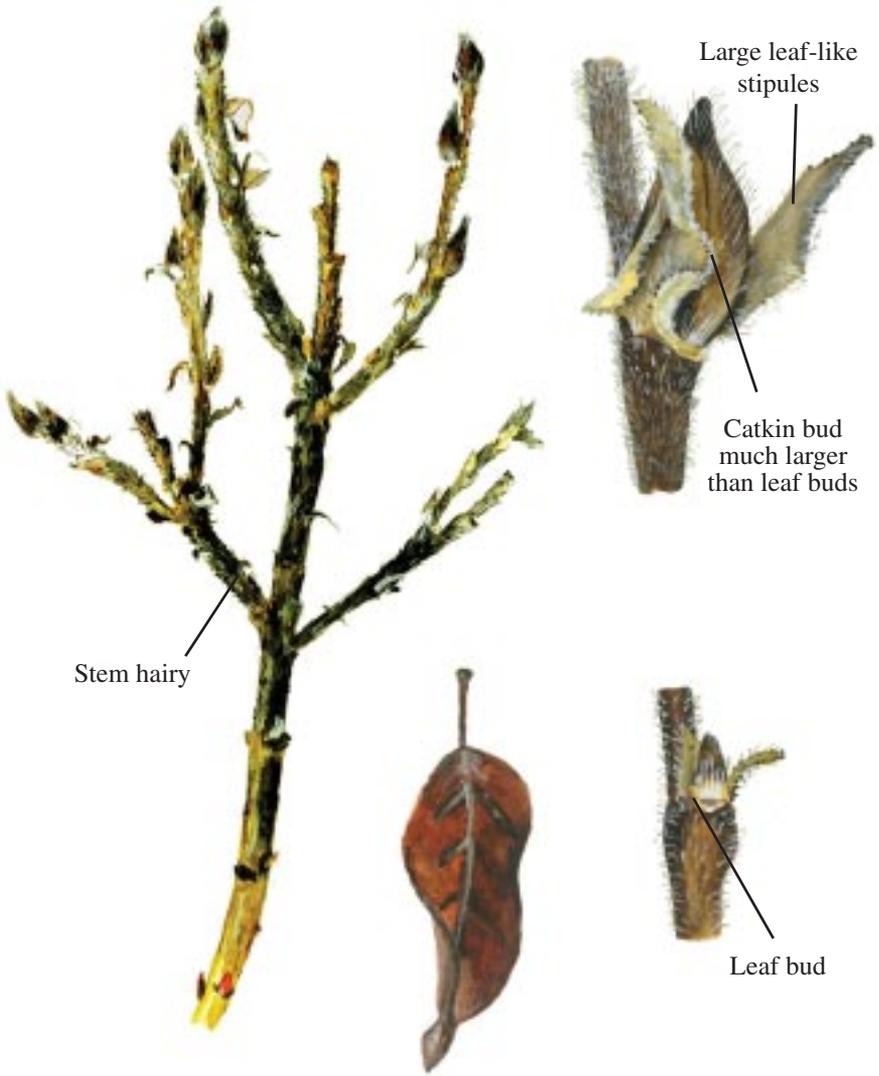
Salix pseudomonticola
Park's Willow

Shrub up to 6 m tall, many branched from the base. Young stem reddish brown. Bark of stem older than 2 years with longitudinal cracks. Outer layer along the split lift and appear yellow. Catkin winter buds much larger than leaf winter buds. Catkins develop and open early in the spring. River floodplain, opening in white spruce forest, bogs and fens.



Salix pulchra
Diamond-leaf Willow

Shrub 0.5 to 2 m tall, many-branched from the base. Elongated dried stipules usually persisting several years on glossy red twigs; catkin buds dark, shiny, and long-beaked, much larger than the leaf buds; hairless catkin buds may develop and show some catkin silk as early as February; diamond-shaped leaves, reddish above, pale underneath with untoothed margin often persisting; reddish-brown rosette gall, small (1-2 cm) with pointed scales and long white silk at the center, diagnostic for the species when present. Pinecone galls with scales hairless. Riverbanks, wetlands, muskegs, moist alpine tundra.

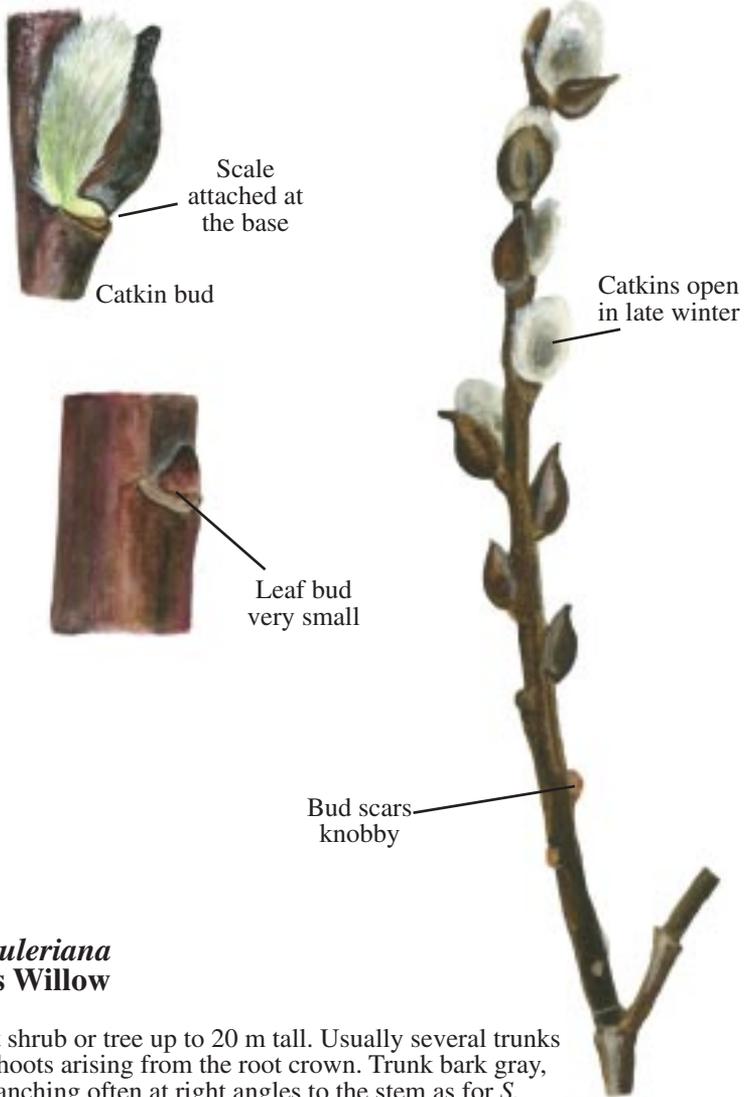


Salix richardsonii
Richardson's Willow

Shrub many-branched, 0.5 to 2 m tall.

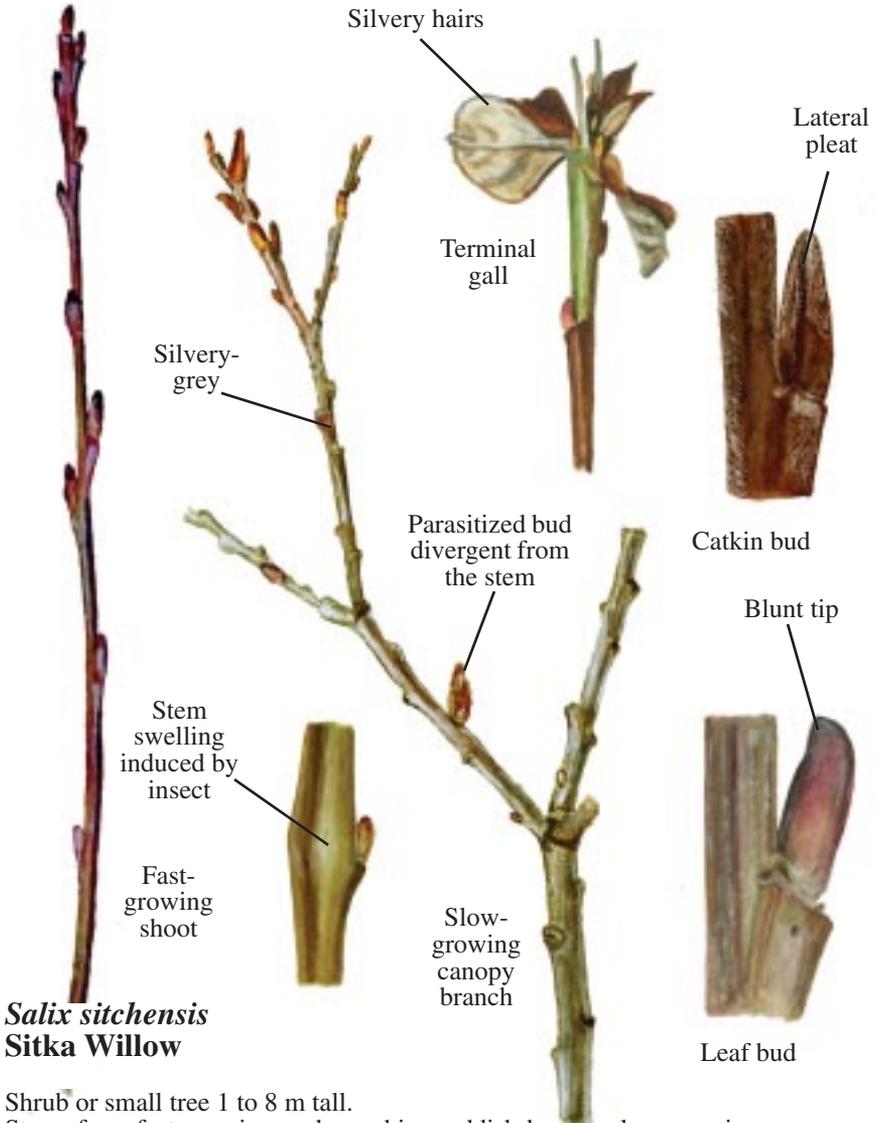
Stem hairy, large dried leaflike stipules persist on the stem, giving a rough appearance to the shrub; catkin buds develop early in the spring, much larger than the leaf buds; leaves dry reddish brown.

Associated with other willows, forming thickets above timberline.



Salix scouleriana
Scouler's Willow

Large erect shrub or tree up to 20 m tall. Usually several trunks with new shoots arising from the root crown. Trunk bark gray, smooth; branching often at right angles to the stem as for *S. bebbiana*, but stouter and "knobby" from the enlarged leaf scars, catkin buds round-oval with an elongated tip, not shiny, much larger than leaf buds; catkin buds develop by midwinter, the bud scales remain attached at the base but split open to the tip exposing the emerging catkin's white silk, making this willow very conspicuous in late winter. Sometimes hollow stem gall, with several communicating chambers at the end of stem, often with dried leaves still attached. Similar galls on *S. bebbiana* have a single chamber, are in the middle of the stem, and usually without attached dried leaves. Common in mixed forest in the uplands and in disturbed sites.



Salix sitchensis
Sitka Willow

Shrub or small tree 1 to 8 m tall.

Stems from fast-growing suckers, shiny reddish-brown; slow-growing upper canopy twigs knobby at the leaf scars, silvery gray, hollowed enlarged parasitized buds divergent from the stem; catkin buds flattened on the back like a duck bill early in the winter, fuller but still showing a lateral pleat later, only slightly larger than the leaf buds that are blunt at the tip; terminal gall on fast-growing shoots very characteristic; sometimes distinctive insect-induced swelling on slow-growing twigs; underside of leaves and deformed leaves on the terminal galls covered with short silvery hairs.

A coastal species, only found in the south of the area covered by this guide. Disturbed sites and creekbanks in the forest zone.

Summer

Flowering key to willows of interior Alaska. Adapted from Argus (2001).

Willows differ from other trees and shrubs by their leaves arranged alternately on the stems, their winter bud covered by a single scale, and their flowers bunched in dense catkins.

Use this key only if catkins are present; otherwise use the vegetative key (p. 39). This summer key relies heavily on female catkin characters. Individual willows are either male or female and the female catkins themselves often remain on the plant only for a short period. Occasionally, dried female catkins or dried leaves remain attached for an extended period and can be useful for identification, but care must be taken to make sure that they are still connected to the plant. Willows of several species frequently grow side by side with their branches entangled. Using dried leaves or catkins collected from the duff under the shrubs may mislead identification.

Catkins that appear before the leaves are usually directly attached to the stems (see p.104) while those that develop simultaneously with the leaves or later are borne on more or less developed leafy branchlets (see p.106). The best way to obtain a full set of characteristics for willows whose catkins and leaves are not present at the same time is to tag a branch from which samples are collected at various times of the year. Make sure that only cuttings from branches observed forking above ground are associated. The branch samples labeled, pressed, and dried between newspapers can be kept indefinitely.



Poplar winter bud covered by several scales



Willow winter bud covered by a single scale

- | | | |
|-----|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| 1.a | Dwarf willow with branches lying flat on the ground, under 20 cm tall..... | 2 |
| 1.b | Upright shrub more than 20 cm tall or tree..... | 12 |
| 2.a | Roundish leaves strongly veined, dark green above and pale beneath; reddish petiole long, at least half as long as the leaf blade..... | <i>S. reticulata</i> , p. 88. |
| 2.b | Leaf shape variable, veins not so conspicuous; petiole short..... | 3 |
| 3.a | Ovary hairy, sometimes only at the beak..... | 4 |
| 3.b | Ovary hairless..... | 10 |
| 4.a | Leaves finely toothed around the whole margin..... | <i>S. chamissonis</i> , p. 62. |
| 4.b | Leaves margin untoothed or toothed only at the basal half..... | 5 |
| 5.a | Leaves green beneath..... | 6 |
| 5.b | Leaves pale beneath (pale waxy layer can be scraped with the fingernail revealing green plant tissue beneath)..... | 7 |
| 6.a | Leaf margin with a fringe of hairs; dried skeletonized leaves at the base of the plants; plant with central root, stems spreading..... | <i>S. phlebophylla</i> , p. 78. |

- 6.b Leaf margin hairless; dried leaves at the base of the plant not skeletonized, plant spreading with roots at internodes.....*S. polaris*, p. 80.
- 7.a Style 0-0.5 mm.....8
- 7.b Style longer than 0.5 mm.....9
- 8.a Ovary red, pear-shaped with short stiff reddish hairs; leaves hairless, dark green glossy above, broadest near the tip; margin of the leaves toothed at the base; flexible branches trailing in the vegetation....*S. fuscescens*, p. 64.
- 8.b Ovary grayish-green, barrel-shaped, densely white hairy; leaves elongated, hairy above and beneath, margin not toothed; shrub erect, branches stiff, grayish black hairy, dull (not shiny).....*S. niphoclada*, p. 76.
- 9.a Ovaries sparsely hairy with short flat crinkled hairs, leaf margin finely toothed-glandular, leaves hairless, nectary shorter than the stipe.....
.....*S. arctophila*, p. 50.
- 9.b Ovary densely hairy with straight hairs, leaf margin untoothed or only finely toothed near the base; branchlets without roots; some of the leaves with long silky hair forming a “beard” at their tip, nectary longer than the stipe
.....*S. arctica*, p. 48.
- 10.a Leaves green beneath, not fleshy.....11
- 10.b Leaves pale beneath (pale waxy layer can be scraped with the fingernail revealing green plant tissue beneath), fleshy.....*S. setchelliana*, p. 96.
- 11.a Plant minute, less than 5 cm high; leaves at most 1.5 cm long, roundish, not toothed at the margin; female catkins short, bearing 4 to 15 pistils.....
.....*S. rotundifolia*, p. 92.
- 11.b Plant 10 cm high or more; leaves oval, more than 1.5 cm long, margin finely toothed.....*S. myrtilifolia*, p. 74.
- 12.a Catkins appearing before the leaves open, borne directly on the stem or on short few-leafed branchlets.....13
- 12.b Catkins appearing at the same time as the leaves open or later, borne on developed leafy branchlets.....18
- 13.a Ovary hairless.....14
- 13.b Ovary hairy15
- 14.a Stipules well-developed, leaflike, persisting several years, young leaves green, when present: *Pontania*-induced densely woolly bean-shaped leaf galls 5-15 mm long..... *S. richardsonii*, p. 90.
- 14.b Previous year’s stipules not present on the plant, new stipules rounded, young leaves reddish: when present, *Pontania*-induced bald bean-shaped leaf gall
.....*S. pseudomonticola*, p. 82.
- 15.a Leaves densely white woolly beneath, shiny bright green above.....
.....*S. alaxensis*, p. 44.
- 15.b Leaves not woolly beneath.....16

- 16.a** Leaves hairless beneath, shiny green above; stipules linear, persisting several years on the stems.....*S. pulchra*, p. 86.
- 16.b** Leaves hairy beneath, previous year's stipules not persisting on the plant. 17
- 17.a** Low, dense shrub in wet subalpine thickets, stipules and buds oily, leaves with long white hairs beneath.....*S. barrattiana* p. 56.
- 17.b** Tall shrub or tree in forest zone, stipules and buds not oily, canopy leaves with reddish hair appearing as a reddish hue; stipules not persisting several years.....*S. scouleriana*, p. 94.
- 18.a** Ovary hairless.....19
- 18.b** Ovary hairy.....23
- 19.a** Leaves narrow, 6 or more times as long as wide, leaf margin finely toothed. Sandbars on major rivers.....*S. interior*, p. 70.
- 19.b** Leaves less than 5 times as long as wide, leaf edge toothed or not toothed. Various habitats20
- 20.a** Leaves lance-shaped; 5 stamens in each male floret; leaf petiole glandular; large shrub or small tree. Trunk bark blackish, deeply furrowed. Riverbanks and wetlands*S. lasiandra*, p. 72.
- 20.b** Leaves not lance-shaped; 1 or 2 stamens in each male floret; no glands on the petiole. Bark variable. Various habitats21
- 21.a** Leaves green beneath22
- 21.b** Leaves pale beneath (pale waxy layer can be scraped with fingernail, showing green plant tissue)*S. barclayi*, p. 54.
- 22.a** Small shrub less than 1 m tall; flexible stems trailing in the vegetation, leaves hairless; minute stipules 1-2 mm; style 0.3-0.5 mm.....*S. myrtilifolia*, p. 74.
- 22.b** Erect shrub 0.5-4 m; stipules 1-5 mm; styles 0.3-0.5 mm.....*S. pseudomyrsinites*, p. 84.
- 23.a** Leaf underside densely white woolly, uncommon plant....*S. candida*, p. 60.
- 23.b** Leaf underside not densely woolly.....24
- 24.a** Reddish hairs scattered on both sides of the leaves especially on young leaves.....*S. athabascensis*, p. 52.
- 24.b** No reddish hairs on the leaves.....25
- 25.a** Stipes 2-5 mm; catkins loose, often a few remaining on the shrub through the winter; leaves upper side shiny, with veins impressed.....*S. bebbiana*. p. 58.
- 25.b** Stipe much shorter; catkins dense; veins not so conspicuous on the upper side of the leaves.....26
- 26.a** Leaves silky beneath.27
- 26.b** Leaves hairy beneath, but not silky.....28

- 27.a** Leaves narrow, 5-7 times as long as broad, margin toothed, with a small gland on each tip; 2 stamens in each male floret..... *S. arbusculoides*, p. 46.
- 27.b** Leaves elliptic, less than 3 times as long as broad, leaves appear satiny beneath (like the fur of a seal); 1 stamen in each male floret.....
..... *S. sitchensis*, p. 98.
- 28.a** Petioles 3-15 mm long, yellowish. Subalpine thicket, lake shores.....
..... *S. glauca*, p. 66.
- 28.b** Petioles short, 1-3mm long, reddish. Coastal meadows and river sandbars
..... *S. niphoclada*. p. 76.

