

# TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE

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## IDENTIFICATION OF TEN WILLOWS USED FOR STREAMBANKS IN THE NORTHWEST

### INTRODUCTION

The Corvallis Plant Materials Center has distributed tens of thousands of willows for testing and streambank stabilization in the Pacific Northwest since 1983. This material consisted primarily of eight native and two introduced species. Clones from five of the eight native willows were released as cultivars in 1988. These continue to be tested and sold. The two introduced species are commercially available cultivars developed for riparian use in the Eastern United States.

There is a need to accurately identify these ten willows in the field. While male and female flowers (catkins) of most willows provide important taxonomic characters, they are frequently unavailable when a specimen is viewed. Therefore, this guide was developed based solely on vegetative traits. A key, table, and sketches of the foliar characteristics of each species or cultivar are provided.

Vegetative traits of an individual willow species are typically quite variable. Vigorous leaves on young shoots may bare less than a close resemblance to mature or slower growing foliage. In addition, the list of native willows in the Northwest is extensive. Hitchcock and Cronquist (1976), list as many as 34 species, and a number of these hybridize resulting in intermediate characteristics. For these reasons, no attempt was made to extend this vegetative key beyond the ten willows distributed for testing and use by the Corvallis PMC.

### INSTRUCTIONS FOR USE OF KEY

1. Because vegetative characteristics such as leaf shape, leaf margins, and pubescence or hairiness vary from clone to clone, the key should only be applied to the following materials: 9004810 coyote willow, 'MULTNOMAH' Columbia River willow, 'CLATSOP' hooker willow, 'PLUMAS' sitka willow, 'STREAMCO' purpleosier willow, 'NEHALEM' Pacific willow, 'BANKERS' cottet willow, 'PLACER' erect willow, 'ROGUE' arroyo willow (also known as 'Rogue' willow), and 9004819 piper willow.
2. The key is dichotomous. Read each pair of statements carefully then select the one that fits the best. Move on to the next set of statements indicated by the number on the far right. Stop when an acceptable description is found. Compare your specimen with the figure (drawing) that follows the key. Cross-reference the table.
3. When the word "and" is encountered in a statement, the phrases on both sides of the word MUST be true for the statement to be true. Phrases on both sides of the word "or" do not have to be true, but one side must be for the statement to be true.

4. The key is most useful if both young, vigorous growth (leaves and twigs) and mature foliage are examined at the same time. Important traits may be more or less visible depending on the age of the leaves. Newly expanding leaves are generally less reliable for such traits as pubescence and shape.

VEGETATIVE KEY FOR WILLOWS

1. Upper surface of mature leaves persistently pubescent or covered with moderate to sparse amounts of appressed, soft hairs; leaf blades lanceolate to linear in shape, 5 to 15 times longer than wide, subsessile.....2
1. Upper surface of mature leaves glabrous or leaf blades elliptic, obovate or oblanceolate in shape, petiolate.....3
  2. Leaf margin entire. Leaf blade very narrow, lance-linear, linear to linear-elliptic, 7 to 15 times longer than wide and subsessile. Dense pubescence on both sides of leaf lends grey-green appearance to foliage. Twigs silky when young, soon becoming glabrous. Stipules minute or soon absent.....9004810 coyote willow (Salix exigua), Figure 1.

[NOTE: Coyote willow should not be confused with Columbia River willow which it will hybridize with in nature. The accession 9004810 is not necessarily typical for the species since several subspecies and botanical varieties exist that have less pubescence and serrate leaf margins.]

2. Leaf margin serrate. Leaf blade narrow, lanceolate, lance-linear to linear-elliptic, 5 to 15 times longer than wide and subsessile. Sparse to moderate amounts of silky, appressed, soft hairs on both sides of leaf. Young twigs slightly pubescent, soon becoming glabrous. Stipules minute or absent....'MULTNOMAH' Columbia River willow (Salix fluviatilis), Figure 2.