Vegetative key to willows of interior Alaska.

Adapted from Viereck and Little (1972).

- 1.a** Dwarf shrub, mostly under 30 cm..... 2
- 1.b** Shrub taller than 30 cm or tree..... 10
- 2.a** Leaves toothed at least at their base..... 3
- 2.b** Leaf margins not distinctly toothed..... 4
- 3.a** Leaf margin toothed at the base only, tip of leaves broad, leaves pale beneath (pale waxy layer can be scraped with the fingernail revealing the green plant tissue beneath).....*S. fuscescens*, p. 64.
- 3.b** Whole leaf margins finely toothed, tip of the leaves pointed, underside green.....*S. chamissonis*, p. 62.
- 4.a** Leaf veins with deeply impressed network on the upper side, long red petiole.....*S. reticulata*, p. 88.
- 4.b** Leaf vein not forming a deeply impressed network, petiole short, of various colorations..... 5
- 5.a** Leaves thick, fleshy like those of a “jade plant,” on barren glacier-fed river sandbars and glacial outwash plain.....*S. setchelliana*, p. 96.
- 5.b** Leaves thinner, flexible, various habitats..... 6
- 6.a** Leaves pale beneath (pale waxy layer can be scraped with the fingernail revealing the green plant tissue beneath)..... 7
- 6.b** Leaves green beneath..... 8
- 7.a** At least some of the leaves with long silk hairs beneath forming a beard at the tip of the leaves, branches stout, sparsely hairy.....*S. arctica*, p. 48.
- 7.b** Leaves hairless, stems trailing, hairless.....*S. arctophila*, p. 50.

- 8.a** Reddish-brown skeletonized leaves remain on the branches, leaf margin with small hairs.....*S. phlebophylla*, p. 78.
- 8.b** No skeletonized leaves remain on the branches, leaf margin hairless.....9
- 9.a** Shrub densely matted, persisting dry reddish-brown leaves at the base of the plant, leaves 0.4-1 cm long, with 3 prominent veins beneath.....*S. rotundifolia*, p. 92.
- 9.b** Shrub loosely matted with long trailing stems, no persisting dried leaves on the plant, leaves up to 2.5 cm long..... *S. polaris*, p. 80.
- 10.a** Leaves densely woolly or felt-like underneath.....11
- 10.b** Leaves hairy or not underneath but not felty or woolly.....12
- 11.a** Stipules 2-3 mm long, leaves 4-7 times as long as broad, branchlets densely woolly, silvery in appearance. Uncommon in bogs of the upper Yukon and upper tributaries.....*S. candida*, p. 60.
- 11.b** Stipules 4-20 mm long, leaves 2-4 times as long as wide, branchlets densely yellowish woolly or hairless with bluish bloom. Some of the leaf petioles often inflated in plants with woolly stems.....*S. alaxensis*, p. 44.
- 12.a** Leaves pale beneath (pale waxy layer can be scraped with the fingernail revealing the green plant tissue beneath).....17
- 12.b** Leaves green beneath.....13
- 13.a** Leaves lance-shaped, broad at the base with an elongated tip. Tree with rough blackish bark or shrub with long shoots.....*S. lasiandra*, p. 72.
- 13.b** Leaves of a different shape. Growth form variable.....14
- 14.a** No stipules or stipules minute.....*S. myrtilifolia*, p. 74.
- 14.b** Stipules present.....15
- 15.a** Low shrub usually less than 1 m tall, stout mostly unbranched stems, dense foliage, buds and stipules oily, stems and leaves densely grey hairy.....*S. barrattiana*, p. 56.
- 15.b** Branching shrub usually taller than 1 m, foliage not so dense, stipules not oily, stems and leaves not densely gray hairy.....16
- 16.a** Leaves toothed at the margin.....*S. pseudomyrsinites*, p. 84.
- 16.b** Leaves toothless at the margin, petiole reddish, often short reddish hairs on the main vein.....*S. hastata*, p. 68.
- 17.a** Stipules minute or lacking.....18

- 17.b** Stipules present (stipules fall off early in *S. bebbiana*).....**22**
- 18.a** Leaves at least 6 times as long as wide, sandbars on major rivers.....
.....*S. interior*, **p. 70.**
- 18.b** Leaves broader, various habitats.....**19**
- 19.a** Leaves densely covered underneath with short hairs, all oriented in the same direction, appearing satiny (like the fur of a seal). Only south of interior Alaska, riverbanks.....*S. sitchensis*, **p. 98.**
- 19.b** Underside of the leaves not satiny. Broader distribution.....**20**
- 20.a** Sparse reddish hairs on both sides of the leaves. Uncommon, in bogs.....
.....*S. athabascensis*, **p. 52.**
- 20.b** Only white hairs on leaves.....**21**
- 21.a** Shrub mostly less than 1 m tall, leaves narrow, leaf hair sparse, straight oriented toward the tip, petioles short.....*S. niphoclada*, **p. 76.**
- 21.b** Shrub or tree, leaves broad, leaf hairs curled, hairs mostly oriented in various directions.....*S. bebbiana*, **p. 58.**
- 22.a** Stipules persisting several years on the stem.....**23**
- 22.b** Stipules not persisting several years on the stem.....**24**
- 23.a** Stipules linear, leaves elongated, diamond shaped, often dried reddish leaves remaining on the shrub, *Pontania*-induced bald round leaf gall 3-10 mm long.....*S. pulchra*, **p. 86.**
- 23.b** Stipules large, leaflike, remaining several years giving a coarse appearance to the shrub, *Pontania*-induced densely woolly bean-shaped leaf galls 5-15 mm long*S. richardsonii*, **p. 90**
- 24.a** Leaves lance-shaped, broad at the base with an elongated tip. Tree with rough blackish bark or shrub with long shoots.....*S. lasiandra*, **p. 72.**
- 24.b** Leaves of a different shape. Growth form variable.....**25**
- 25.a** Mature leaves hairless or hairy only on the main vein.....**26**
- 25.b** Mature leaves hairy.....**27**
- 26.a** Mature leaves hairless, stem tips stout, finely (densely) hairy stipules, leaf like, asymmetrical, often numerous large blackish rosette galls, stem variable. South of the Alaska Range.....*S. barclayi*, **p. 54.**
- 26.b** Mature leaves upper side with small red hairs on the main vein, (dissecting microscope may be needed to see the small hairs), petiole reddish, stem tips

thin, dark, shiny, leaves ending in a pointed tip, stipules mostly rounded.
Throughout Alaskan interior.....*S. pseudomonticola*, p. 82.

- 27.a** Upper surface wrinkled by creases caused by impressed veins, textured like leather, leaf hairs long, curled.....*S. bebbiana*, p. 58.
- 27.b** Upper surface plane, veins not impressed, leaf hairs not curled.....28
- 28.a** Upper leaf surface shiny, hairs on leaf underside short, flat and reddish, buds hairless or with few hairs.....29
- 28.b** Hairs long and silky, buds densely hairy.....*S. glauca*, p. 66.
- 29.a** Leaves long, margin serrated, hairs densely hairy, reddish hairs underneath, branch tips thin.....*S. arbusculoides*, p. 46.
- 29.b** Leaves hairs not so dense, branch tips stout.....*S. scouleriana*, p. 94.

Summer Willow Descriptions

Felt-leaf Willow

Salix alaxensis (Andersson) Coville

Identification

Summer: Shrub or tree up to 10 m tall. **Underside of leaves densely felty** contrasting with green upperside; leaf stipule elongated; **long female catkins** directly attached to the stem, upright to 14 cm long, **developing early** before the leaves; **ovary densely hairy; style long.**

Two varieties of Felt-leaf willow grow in Alaska:

Salix alaxensis alaxensis: **branchlets densely covered with white-yellow woolly hairs, leaf petioles often swollen**, and the winter buds sometimes enlarged. This variety of the Felt-leaf willow develops as a shrub up to 4 m tall.

Salix alaxensis longistylis: differs by the branchlets lacking woolly hairs. Instead, the **branchlets are coated with a fine white waxy powder** (bloom) similar to that found on fresh plums or grapes. The leaf petioles are rarely swollen and the winter buds are often small. This variety may grow to tree size up to 10 m tall, trunk diameter up to 30 cm.

Winter: see p. 21.

Similar species

Salix candida is the only other willow species with leaf underside densely covered with woolly hairs. *Salix candida*, which is not common, differs from *S. alaxensis* by flowering at the same time the leaves develop, the catkins borne on leafy branchlets and by the elongated leaves less than 2 cm wide.

Phenology

At low elevation in the forest zone, *S. alaxensis* catkins appear mid-April to mid-May; the female catkins start releasing seeds from mid-May to mid-June. The leaves appear in early May and are fully developed by mid-June. In the alpine zone above timberline, isolated *S. alaxensis* shrubs may start flowering as late as mid-June.

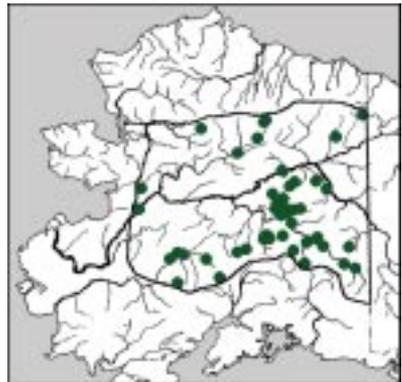
Habitat

Feltleaf willow forms dense stands on gravel bars of rivers with fast-flowing water and grows associated with other willows in wetlands, alpine meadows, and young forest. It is one of the first tall shrub species to colonize gravel bars of glacier-fed rivers.

Wetland indicator status

Facultative.

Continued p. 100.





Little-tree Willow

Salix arbusculoides Andersson

Identification

Summer: Shrub or small tree 1-6 m tall, occasionally to 10 m. Branches thin and flexible; **leaves elongated, 3 to 6 times as long as wide**, hairless above, **silky below** with short white or reddish hair oriented toward the leaf tip, **margin finely toothed; ovary densely silky**. Fast growing shoots develop large lance-shaped leaves.

Winter: see p. 22.

Similar species

This is the only willow species with the combination of leaves more than 3 times as long as broad with silky underneath surface and finely glandular-toothed margin. *Salix pulchra* may have elongated leaves, but these are hairless underneath, without fine teeth at the margin, and the stipules remain on the stems for several years.

Phenology

Catkins develop before or at the same time as the leaves, which are fully developed as early as the end of May. The capsule releases its seeds by mid-June.

Habitat

Openings in the boreal forest, muskegs, willow thickets in drainages in subarctic tundra.

Wetland indicator status

Facultative Wetland.

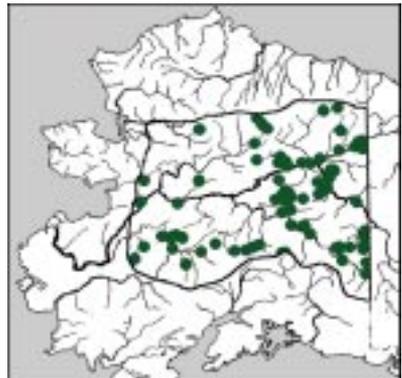
Uses

This species is recommended for revegetation projects using the dormant cuttings method. Moose browse this willow.

“Diamond willows” are sometimes formed on this species.

Insects and diseases

Euura sp., *Micrurapteryx salicifoliella*, *Pontania* sp., *Rabdophaga rigidae*, *R. rosaria*, *R. strobiloides*, eriophyiid mites, and tar spot fungus.





Arctic Willow

Salix arctica Pall.

Identification

Dwarf shrub growing prostrate against the ground or erect; oval leaves hairless and shiny above, **whitish underneath** with **long white hairs that form a beard at the tip**; catkins borne on leafy branchlets; **female catkins long**, many-flowered; **ovary hairy**; anthers purple; bract hairs long and straight.

Similar species

Usually, at least some leaves of *S. arctica* have long white hair on the undersurface and margin forming a beard at the tip, undersurface whitish whereas in *S. rotundifolia*, *S. phlebophylla*, and *S. polaris* leaves are hairless, and the leaf undersurface is green. *Salix stolonifera* and *S. ovalifolia* have hairless ovaries. Specimens of *S. arctica* that lack the “beard” hair at the apex of leaves and have no female catkins may be difficult to distinguish from *S. stolonifera* and *S. ovalifolia*.

Phenology

Catkins develop at the same time as the leaves. The male and female catkins of *S. arctica* appear from early June until mid-August, depending on the local conditions in its natural subalpine or alpine habitat. Fully developed leaves can be present as early as June.

Habitat

Alpine meadows, exposed mountain ridges, glacial river sandbars.

Uses

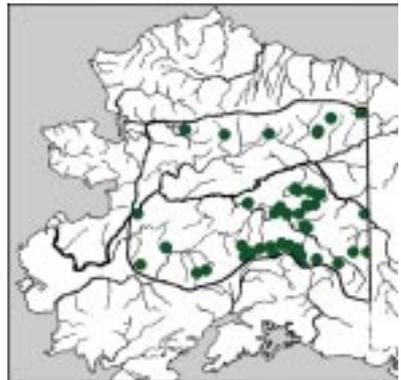
Salix arctica is the main diet for Arctic hares (*Lepus arcticus*), musk oxen and collared lemmings (*Dicrostonyx groenlandicus*) in Greenland (Klein and Bay 1991).

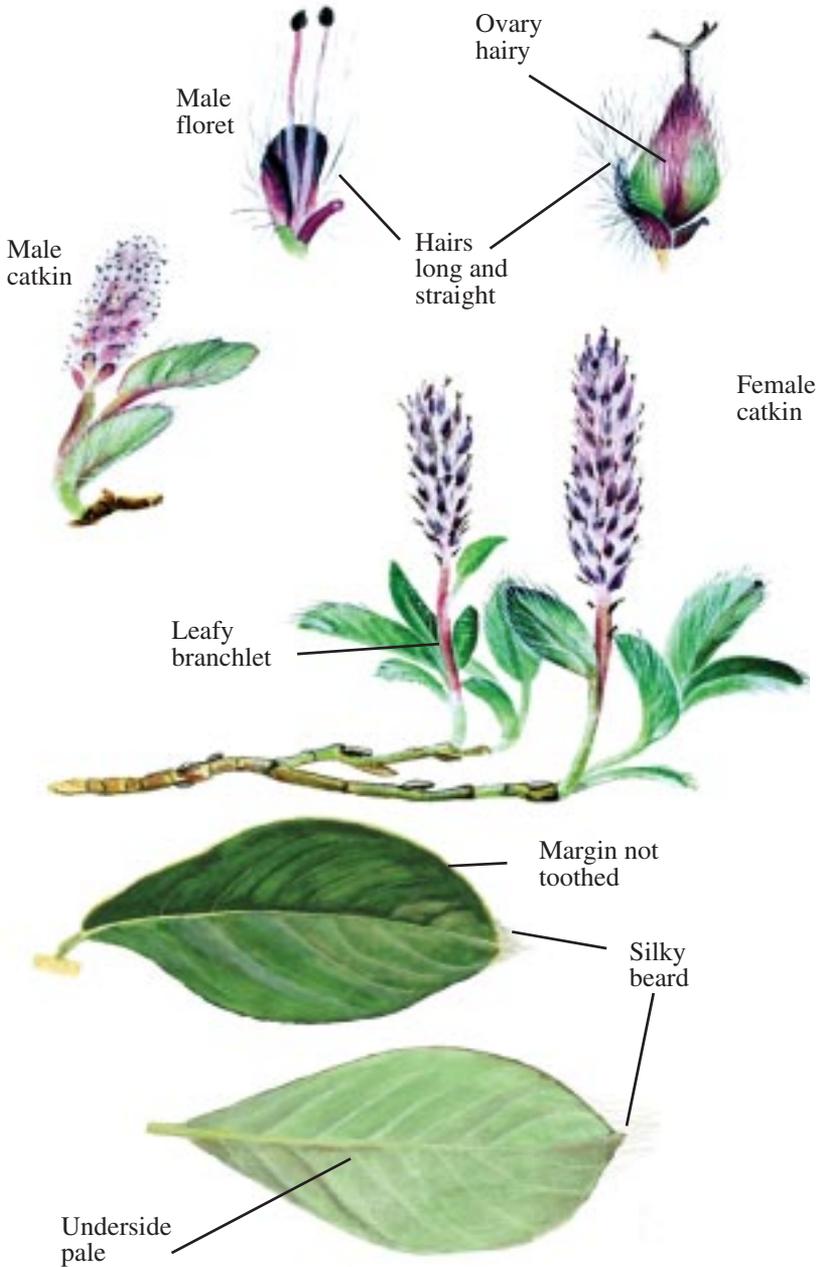
Insects and mites

Chrysomelidae, *Pontania* sp., *Rabdophaga salicis*, and Eriophyiidae.

Note

Salix arctica hybridizes with *S. barclayi* and *S. stolonifera*.





Northern Willow

Salix arctophila Cock.

Identification

Dwarf shrub, often with **long running branches**; mature leaves hairless, elliptic, margin untoothed, glossy yellow green above, whitish underneath. Catkins developing at the same time as the leaves, on leafy branchlets; **female catkin** long, erect; **ovary** reddish-purple, sparsely hairy with short **flat crinkled hairs**, bract purplish or black with long straight hairs.

Similar species

Differs from *S. arctica* by the sparse flat, crinkled and refractive hairs on the ovary while those on *S. arctophila* ovary are dense, or sparse but round in cross section and non-refractive. Vegetative specimens may be difficult to separate from *S. arctica*. *Salix arctophila* differs mostly by the absence of hair beneath the leaves, and the long yellow-green branchlets often trailing.

Phenology

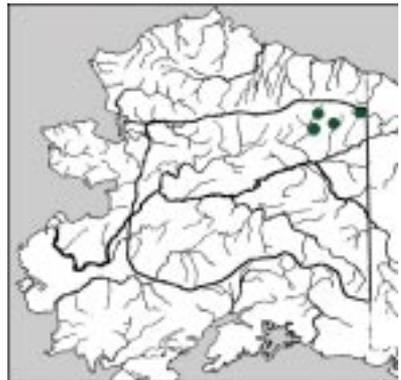
Catkins develop at the same time as the leaves.

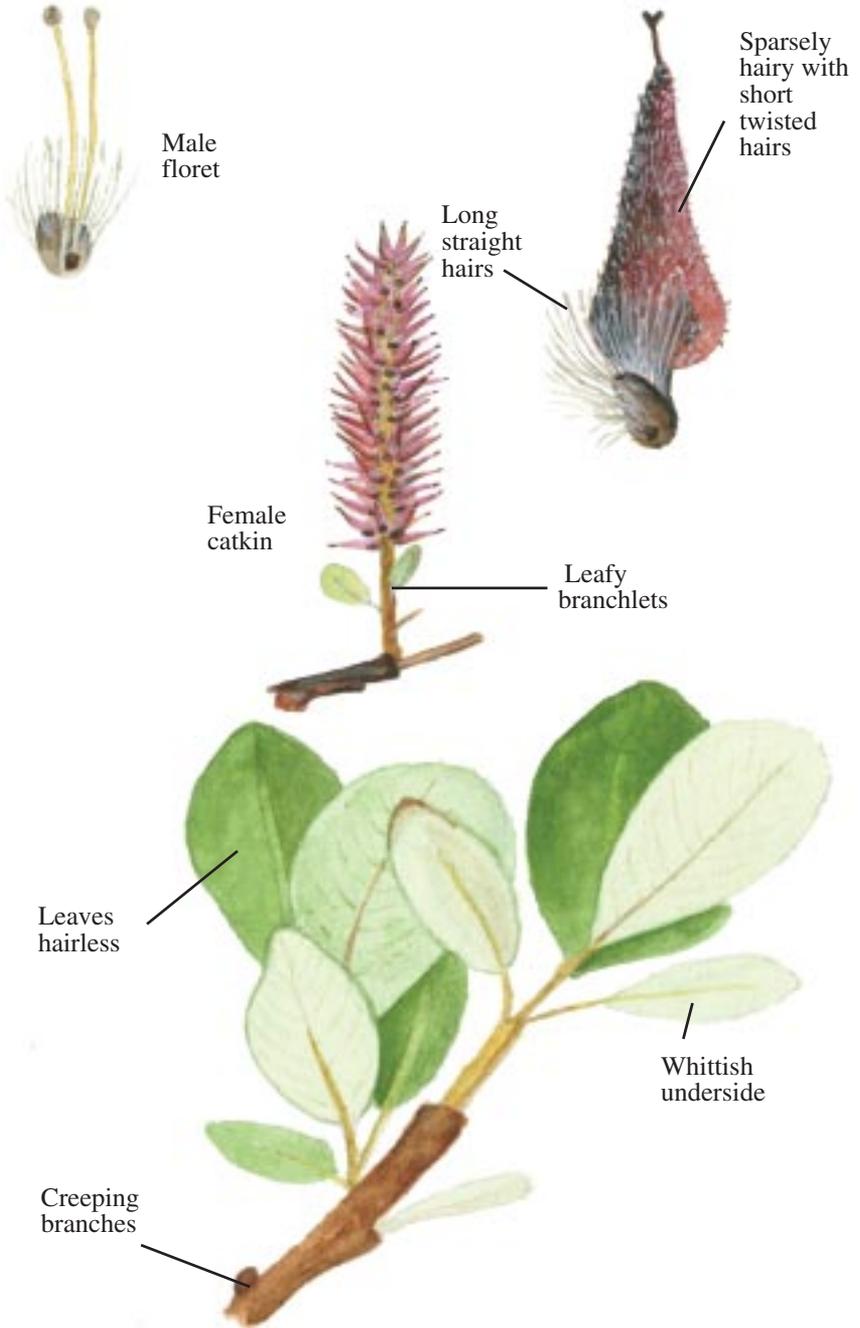
Habitat

Wet tundra arctic or alpine tundra in the northeast of the area covered by this guide.

Wetland indicator status

Obligate Wetland, Facultative Wetland.





Athabasca Willow

Salix athabascensis Raup.

Salix pedicellaris var. *athabascensis* (Raup) Boivin

Salix fallax Raup.

Identification

Shrub up to 1 m tall. **Branchlets covered with curved hairs**; leaf margin untoothed, more or less covered with **white or reddish hairs lying flat** against the surface of the leaf, stipules minute, **catkins loosely flowered**, bracts pale brown, ovaries densely covered with long flat silks, **stipe \pm 1 mm** long, nectaries shorter than stipe.

Similar species

Difficult to identify, characteristic reddish hairs often sparse, or lacking. Separated from *S. niphoclada* by the longer stipes. Vegetative specimens lacking reddish hair may be confused with *S. niphoclada*.

Phenology

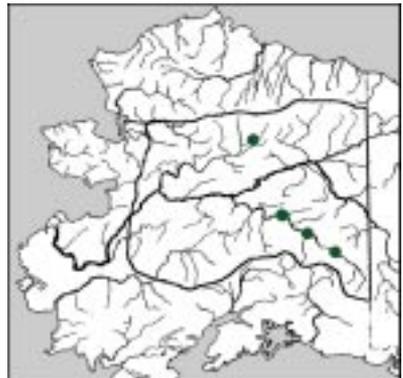
Catkins develop at the same time as the leaves.

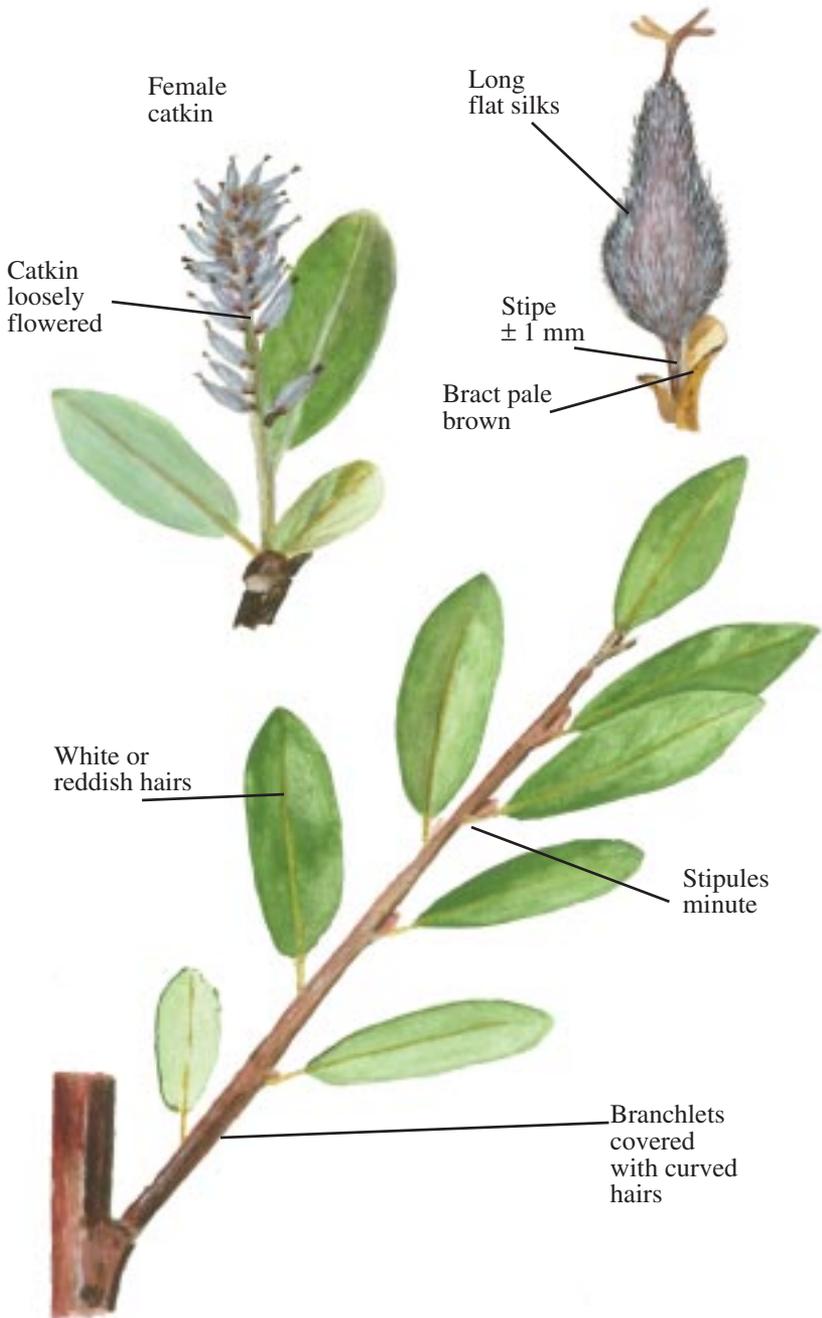
Habitat:

Fens, bogs, treed bogs. Not many locations known within the area considered by the guide. May be overlooked.

Wetland indicator status

Obligate Wetland.





Barclay's Willow

Salix barclayi Andersson

Identification

Summer: Shrub 1-2 m tall occasionally to 5 m, branching from the ground level. Leaves develop at the same time as the catkins; mature leaves hairless, green above, **whitish underneath**, margin more or less toothed, **dry or bruises gray-black**; **stipules broad**, not persisting over winter; **catkins borne on leafy branchlet**; **ovaries pear-shaped, hairless**. Often **many large rosette galls**, especially in disturbed sites. Very common species from lowlands to subalpine south of the Alaska Range.

Winter: see p. 23.

Similar species

Salix barclayi is not found north of the Alaska Range. Reports of specimens of *S. barclayi* north of the Alaska Range usually are mis-identification of *S. hastata*. Close examination will often reveal sparse reddish hairs on the main leaf vein of *S. hastata*. *Salix barclayi* is variable in appearance but can be distinguished from *S. myrtilifolia* and *S. pseudomyrsinites* by the leaf's pale underside, *S. richardsonii* and *S. pseudomonticola* by the catkins borne on well-developed leafy branchlets, appearing at the same time as the leaves. In the subalpine, *S. barclayi* can be distinguished from *S. richardsonii* by their lack of large dried stipules that persist several years on the stems.

Phenology

In the forest zone at low elevations, catkins and leaves start developing from mid-May until mid-June, and the capsules start releasing seeds in mid-June. The spent catkins drop at maturity.

In the alpine zone the development of catkins and leaves may be delayed as late as mid-August by local snow conditions and may not mature every year.

Habitat

Salix barclayi is the dominant species in subalpine willow thickets and in moist disturbed sites at lower elevations south of the Alaska Range. It reaches higher elevations in moist gullies in alpine habitats. *Salix barclayi* is very common along road rights-of-way.

Wetland indicator status

Facultative.

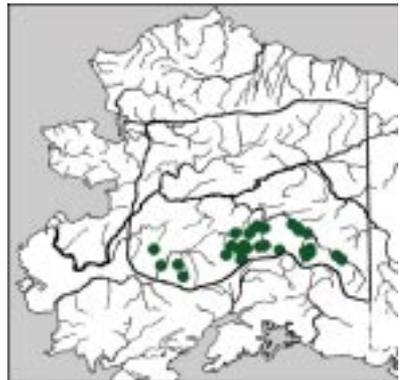
Note

Hybridizes with *S. arctica* and *S. richardsonii*.

Uses

This species is recommended for revegetation projects using the dormant cutting method.

Continued p. 100





Barratt Willow***Salix barrattiana* Hook.****Identification**

Shrub up to 1.5 m. Plant **densely leafed**, appears gray from a distance, characteristically standing out among other willows; **oily stipules and buds**, leaving stains on the paper used to dry the specimens. **Stems densely gray hairy**, stipules leaflike, leaves crowded, long, gray hairy beneath, margin untoothed, catkins long, appearing before the leaves, **ovaries densely long hairy**, with flat hairs.

Phenology

Catkins appear before the leaves.

Habitat

Wet meadows, river gravelbars, and subalpine tundra.

Wetland indicator status

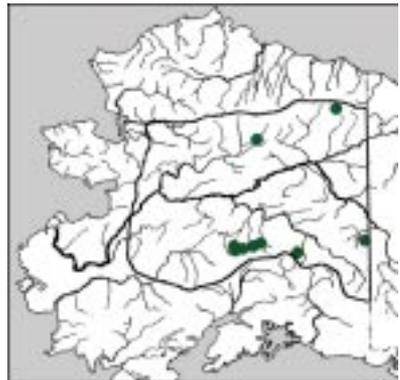
Facultative wetland.

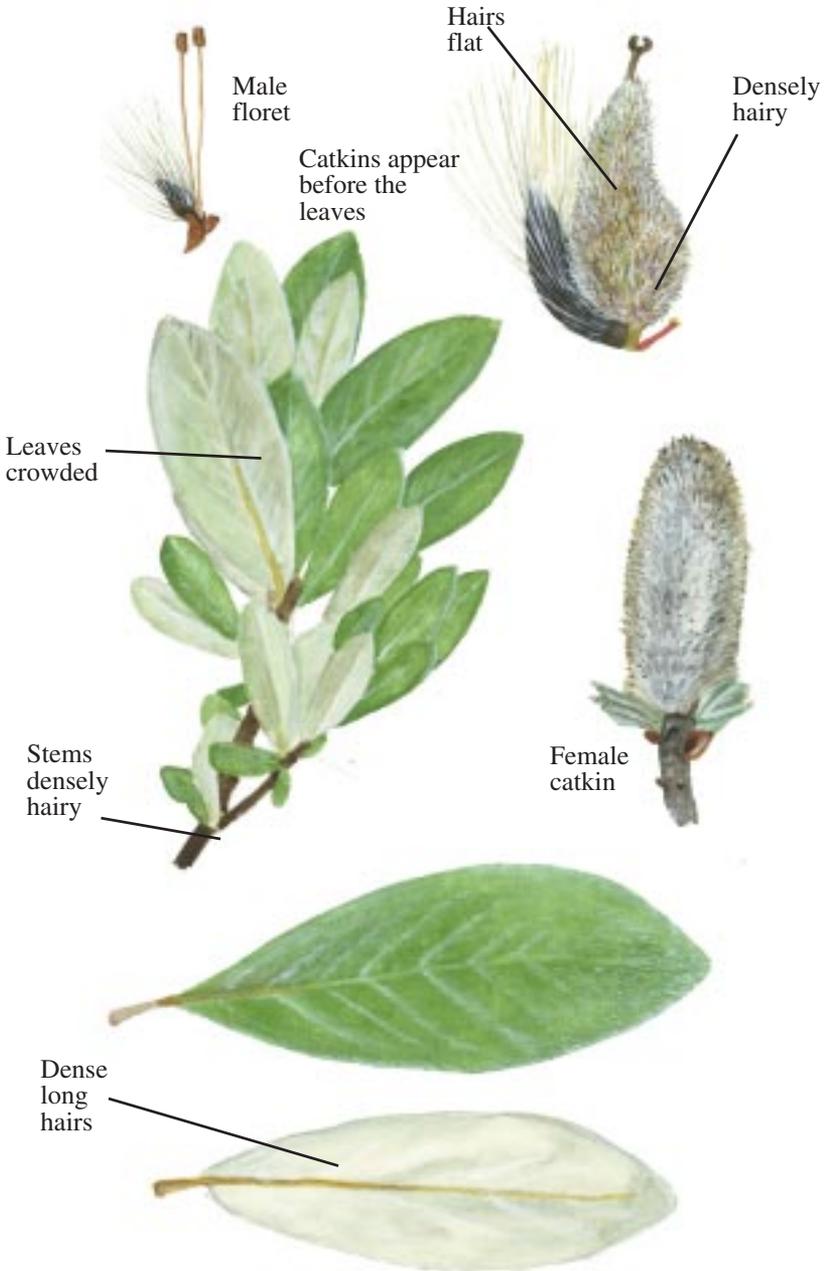
Uses

Salix barratiana is very bitter and is avoided by most herbivores.