[NOTE: Hybrids of this species can resemble coyote or Northwest willow (Salix sessilifolia). Northwest willow is not described here.]

3. Mature leaves with persistent, dense pubescence beneath, and leaf blades obovate, elliptic, to broadly elliptic.....4
3. Mature leaves glabrous or very soon glabrous beneath.....5
  4. Stipules present on new shoots. New twig growth green-red and moderately pubescent. Leaves white and silky beneath due to short, dense pubescence. This feature may be less evident on vigorous, new leaves. Pubescence sparser above. Leaf blades elliptic to obovate or oblanceolate, 2 to 4 times longer than wide. Leaf margin entire or slightly wavy with scattered glands or teeth....'PLUMAS' sitka willow (Salix sitchensis), Figure 3.
  4. see next page for alternate choice.

4. Stipules absent. New twig growth yellow to green and densely pubescent. Leaf blades woolly below due to dense pubescence, obovate to broadly elliptic, 2 to 3 times longer than wide, thick and "leathery" in texture. Petioles long. Leaf margin nearly entire or wavy with scattered, rounded teeth.....'CLATSOP' hooker willow (Salix hookeriana), Figure 4.
5. Leaves always alternate, stipules present on vigorous growth, and leaf margin serrate, wavy or entire below middle of leaf.....6
5. Leaves often opposite or subopposite, stipules absent, and leaf margin serrate only above the middle, otherwise entire. Leaf blade lanceolate, lance-linear to linear-elliptic, glabrous on both sides, and pale green to glaucous below. Petioles short. Young twigs red-purple and glabrous, becoming grey or yellow-green with age.....'STREAMCO' purpleosier willow (Salix purpurea), Figure 5.
6. On vigorous shoots, the base of most leaf blades or petiole ends have 2 or more yellow-brown glands on the upper surface. Leaf tips long and strongly acuminate on vigorous foliage, otherwise acute. Leaf margins finely and closely serrate. Leaves soon glabrous, glaucous beneath, lanceolate or narrowly elliptic, resembling a "peach leaf". Stipules often present and gland toothed on immature foliage. New branchlets purple-red becoming yellow.....'NEHALEM' Pacific willow (Salix lasiandra), Figure 6.
6. Upper surface of leaf lacking glands or glandular protrusions at junction of petiole and blade.....7
7. Leaf blades cuneate or oblique at base, shiny above and strongly glaucous beneath.....8
7. Leaf blades cordate at base, dull green above and moderately glaucous beneath. Petioles short. Stipules very broad and prominent, persistent, often wavy, and with wide petioles. Leaves broadly elliptic to elliptic and soon glabrous. Leaf margins finely and closely serrate. Twigs glabrous and often decumbent in habit.....'BANKERS' cottet willow (Salix X cotteti), Figure 7.
8. Leaf blades oblanceolate, obovate, to nearly elliptic and up to 4 times as long as wide, cuneate at base.....9
8. Leaf blades narrowly lanceolate to linear, 5 to 12 times longer than wide. Mature leaves glabrous, shiny above, glaucous below, and cuneate to occasionally oblique at base. Leaf tips mostly acute. Leaf margins finely serrate to nearly entire. Young twigs soon glabrous.....'PLACER' erect willow (Salix ligulifolia), Figure 8.

[Note: Since Salix ligulifolia is closely related to erect willow, Salix rigida, the same common name is being applied to both species.]

9. Leaf blade pubescent below only on the midrib. Stipules found on vigorous, new leaves, otherwise soon absent. Leaf blades oblanceolate, obovate, or elliptic. Leaves shiny above and strongly glaucous below, creating a white, waxy appearance. Leaf margin serrate to nearly entire. New foliage and twigs slightly pubescent but soon becoming glabrous.....PI-508557 willow species  
(Salix lasiolepis), or 'ROGUE' arroyo willow. Figure 9.

[NOTE: 'ROGUE' arroyo willow is difficult to distinguish from piper willow. Some characteristics resemble scouler willow (Salix scouleriana) as well.]