Insects and diseases

Pontania.





Bebb's Willow

Salix bebbiana Sarg.

S. depressa L. subsp. *rostrata* (Richardson) Hiitonen

Identification

Summer: Upright shrub or tree to 10 m tall. Many-branched from the base, lateral branches often inserted at right angles to the stems; upper surface of mature leaves embossed with **impressed veins**, underside whitish, **long wavy white hairs** on both surfaces; stipules falling off during summer; **capsule stipes long, female catkins loose; bracts tan-colored.**

Winter: see p. 24.

When heavily browsed by moose, upright shrubs are scraggly-knotty looking. Sucker leaves can be very large and have little likeness to usual canopy leaves.

Similar species

Salix scouleriana is also found on well-drained soil, with the branches often inserted at right angles, and leaves are hairy on both sides; but the ends of the canopy branches are stouter, the veins are not embossed on the upperside of the leaves, the hairs on the leaf undersurface are short and flat, often reddish, especially on the smaller leaves of the upper canopy. *Salix bebbiana* leaves are usually distributed on the shrub from the ground up, while for *S. scouleriana*, the canopy leaves are usually out of reach without bending the branches downward. *Salix bebbiana* has rough bark with ridges while *S. scouleriana*'s gray bark is smooth. Les Viereck noted also that *S. bebbiana* wood is hard like birch while *S. scouleriana* wood is soft and decays like aspen.

Phenology

Catkins appear from mid-June until mid-July, at the same time as the leaves develop. The abundant **yellow stamens of the male catkins and the grayish female catkins** appear simultaneously, making Bebb's willow shrubs stand out clearly against the background of the forest. The female catkins release seeds in midsummer but often a few dried female catkins remain on the shrub over winter.

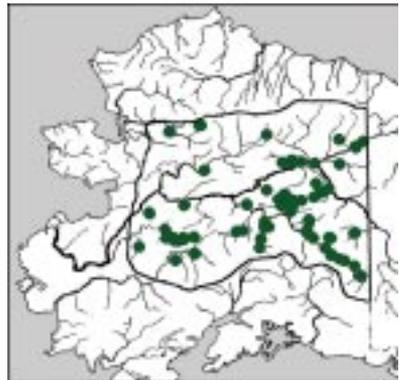
Habitat

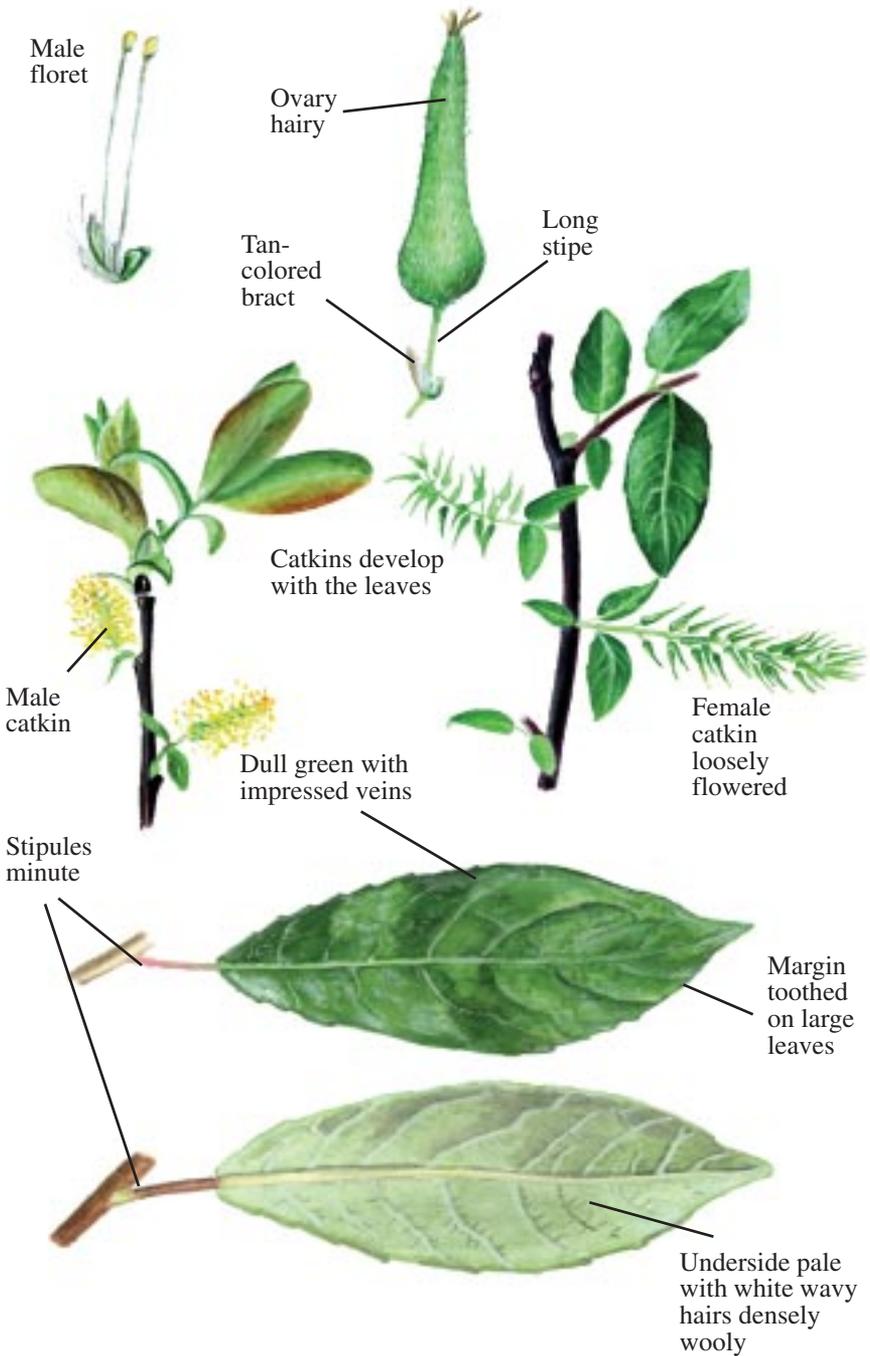
Bebb's willow is a tall shrub in dry sites as an understory of aspen, birch and white spruce mixed forests; it is especially common near the forest edge, in wetlands, and along riverbanks.

Wetland indicator status

Facultative.

Continued p. 100





Silvery Willow

Salix candida Fluegge

Identification:

Less than 1 m tall, **branchlets densely woolly**; young leaves covered with **felt-like** material, **petioles woolly**, leaves narrowly elliptical, densely woolly underneath, margin untoothed, **ovary very densely woolly**.

Similar species

In interior Alaska, only the leaves of *S. alaxensis* are woolly underneath but those plants are usually much taller, the ovaries are covered with straight hairs, the petioles are hairless, the stipules are elongated and often at least a few persist more than a year on the twigs. *Salix candida* catkins appear at the same time as the leaves and are borne on a leafy branchlet while *S. alaxensis* catkins are borne directly on the stem.

Phenology

The catkins develop at the same time as the leaves.

Habitat

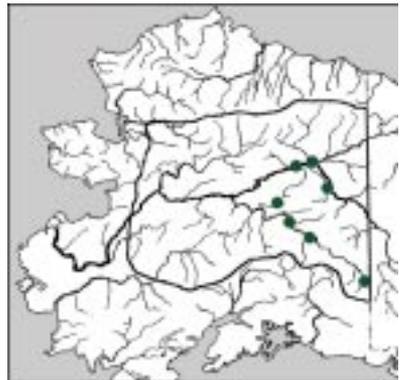
Fens, muskeg.

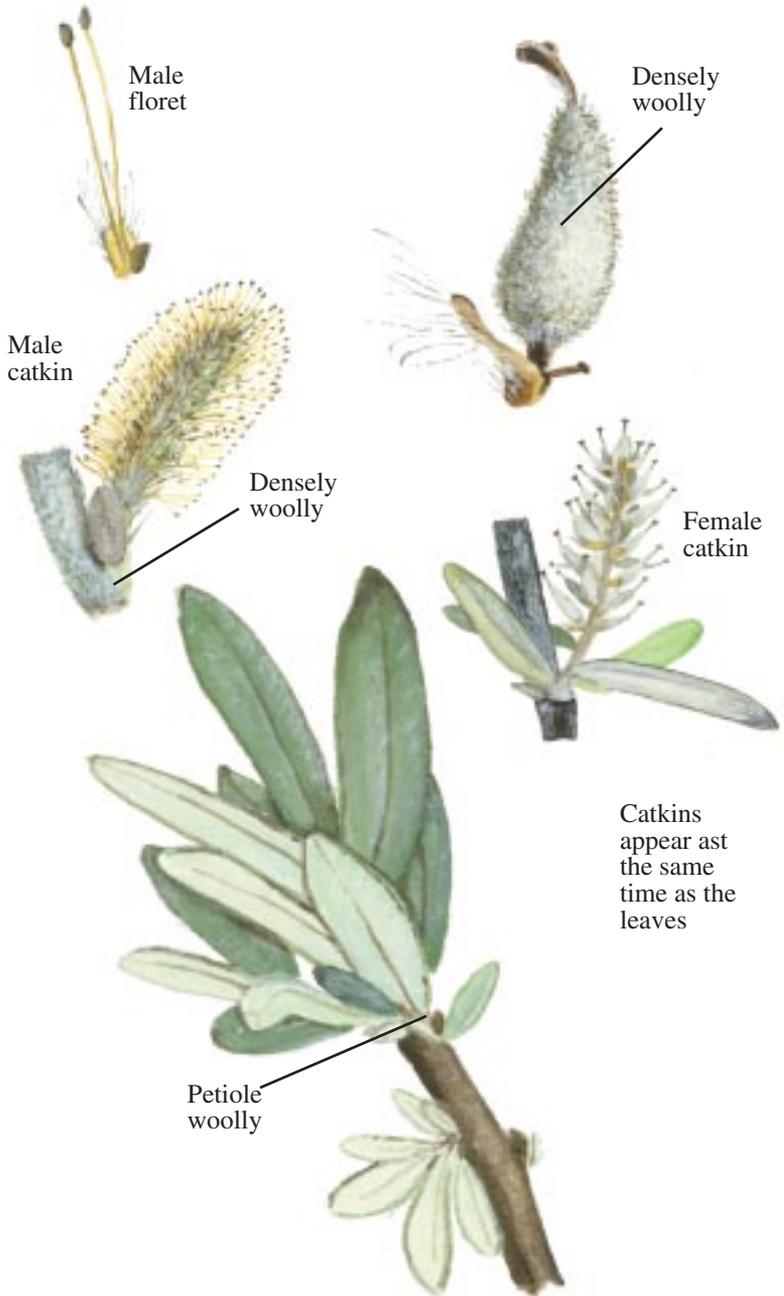
Wetland indicator status

Obligate Wetland.

Insects and diseases

Rabdophaga salicis.





Chamisso Willow

Salix chamissonis Andersson

Identification

Dwarf shrubs less than 10 cm tall. Stems long, spreading. Stipules leaflike, leaves oval or round, whitish beneath, hairless, upper surface shiny, hairless, **whole leaf margin toothed**, ovaries hairy near the tip, with flat hairs.

Similar species

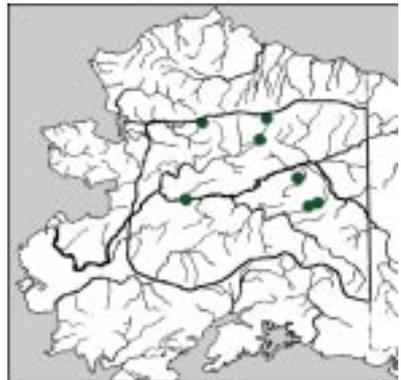
Salix chamissonis is distinguished from other dwarf willows by the leaves finely toothed around the whole margin. The leaves of *S. fuscescens* are only toothed at the basal half and leaves are broadest near the tip.

Phenology

Catkins develop at the same time as the leaves.

Habitat

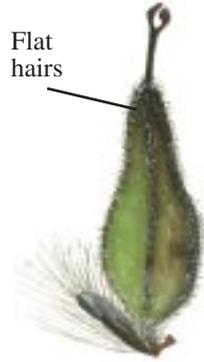
Low shrub tundra, gravelly slopes and snow beds.



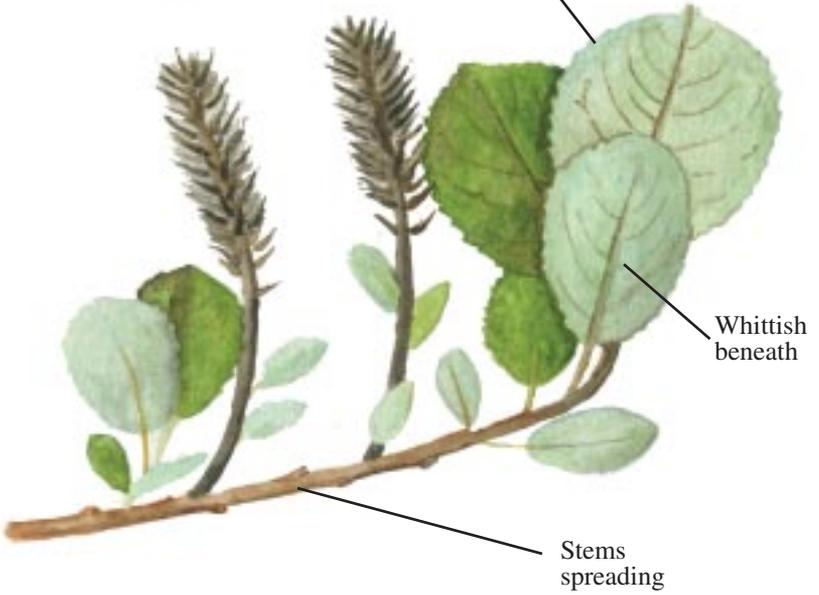
Female catkin



Flat hairs



Margin toothed



Whittish beneath

Stems spreading

Alaska Bog Willow

Salix fuscescens Andersson

Identification

Low creeping shrub, mostly hidden in grass, **rooting from the stems; leaves hairless, glossy green above**, waxy white beneath, **broadest near the tip**, narrowing toward the base, margin toothed near the base; **no stipules**; catkins on long leafy branches develop at the same time as the leaves; ovaries long pear-shaped, dark red and covered with short red hairs.

Similar species:

No other low-growing willow from interior Alaska has the combination of smooth shiny leaves, broader near the tip and large pear-shaped and red-hairy ovaries.

Phenology

At low elevations, catkins first appear in mid-May at the same time as the leaves and release the seeds starting mid-July.

Habitat

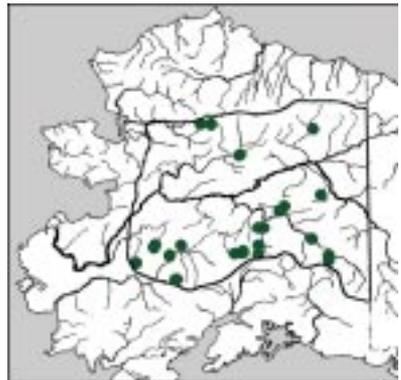
Salix fuscescens is found in sedge fens and moist meadows, often growing associated with *S. barclayi*, *S. commutata*, *S. pulchra* and *S. myrtilifolia*.

Wetland indicator status

Facultative Wetland.

Insects

Pontania sp., *Rabdophaga rigidae*, and *R. rosaria*.





Gray-leaf Willow

Salix glauca L.

Identification

Summer: Shrub 0.3-1m tall. Stem bark with translucent layer often peeling off; branchlets hairy; leaf upper surface dark green, underside **densely white hairy**, tip more or less pointed, **margins untoothed**; **yellowish petiole** 2-15 mm long; **stipules elongate**; densely flowered catkins borne on a leafy branchlet, leafy branchlet of male catkin remains on the stem after the catkin falls; ovaries short, **densely woolly**; styles 0.5-1 mm long; **4 long stigmas**; bracts light brown, hairs short and wavy; 2 nectaries, one on either side of the base of the pistil or stamens.

Winter: see p. 25.

Similar species

Not always easily distinguished from *S. niphoclada*. *Salix glauca* leaves are broader and are pointed at the tip, longer petioles, stipules, and stipes and is typically found in the subalpine to alpine habitat, whereas *S. niphoclada* is usually found in coastal wetlands. Hybridizes with *S. arctica* and *S. niphoclada*.

Phenology

Salix glauca is a late-flowering species. In the subalpine zone, depending on the local late snow conditions, the catkins appear at the same time as the leaves from mid-June until mid-August. The light brown mature female catkins remain on the shrub over winter and the seeds are released the following spring.

Habitat

River floodplain and terraces, alpine tundra, edge of boreal forest, disturbed sites. Common also following fires in black spruce stands and in mature black spruce stands.

Wetland indicator status

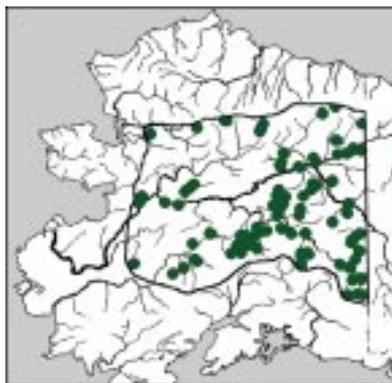
Facultative.

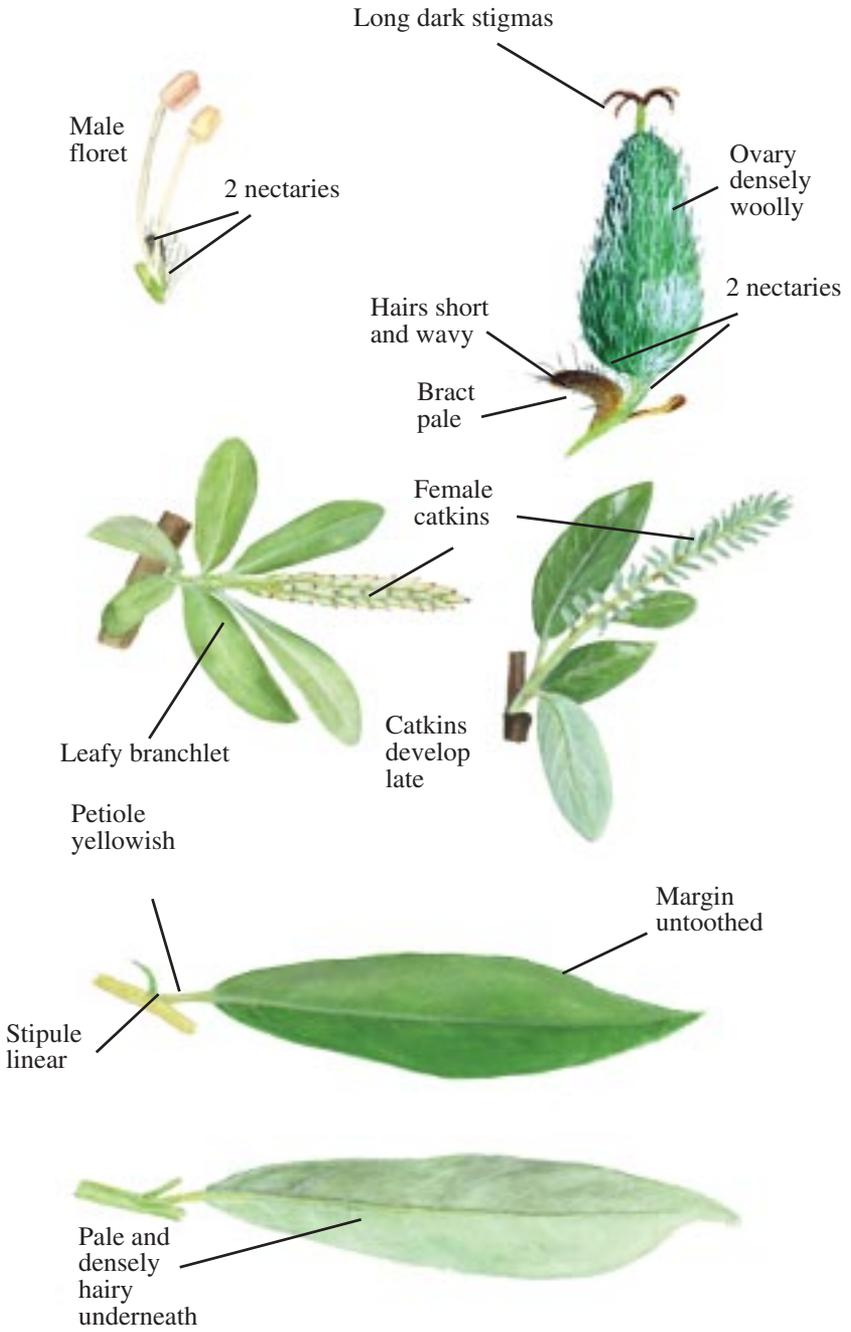
Uses

Winter cuttings do not root well and are not recommended for revegetation projects.

Insects and mites

Euura sp., *Micrurapteryx salicifoliella*, *Pontania* sp., *Rabdophaga rigidae*, *R. rosaria*, *R. salicis*, *R. strobiloides*, and Eriophyiidae.





Halberd Willow

Salix hastata L.

Identification

Shrub 1-3 m tall. Branches covered with **short hooked hairs**; leaf margins not toothed, **red hair** persistent on upper surface midrib; **ovaries reddish on very short stipe**, style sometimes forked.

Winter: see p. 26.

Similar species:

Resembles *S. barclayi* from which it differs by the presence of scattered reddish hairs especially on the leaf midrib.

Phenology

Catkins develop at the same time as leaves.

Habitat

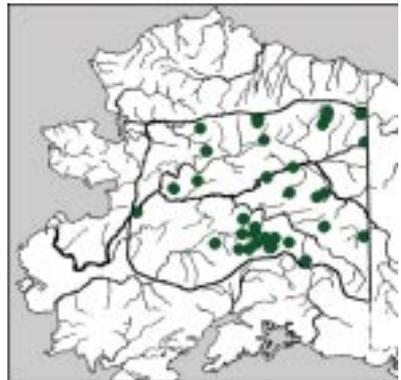
River floodplain, riverbank thickets, alpine sedge meadows.

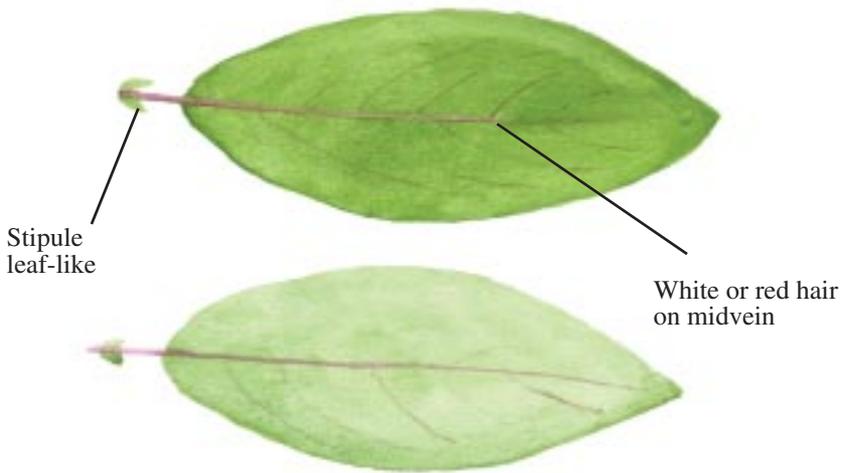
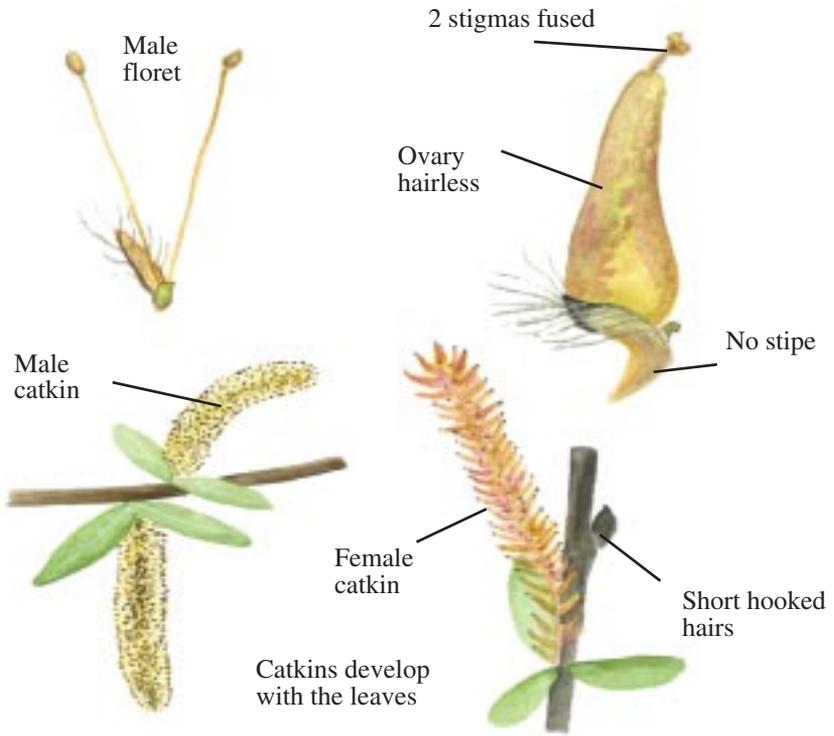
Wetland indicator status

Facultative.

Insects

Rabdophaga rosaria.





Sandbar Willow

Salix interior Rowlee

Salix exigua subsp. *interior* (Rowlee) Cronquist

Identification

Erect shrub up to 6 m tall, spreading by root shoots. Stipules minute or lacking, **leaves long and narrow**, weakly whitish below, **margin finely toothed** or glandular, tip pointed, bract beige, soon falling off after flowering; catkins long and narrow on long leafy branchlets.

Winter: see p. 27.

Phenology

Catkins start developing at the same time as the leaves and keep flowering through the warm season.

Habitat

One of the first species to get established on actively depositing alluvium, *S. interior* forms almost pure stands on muddy sandbars flooded during high spring water. As the water recedes, stems of *S. interior* emerging from the mud resemble mangroves at low tide.

Wetland indicator status

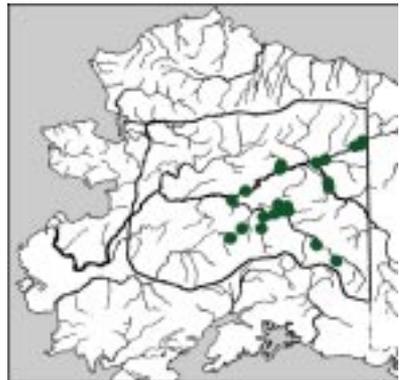
Obligate Wetland, Facultative Wetland.

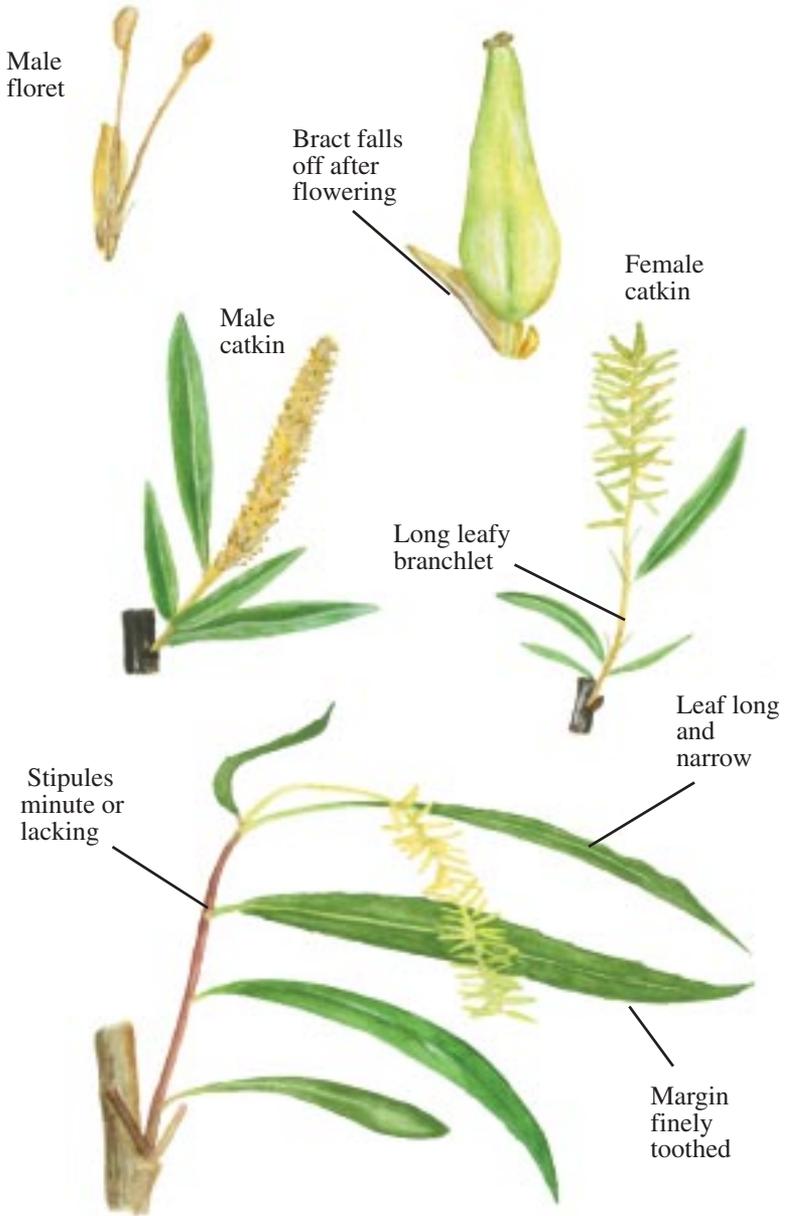
Uses

In one site in the Tanana River floodplain, Wolff and Zasada (1979) report that *S. interior* was favored over other willows by moose. This is unusual as moose often appear to ignore this willow.

Insects

Micrurapteryx salicifoliella, and *Rabdophaga salicis*.





Pacific Willow

Salix lasiandra Benth.

Salix lucida Muhl. subsp. *lasiandra* (Benth.) E. Murray

Identification

Summer: Shrub or tree up to 7 m tall. **Old bark rough**, blackish, and vertically furrowed like the bark of cottonwood; young stems yellow-green, waxy; **leaves lance-shaped** and rounded at the base, long pointed at the tip, green or sometimes reddish; two nectaries at the base of the flowers; **4-5 stamens** for each male flower; bract of female flowers drops off after flowering.

Winter: see p. 28.

Similar species:

At first glance, robust compensatory growth resembles cottonwood suckers. This is the only willow species in Alaska with lance-shaped leaves, 4 or 5 stamens in each male flower. Like *S. interior*, the bract of the female *S. lasiandra* flower falls off after flowering.

Phenology

Catkins start developing in mid-May, maturing by the end of June. Leaves develop at the same time as catkins.

Habitat

Wet habitat such as pond edges and fast-flowing stream banks. *Salix lasiandra* appears early in succession and is able to keep up with the alders.

Wetland indicator status

Facultative Wetland.

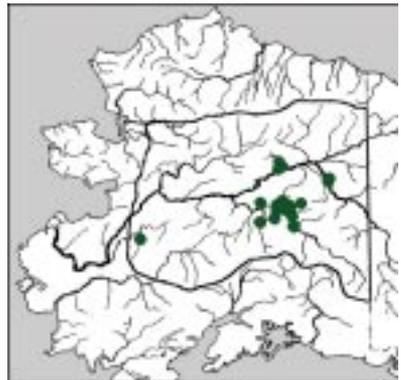
Uses

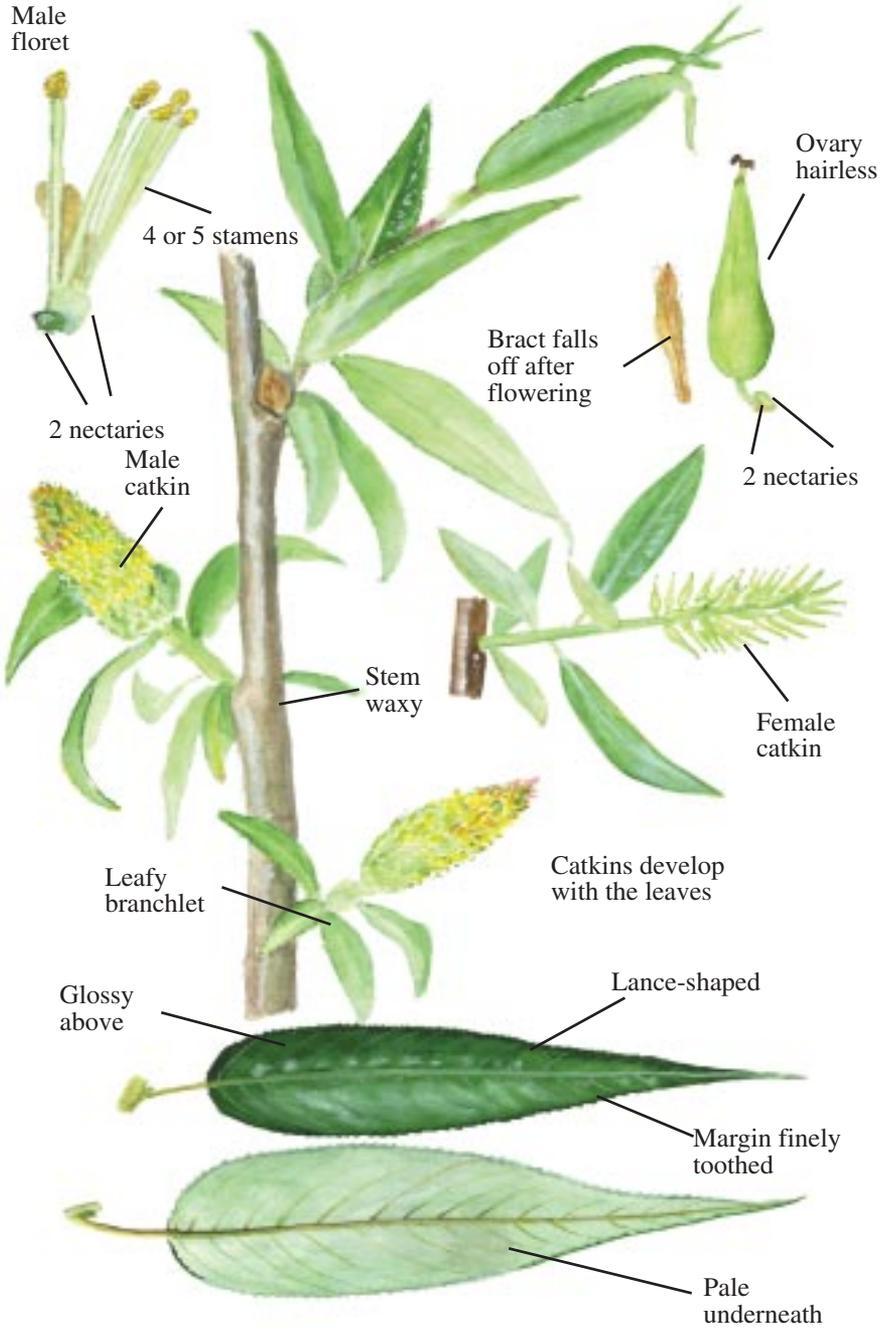
This species is recommended for revegetation projects using the dormant cuttings method.