9. Leaf blade sparsely pubescent below, not restricted to the midrib. Stipules small or inconspicuous on vigorous new foliage, otherwise absent. Leaves oblanceolate, obovate, or narrowly elliptic to elliptic. Leaves glaucous below, creating a dull, whitish green appearance. New foliage and twigs pubescent when young but soon becoming glabrous. Leaf margin serrate to nearly entire.....9004819 piper willow  
(Salix piperi), Figure 10.

[NOTE: Piper willow may be mistaken for the less pubescent forms of arroyo, scouler and hooker willows. It is usually less pubescent than hooker willow. This holds true when compared to the cultivar 'CLATSOP', but the two species hybridize in the wild.]

\* \* \* \* \*

Illustrations contained in Figures 1-10 courtesy of Gail Stoll, Beaverton, OR.

cultivar/ common name	mature leaf characteristics					ht. feet	form	native habitat and range(OR&WA)	remarks or key features
	shape	length (vs width)	margin	pubescence					
				above	below				
9004810 'coyote willow'	linear, linear-elliptic lance-linear	7-15X	entire	dense	dense	6-20	open, upright leggy	streambanks, bottom-lands E. of Cascade Mts. Foothills to mid-elevations	gray-green lvs., thicket forming, female clone, subsessile lvs.
'MULTNOMAH' Columbia River willow	lanceolate lance-linear, linear-elliptic	5-15X	moderately serrate	sparse (appressed)	sparse (appressed)	6-20	compact, dense, upright	banks of Columbia R. below Deschutes R. and lower end of related tributaries	thicket forming, threatened species, subsessile lvs.
'CLATSOP' hooker willow	obovate, broadly elliptic	1.5-3X	entire or wavy	sparse to mod.	dense, woolly	6-26	dense, upright, spreading	stable dunes, backwaters, sloughs, and streams within 5 miles of coast	young twigs very pubescent, lvs. "leathery" and thick, female leaves satiny
'PLUMAS' sitka willow	elliptic, obovate, oblanceolate	2-4X	entire	moderate	dense, velvety	6-23	open, very upright	west of E. Cascade foothills, also E. Wash. and Wallows	leaves opposite to subopposite, young twigs reddish purple in color.
'STREAMCO' purpleosier willow	lanceolate, lance-linear, linear-elliptic	4-10X	serrate above middle	none	none	10-20	upright to spreading	lowlands in Europe and Asia, introduced to Eastern North America	"peach leaves", tiny glands on upper surface of leaf blade (base)
'NEHALEM' Pacific willow	lanceolate, narrowly elliptic	4-12X	finely serrate	sparse or none	none	6-30	upright shrub or small tree	along streams from sea level to mid-elevations in western N. America	leaf stipules broad and prominent, spreads by layering
'BANKERS' cottet willow	broadly elliptic with cordate base	2-3X	finely serrate	sparse or none	none	3-6	dwarf, spread- ing, de- cumbent	alpine regions of Western Europe, introduced to the United States	Salix ligulifolia
'PLACER' erect willow	ligulate, lanceolate, linear (oblong)	5-12X	serrate to nearly entire	sparse or none	none	3-16	open at base, up- right to rounded	meadows, streams at 3000 to 9000 feet, Sierra Nevada to Southern Oregon.	is part of the S. rigida (erect willow) complex
'ROGUE' arroyo willow	oblanceolate, obovate, elliptic	2-4X	serrate to entire	sparse or none	sparse or none	14-36	upright, spread- ing, sm. tree	Western Oregon collection	Very rapid growth rate, first ID as scouler willow, male clone
9004819 piper willow	oblanceolate, obovate, elliptic	2-4X	serrate to entire	sparse or none	sparse or none	6-10	upright, small, to spread- ing	streambanks, ponds, swamps, west of Cascade Summits below 500 feet	slower growing native specimen