Moose are very fond of this species.

Insects

Chrysomelidae, and *Micrurapteryx salicifoliella*.





Blueberry Willow

Salix myrtilifolia Andersson

Identification

Low shrub 10-60 cm tall. Base of **stems trailing** and rooting, partially covered by grasses and sedges, **leaf underside green, hairless, leaf margin finely toothed**; stipules minute or leaflike, ovaries pear-shaped, **hairless**.

Similar species

Salix myrtilifolia can be distinguished from most shrubby willows by the green leaf underside. *Salix pseudomyrsinites* and *S. commutata* undersides are also green but their young leaves are hairy. The mature leaves of *S. pseudomyrsinites* usually have at least a few hairs and *S. commutata* is distinctly hairy, with long hairs on both sides of the leaves. Both are taller erect shrubs.

Phenology

At low elevation in the forest zone, the catkins and leaves start to develop in mid-May and are fully developed by mid-July.

Habitat

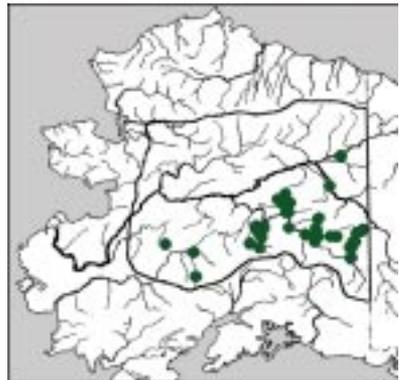
Fens and muskegs, associated with dwarf birch (*Betula nana*), Labrador tea (*Ledum palustre*), *S. fuscescens*, *S. pulchra*, and *S. barclayi* in the south.

Wetland indicator status

Facultative Wetland.

Insects and disease

Rabdophaga rigidae, *R. rosaria*, *R. salicis*, Eriophyiidae, and tar spot fungus.



Male
floret

Ovary
hairless

Male
catkin

Young
female
floret

Female
catkin

Leafy
branchlet

Catkins develop
with the leaves

Margin
toothed

Green
underneath



Barren-ground Willow***Salix niphoclada* Rydb*****Salix brachycarpa* Nutt. subsp. *niphoclada* (Rydb.) Argus****Identification**

Summer: Low-to-medium-sized shrubs usually less than 1 m, but up to occasionally 3 m tall. Stems grayish black, not shiny, **gray-hairy**; leaves elongated with a rounded tip, **margin not toothed**, upper side slightly hairy, **underside whitish**, more hairy than upper side; **petiole short (1-3 mm)** yellow or reddish; stipules minute or leaflike; catkins persisting; ovaries barrel-shaped, **densely hairy**, short with **4 long dark stigmas** on a short style.

Winter: see p. 29

Similar species:

Resembles *S. glauca*, which mostly grows at a higher elevation and has oval pointed leaves, longer styles, and longer petioles (2.5-15 mm).

Phenology

Catkins and leaves start to develop from the end of May to mid-June; catkins mature from mid-June.

Habitat

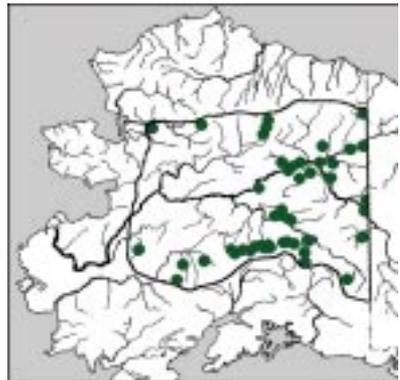
Willow thickets along rivers, recently disturbed sites, and alpine thickets. *Salix niphoclada* is abundant in the early successional stages on the Tanana River.

Wetland indicator status

Facultative.

Insects

Micrurapteryx salicifoliella, *Orgyia antiqua*, *Pontania* sp. *Rabdophaga rigidae*, and *R. rosaria*.





Skeleton-leaf Willow

Salix phlebophylla Andersson.

Identification

Dwarf shrub 1-7 cm tall. Stem stout, resting on the ground and rooting, forming mats up to 2 m in diameter; **leaves green beneath, margin hairy**, leaves persisting for several years, disintegrating except for the **skeleton of leaf veins**; catkins robust, ovaries pear-shaped, usually **hairy**; **nectaries shorter or equal to the stipe**.

Similar species

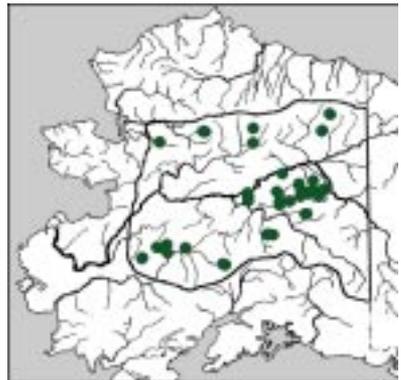
The skeletonized old leaves, dense mats, many-flowered female catkins and hairy ovaries distinguish *S. phlebophylla* from other dwarf willows. Separated from *S. polaris* by nectaries shorter than stipes and hairy leaf margins.

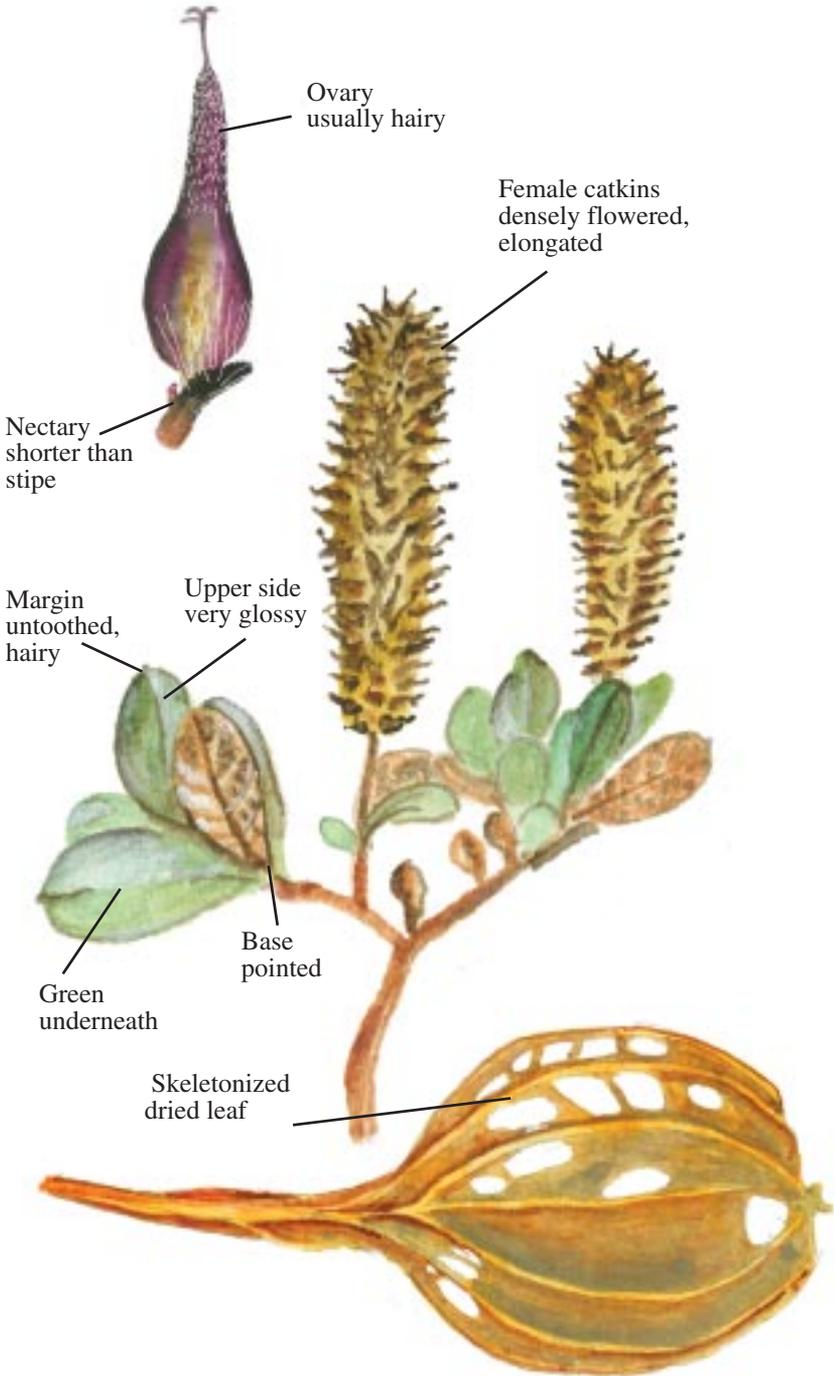
Habitat

Alpine tundra, *Dryas*-lichen tundra.

Insects

Pontania sp.





Polar Willow

Salix polaris Wahl.

Identification

Dwarf shrub 1-9 cm tall. Stems partly buried, rooting, branches coated with a **waxy whitish layer**; leaves oval, **not hairy** at the margin, tip rounded, shiny above, underside **green** glossy, veins raised; no stipules; **ovaries hairy**, **style long**.

Similar species

Differs from other dwarf willows by leaves green underneath, hairy ovaries, and long styles.

Phenology

Catkins develop at the same time as leaves.

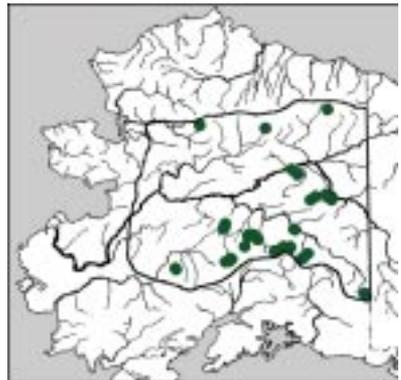
Habitat

Alpine tundra, late snowbeds, alpine scree slopes.

Wetland indicator status

Facultative Wetland.

Uses: *Salix polaris* is the main source of forage for reindeer in Svalbard in Norway (Skarpe and Van der Val 2002).



Male
floret



Style
long



Ovary
hairy

Nectary
longer than
stipe

Margin
untoothed
and hairless

Green
underneath

Whitish
coating

No persistent
leaves

Female
catkin



Park Willow

Salix pseudomonticola C. R. Ball.

Salix monticola Bebb sensu Argus 1973

Identification

Shrub 1-4 m tall. **Young leaves reddish**, mature leaves **pale underneath**, base rounded, tip pointed, margin finely toothed; **petiole and midvein reddish**; **stipules rounded**; **catkins appear before the leaves**, borne directly on the stem, **ovaries hairless**; stipe 0.5-3 mm.

Winter: see p. 30.

Similar species:

Distinguished from *S. myrtillofolia* and *S. pseudomyrsinites* by the green underside of the leaves. Resembles *S. barclayi* from which it is distinguished by the catkins appearing before the leaves and attached directly to the main stem, the young leaves and petiole reddish. *Salix barclayi* catkins are borne on leafy branchlets and develop at the same time as the leaves. Distinguished from *S. richardsonii* by the lack of persisting stipules.

Phenology

Catkins develop early in the spring; leaves appear later.

Habitat

Willow-sedge wetlands in white spruce forests. Sparse in early successional stages on the Tanana River.

Wetland indicator status

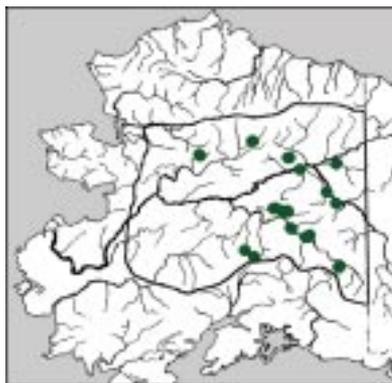
Facultative Wetland.

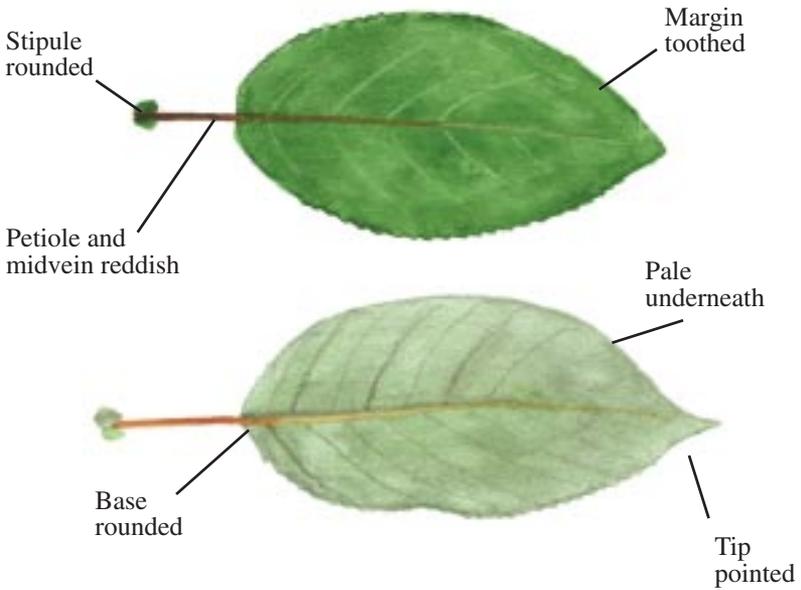
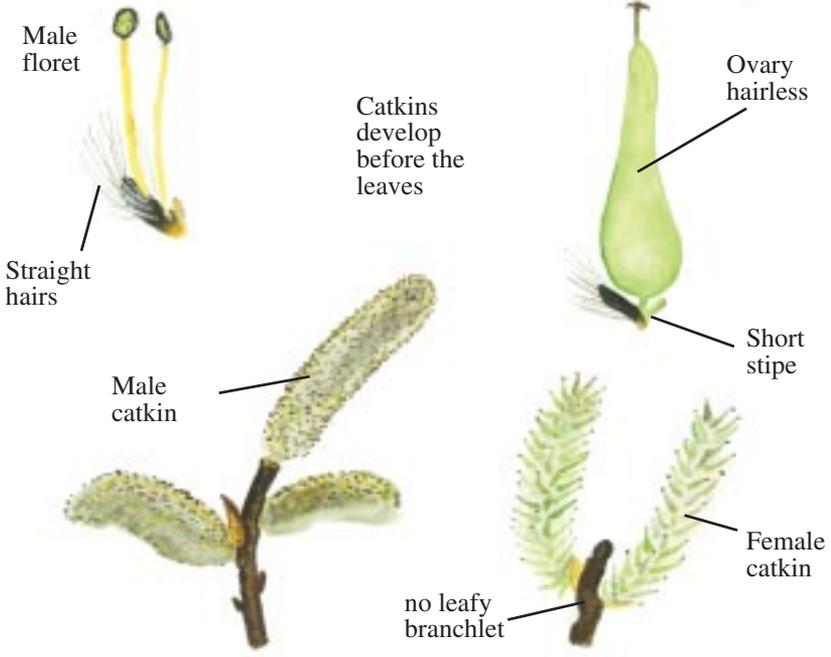
Uses

“Diamond willows” are sometimes formed on this species.

Insects

Micrurapteryx salicifoliella, and *Rabdophaga salicis*.





Tall blueberry Willow

Salix pseudomyrsinites Andersson

S. myrtilifolia var. *pseudomyrsinites* (Andersson) Ball

S. myrtilifolia var. *cordata* (Andersson) Dorn

S. novae-angliae Andersson

Identification

Shrub 1-4 m tall. Young leaves reddish, hairless, or hairy with **white or rust colored hair, especially on the midvein**, mature leaves **green underneath**, upper side hairy on the midvein; catkins **on well-developed leafy branchlets**; ovaries **hairless**.

Similar species

Resembles *S. myrtilifolia*, which is smaller, has hairless leaves, and grows in fens and bogs.

Phenology

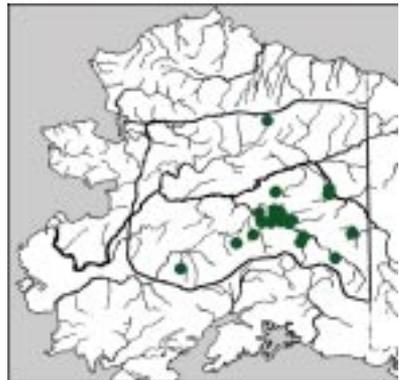
Catkins develop at same time as leaves.

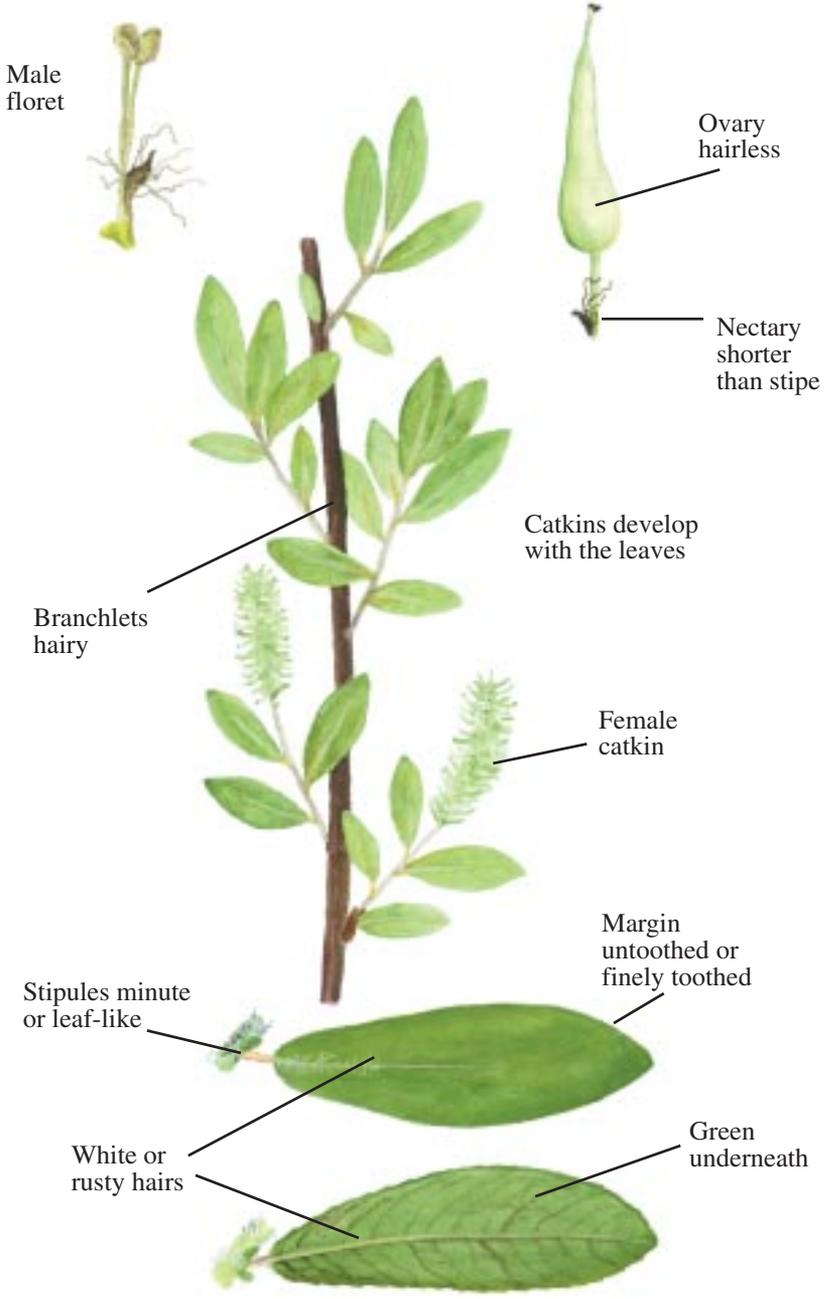
Habitat

Lakeshores, wetlands. *Salix pseudomyrsinites* is very common in early successional stages on the Tanana River.

Insects

Micrurapteryx salicifoliella, and *Rabdophaga rosaria*.





Diamond-leaf Willow

Salix pulchra Cham.

Salix planifolia subsp. *pulchra* (Cham.) Argus var. *pulchra*

Identification

Summer: Low to tall shrub, 1-4 m. **Stems glossy; leaves diamond-shaped**, tip pointed, **margin not toothed**, hairless, except on the upperside main vein, shiny green above, whitish beneath; **elongated stipules remain on the stem** for several years; **catkins borne directly on the stem; ovaries hairy**. *Salix pulchra* variety *yukonensis* is characterized by densely hairy stems.

Winter: see p. 31. Stems shiny, tip of catkin winter bud sharp-pointed, stipules linear, persistent on the stems, few orange-brown leaves often remaining on the shrubs over winter. When present, the rosette gall with scales pointed at the tips and long straight white hairs spreading from the center are diagnostic.

Similar species.

Salix pulchra is differentiated from other shrubby willows by hairless leaves green above and whitish beneath, persistent linear stipules, catkins developing before the leaves, and hairy ovaries.

Phenology

In the forest zone, the catkins start to develop as early as the end of February and start releasing seeds by mid-June to early July. Leaves develop later from the end of May to mid-July. In the alpine zone, depending on the snow conditions, the catkins may only start maturing in mid-June or later with leaf development delayed even later.

Habitat

Salix pulchra forms more or less dense thickets with other willows in wetlands bordering lakes and rivers and in moist sites above treeline. It remains a low shrub in fens and bogs, often associated with *S. barclayi* in the south, occupying the wetter zone of the habitat. From sea level to high alpine tundra.

Wetland indicator status

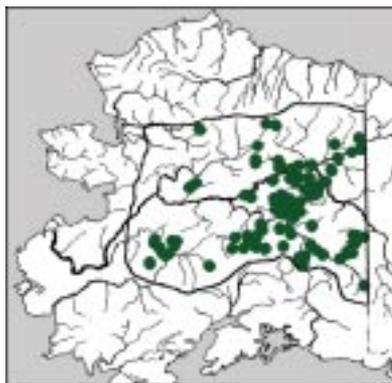
Facultative Wetland.

Uses

This species is recommended for revegetation projects using the dormant cuttings method. It is also the main source of food for ptarmigan, arctic hare, musk oxen, caribou, reindeer, moose, and beaver.

Insects, mites and diseases

Chrysomelidae, *Dorytomus* sp., *Euura* sp., *Pontania* sp., *Rabdophaga rigidae*, *R. rosaria*, *R. strobiloides*, *Trypophloeus striatulus*, Eriophyiidae, and tar spot.





Net-vein Willow

Salix reticulata L.

Identification

Dwarf shrub 1-15 cm tall. **Leaves deeply impressed, on long petiole**; stipules mostly lacking; **catkins on terminal branchlets**, appearing late in the summer; 2 nectaries, one on either side of the base of the pistil or stamens, the exposed nectaries often forked as illustrated.

Similar species

The roundish deeply-veined leaves with long petioles are unique among our local willows. In the absence of catkins, they could only be confused with the alpine bearberry *Arctostaphylos alpina*, which is found in similar habitat. *Salix reticulata* has one scale covering the winter buds, while *Arctostaphylos alpina*, has several.

Phenology

Catkins and leaves develop late in mid-June.

Habitat

Salix reticulata does not tolerate shade and will grow in fens, where all plants remain short, and in the alpine tundra where it is fairly common.

Wetland indicator status

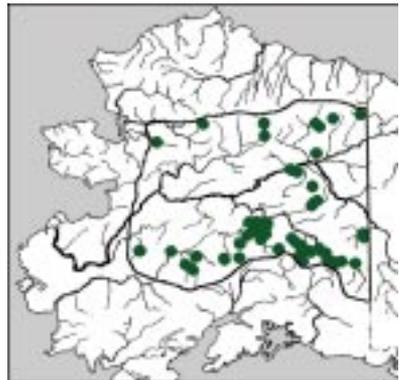
Facultative.

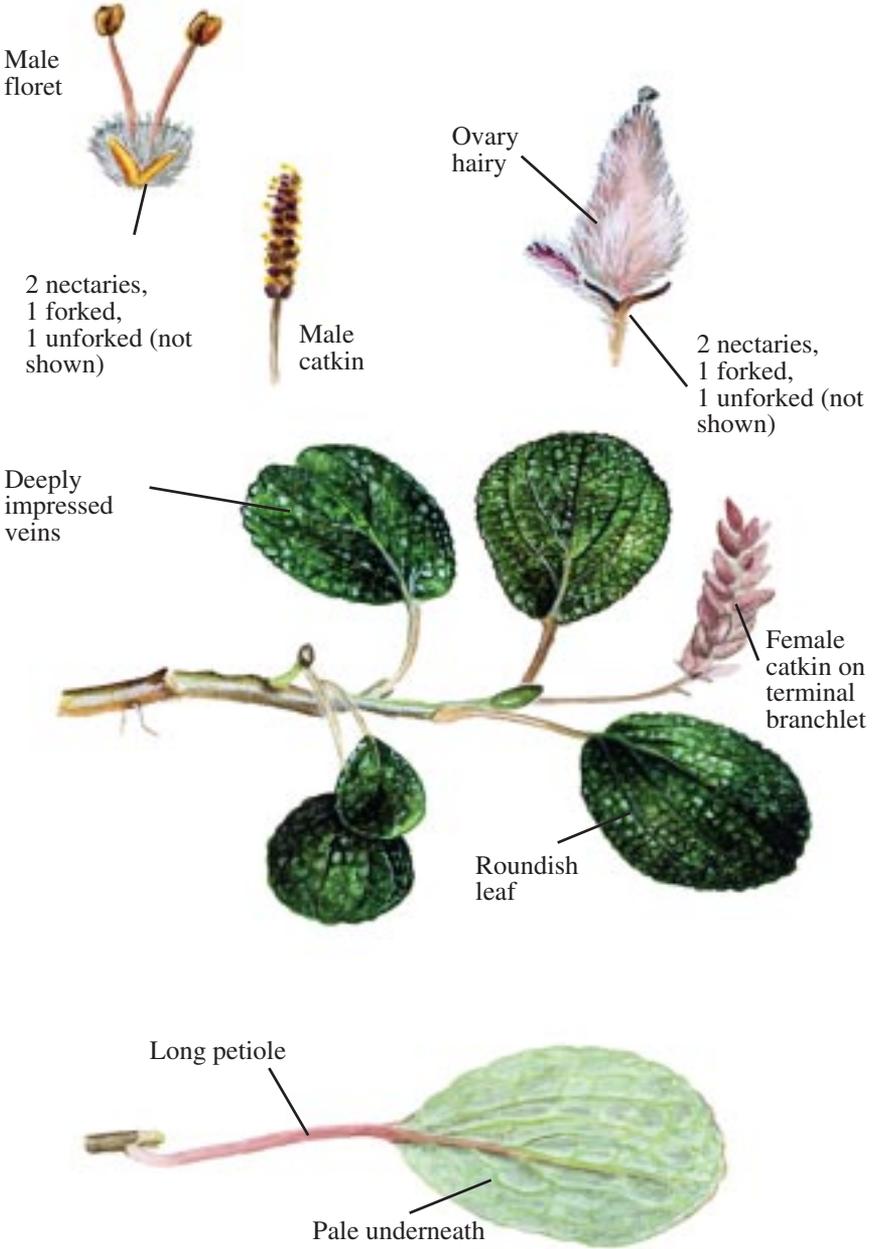
Uses:

Browsed by Dall sheep (*Ovis dalli dalli*).

Insects and mites

Orgyia antiqua, *Pontania* sp., Eriophyiidae, and rust fungus.





Richardson's Willow

Salix richardsonii Hook.

Salix lanata L. subsp. *Richardsonii* (Hook) A. Skv.

Identification

Summer: Low-to-medium shrub 0.5-2 m. Leaves hairy and shiny above, whitish and hairless underneath; **stipules large leaflike**, persisting dried on the stem; **catkins borne directly on the stem**; pear-shaped ovaries **hairless**. *Pontania*-induced bean-shaped gall densely white-yellowish woolly.

Winter: see p. 32.

Similar species

The best character for distinguishing *S. richardsonii* is the presence of large persistent leaflike stipules. These dried stipules give *S. richardsonii* a distinctive scraggly appearance. Only *S. alaxensis* and *S. glauca* also bear **woolly** *Pontania*-induced bean-shaped galls, but leaves of both species have hairs on the underside.

Phenology

Catkins develop before leaves.

Habitat

Subalpine and subarctic creek drainage, extensive willow thickets in moist sites.

Wetland indicator status

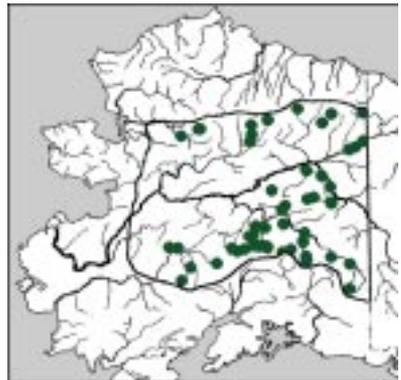
Facultative.

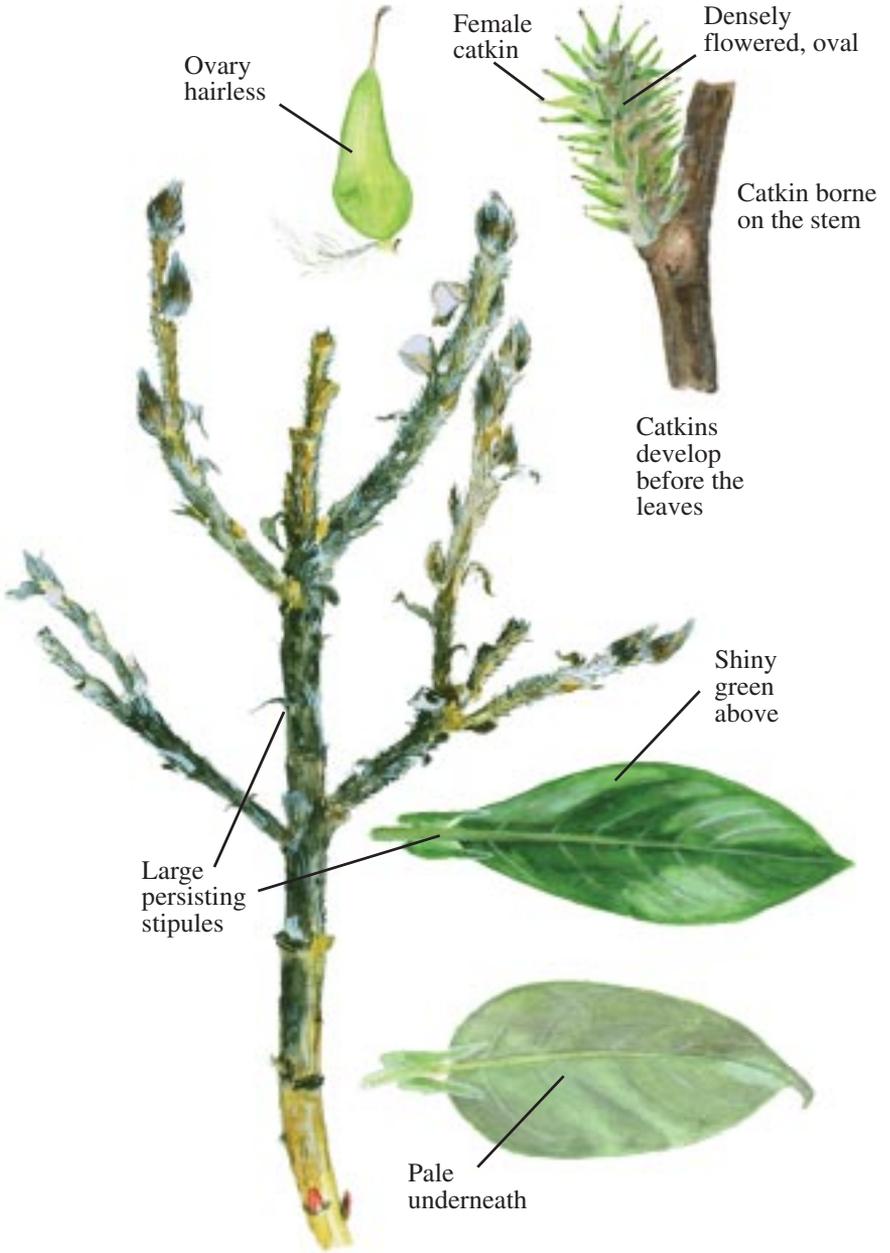
Uses

Browsed by moose.

Insects, mites and diseases

Chrysomelidae, *Pontania* sp, *Rabdophaga rigidae*, *R. rosaria*, *R. salicis*, Eriophyiidae, tar spot and rust fungi.





Least Willow

Salix rotundifolia Trautv.

Identification

Minute shrub 5 cm tall. Stems mostly imbedded in ground vegetation or forming mats on rocky soil; dried reddish leaves remain on the stem, leaves with **3 distinct veins, both sides glossy green**, hairless; **catkins few-flowered**.

Two subspecies in Alaska:

Salix rotundifolia subsp. *rotundifolia* is 1-5 cm tall, catkins 4-12 flowered; leaves 5-15 mm long, roundish.

Salix rotundifolia subsp. *dodgeana* is very small: 0.5 - 2 cm tall, catkins 2-4 flowered; leaves 4-6 mm long, oval.

Similar species:

Salix rotundifolia is the smallest willow in Alaska. Distinguished from other dwarf willows by hairless leaves, green glossy on both sides, and few-flowered catkins.

Phenology

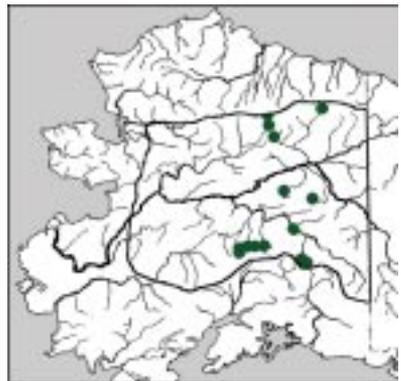
Salix rotundifolia catkins and leaves start to develop at the end of June or later, depending on the local weather conditions.

Habitat

This diminutive willow grows mostly on exposed mountain ridges, associated with other tenacious plants like Moss Campion (*Silene acaulis*), White Mountain-Avens (*Dryas integrifolia*), Crowberry (*Empetrum nigrum*), and lichens.

Insects

Pontania sp.



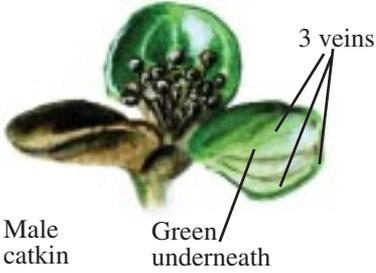
Male floret



Ovary hairless



Nectary longer than stipe



Male catkin

Female catkin

Few-flowered



Persisting but not skeletonized leaves



Scouler's Willow

Salix scouleriana Barratt ex Hook.

Identification

Summer: Tall shrub or tree to 20 m. Several trunks, up to 60 cm in diameter; **bark gray, smooth; branches often inserted at right angles to the stems;** crown leaves are fairly small, broader near the tip; leaves on suckers and fast-growing stem large; young leaves covered with white straight hair that sheds on mature leaves and reveal short flat white or **reddish-brown hair on the underside;** catkins short; capsules pointing outward to give the female catkin a **spikey appearance; ovary densely hairy.**

Winter: see p. 33.

Similar species

In **early spring**, *Salix scouleriana* is first tree to develop catkins. *Salix alaxensis* catkins also appear early in the spring, but the catkins are long and erect. By summer, no catkins remain on *S. scouleriana*. The reddish hairs are not always present on large sucker leaves. *Salix bebbiana* leaf underside hairs are white, long and curly, whereas in *S. sitchensis* leaf underside hairs are white, short, and stiff, all oriented toward the tip of the leaves. *Salix bebbiana* bark is rough and is impressed by deep grooves as opposed to *S. scouleriana* smooth gray bark and the veins are more impressed on the upperside leaves than those of *S. scouleriana*.

Phenology

The catkin buds start to swell in midwinter and the male and female catkins open by the end of March and start releasing the seeds by early June. At low elevation in the forest zone, the catkins develop early in the spring, often before the snow melts. The short catkins appear early in the spring before any other plants leaf out. Female catkins mature, release their seeds, and shed before the leaves mature. The leaves start developing from mid-May to early June.

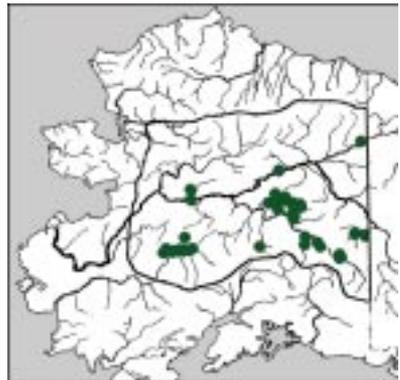
Habitat

Very common in the forested zone. Scouler's willow colonizes disturbed and burned habitat. Isolated trees survive longer in mixed forest after other willow species have been overtopped by slow-growing birches and spruces. Very common at the edge of the forest, along roadways. Also called fire willow because it recolonizes burned forest.

Wetland indicator status

Facultative.

Continued p. 101





Setchell's Willow***Salix setchelliana* C. R. Ball****Identification**

Dwarf shrub up to 30 cm tall. Stem mostly unbranched. Branchlets, are at first densely woolly; leaves thick, hairless, **fleshy** like those of “Jade plant;” the dried leaves of the previous year pinkish-gray; female catkins showy; **ovaries large**, dark red turning bright yellow at maturity.

Similar species

In interior Alaska, no other willow has fleshy leaves.

Phenology

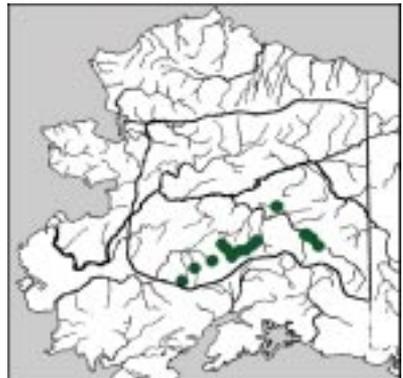
Salix setchelliana catkins and leaves start to develop in mid-June and seeds start to disperse by mid-July. *Salix setchelliana* spread mostly vegetatively by root shoots.

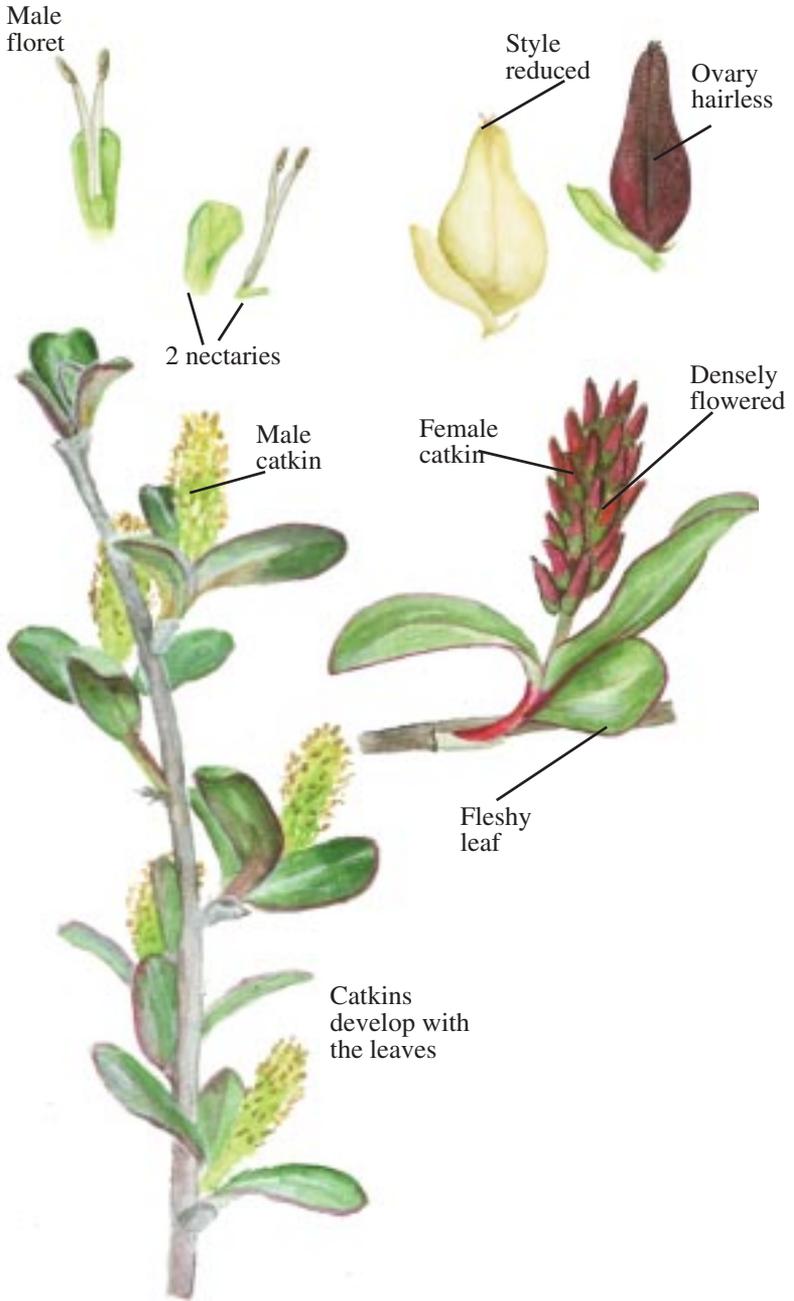
Habitat

This willow favors mostly barren sandbars of glacier rivers where the seasonal rush of snowmelt water prevents other shrubs from getting permanently established.

Wetland indicator status

Facultative.





Sitka Willow

Salix sitchensis Sanson ex Bong

Identification

Summer: Shrub or tree up to 6 m tall. **Leaves broader toward the tip, margin toothless** and slightly rolled under, underside of leaves covered by short stiff hairs oriented toward the tip, giving a **silky shine**, like the fur of a seal; **catkins, long** and narrow, develop at the same time as the leaves; ovaries pear-shaped. In southcentral Alaska, *S. Sitchensis* is the only willow with a **single anther** for each male flower.

Winter: see p. 34.

Similar species

Salix scouleriana leaf underside, covered with short flat white or reddish hairs, is not silky in appearance. *Salix scouleriana* does not bear catkins and mature leaves simultaneously.

Phenology

Salix sitchensis catkins and leaves develop at the same time, from mid-May to early July and start releasing seeds in mid-June at favorable sites.

Habitat

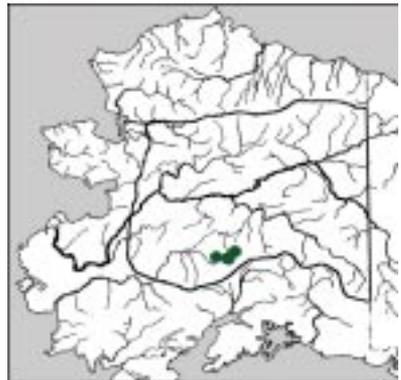
Very common in coastal locations where it forms dense thickets in wetlands; disturbed sites, and on sandbars of fast-flowing creeks; south of the Alaska Range.

Uses

This species is recommended for revegetation projects using the dormant cuttings method. The flexible twigs are used by coastal Alaska Natives for weaving baskets.

Insects and mites

Chrysomelidae, *Dorytomus* sp., *Itomeyia* sp., *Pontania* sp., *Phyllocolpa* sp., *Rabdophaga rosaria*, and Eriophyiidae.





Salix alaxensis

Continued from p. 44

Uses

Felt-leaf willow leaves have a relatively low content of bitter anti-herbivory substances compared to most other willows. Moose are very fond of Felt-leaf willows and reach the higher branches by breaking off the small trunks. It is also an important food source for snowshoe hare, beaver, and smaller herbivores.

Feltleaf Willow is the favorite species for riverbanks restoration because it roots readily from cuttings.

The young leaves are edible and are traditionally collected and preserved by Eskimos. The inner bark has a sweet taste and can be eaten raw or cooked. The long leafless sprigs cut early in the spring make fine interior decorations of “pussy willows” when the young catkins burst open.

“Diamond willows” are sometimes formed on this species.

Insects and mites

Chrysomelidae, *Dorytomus* sp., *Euura* sp., *Itomeya* sp., *Orgyia antiqua*, *Pontania* sp., *Phyllocolpa* sp., *Rabdophaga rosaria*, *R. rigidae*, *R. strobiloides*, *Saperda concolor*, *Trypophleus striatulus*, and Eriophyiidae.

Salix barclayi

Continued from p. 54

Insects and diseases

Chrysomelidae, *Dorytomus* sp., *Euura* sp., *Orgyia antiqua*, *Phyllocolpa* sp., *Pontania* sp., *Rabdophaga rigidae*, *R. rosaria*, *R. salicis*, *Trypophleus striatulus*, *Trichiosoma triangulum*, Eriophyiidae, rust, white mildew, and tar spots.

Salix bebbiana

Continued from p. 58

Uses

Shrubs are usually heavily browsed by moose, causing them to be many-branched from ground level. Stiff erect Bebb shrubs remain accessible above snow cover for moose after lower willow shrubs with flexible stems have been buried under the snowpack. Where overwintering moose density is high, Bebb willows are heavily browsed by the end of the winter, little remains of the last summer’s new growth.

Winter cuttings do not root well and are not recommended for revegetation projects.

Most “Diamond willows” sticks and poles harvested for crafts are of *Salix bebbiana*.

Insects

Euura sp., *Micrurapteryx salicifoliella*, *Orgyia antiqua*, *Pontania* sp., *Rabdophaga rigidae*, *R. rosaria*, *R. salicis*, *R. strobiloides*, and rust spot.

Salix scouleriana

Continued from p. 94

Uses

Moose are fond of the lush *S. scouleriana* suckers. Moose feed on foliage and strip the bark in winter (Weixelman et al. 1998). Post-fire upland habitats, recolonized by abundant fast-growing shoots of the “fire willow” *S. scouleriana*, support the highest densities of moose in Alaska. Simulation of post-fire conditions, to increase browse available to moose, has been experimentally done by mechanical crushing and prescribed burns of mature forest.

The early catkins are a very important source of nectar for insects such as bees and flies.

Winter cuttings do not root well and are not recommended for revegetation projects.

“Diamond willows” are sometimes formed on this species.

Insects and diseases

Chrysomelidae, *Euura* sp., *Itomeyia* sp., *Micrurapteryx salicifoliella*, *Orgyia antiqua*, *Pontania* sp., *Rabdophaga rigidae*, *R. rosaria*, *R. salicis*, and *Trichiosoma triangulum*.

Female catkins of dwarf willows less than 20 cm tall



S. arctophila



S. polaris



S. phlebophylla



S. chamissonis



S. rotundifolia



S. fuscescens



S. arctica



S. myrtilifolia



S. reticulata



S. setchelliana

Pistils of dwarf willows less than 20 cm tall



S. arctophila



S. polaris



S. phlebophylla



S. chamissonis



S. rotundifolia



S. fuscescens



S. arctica



S. myrtillofolia



S. reticulata



S. setchelliana

Female catkins of willows taller than 20 cm whose catkins develop before the leaves

Catkins are mostly borne **directly** on the stem.



S. richardsonii



S. pseudomonticola



S. arbusculoides



S. sitchensis



S. barrattiana



S. scouleriana



S. pulchra



S. alaxensis

Pistils of willows taller than 20 cm whose catkins develop before the leaves



S. richardsonii



S. pseudomonticola



S. arbusculoides



S. sitchensis



S. barrattiana



S. scouleriana



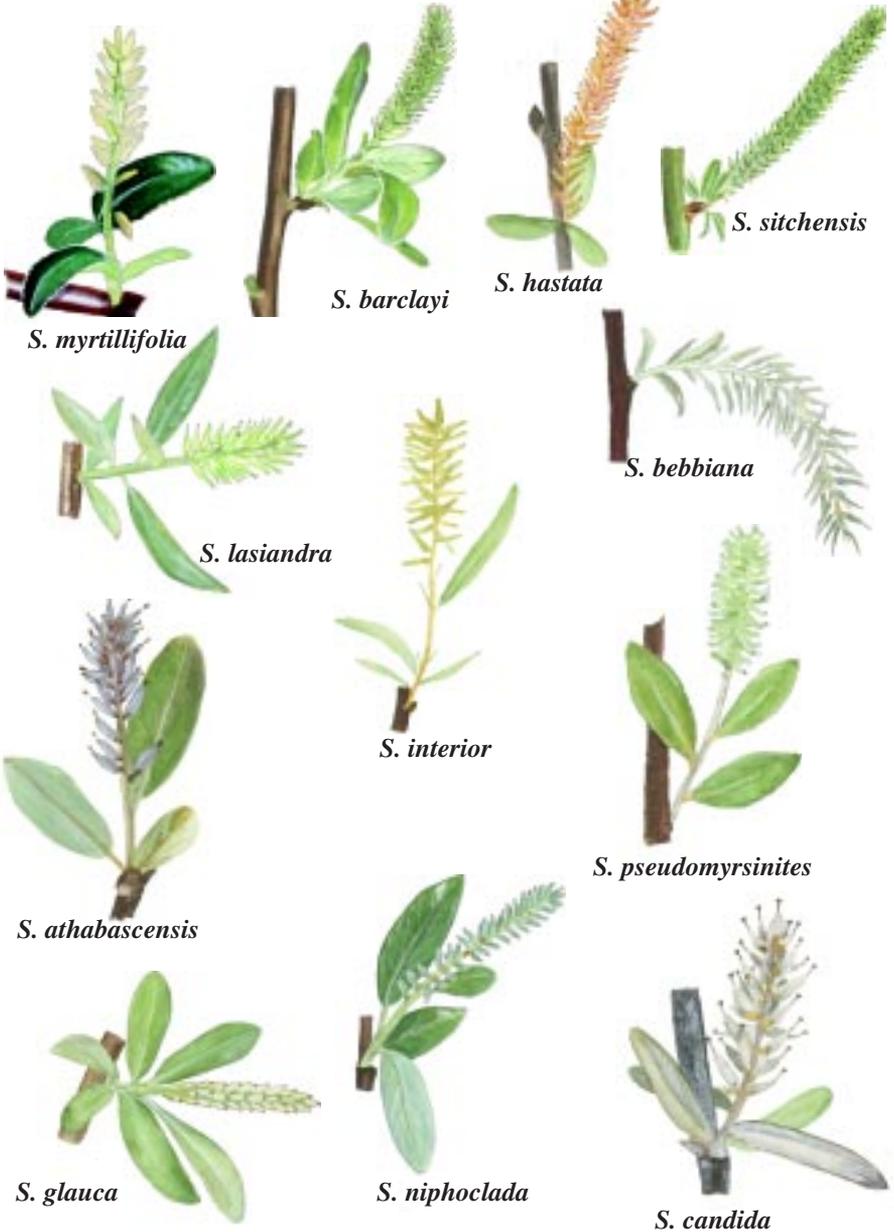
S. pulchra



S. alaxensis

Female catkins of willows taller than 20 cm whose catkins develop at the same time as the leaves

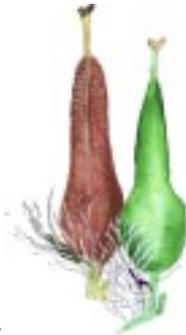
Catkins are borne on leafy branchlet



Pistils of willows taller than 20 cm whose catkins develop at the same time as the leaves



S. myrtilifolia



S. barclayi



S. hastata



S. sitchensis



S. lasiandra



S. interior



S. pseudomyrsinites



S. bebbiana



S. athabascensis



S. glauca



S. niphoclada



S. candida

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Useful information sources:

American Willow Grower Network. 412 County Road 31, Norwich NY 13815-3149.

Directory of Alaska Native Plant Sources. Alaska Plant Material Center. HCO2 Box 7440, Palmer, Alaska 99645.

The 1996 National List of Vascular Plant Species that Occur in Wetlands can be downloaded from this website: <http://www.nwi.fws.gov/bha/>

George Argus' s out-of-print 1973 The Genus *Salix* in Alaska and the Yukon is available for download at <http://info.dec.state.ak.us/ciimms/news.htm>, the website of the Information Management System of the State of Alaska.

George Argus' s electronic copy of the Alaska and Yukon Willow Workbook and the interactive Key to *Salix* (INTKEY) are available for download at <http://www.uaa.alaska.edu/enri/willow/index.html>, the website of the Alaska Natural Heritage Program.

Glossary

Alluvions- See p. 6

Anther- See p. 11

Bloom- See p. 44

Bract- See p. 11

Bud scale- See p. 36

Catkin- See p. 11

Compensatory growth see p. 8

Fen- Wetland dominated by grasses and sedges.

Gall- Swelling or abnormality in plant tissue caused by an organism. See p. 13.

Genus- See p.12

Hybrid- Offspring of two separate species.

Floret- See p. 11

Midvein- See p. 11

Nectary- See p. 11

Ovary- See p. 11

Phenology- See p. 12

Petiole- See p. 11

Stamen- See p. 11

Stigma- See p. 11

Stipule- See p. 11

Sucker- See p. 18