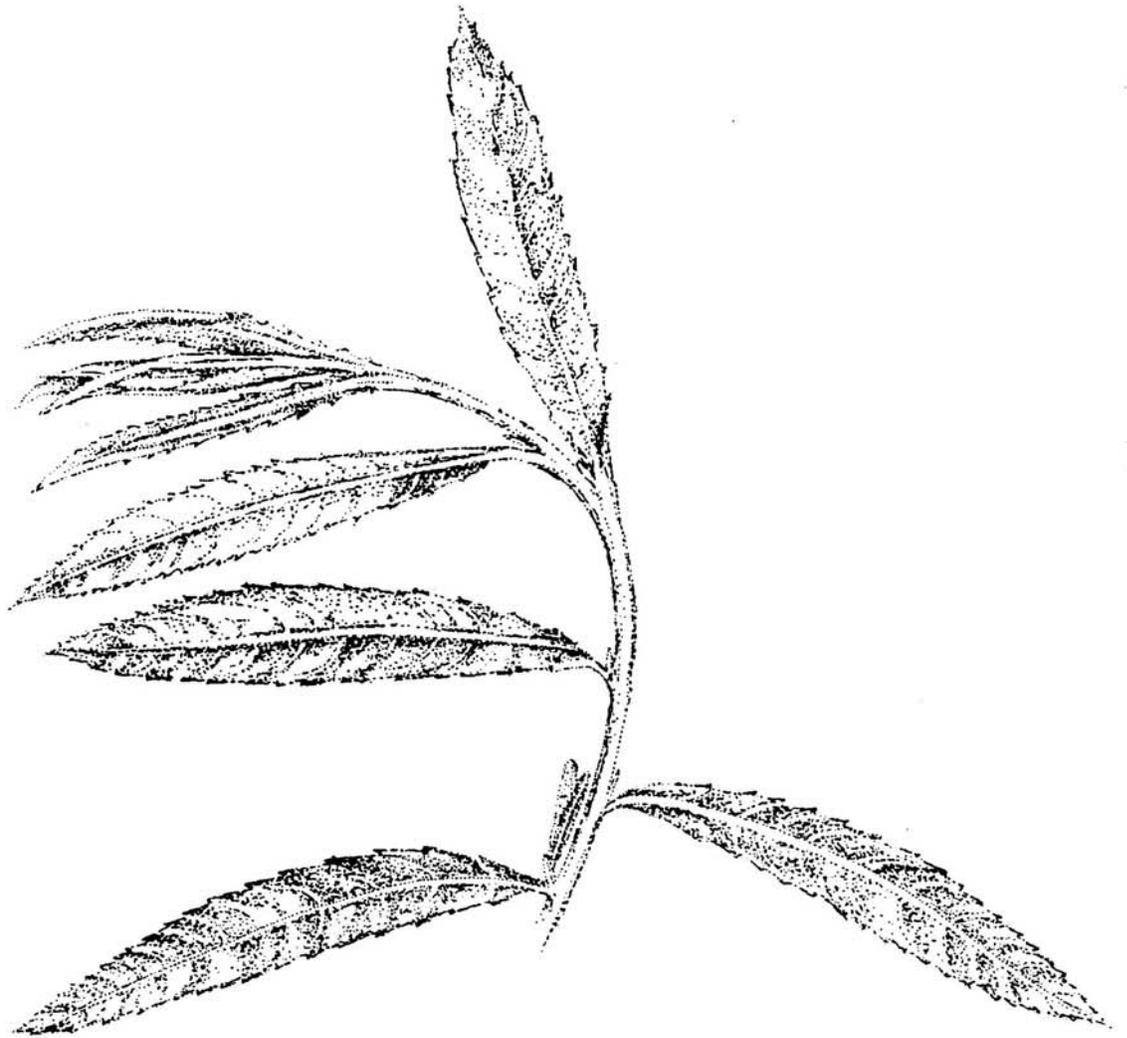
Figure 1



Salix exigua  
Coyote Willow

Carl F. Hall

Figure 2



*Salix fluviatilis*  
'MULTNOMAH' Columbia River Willow

Figure 3



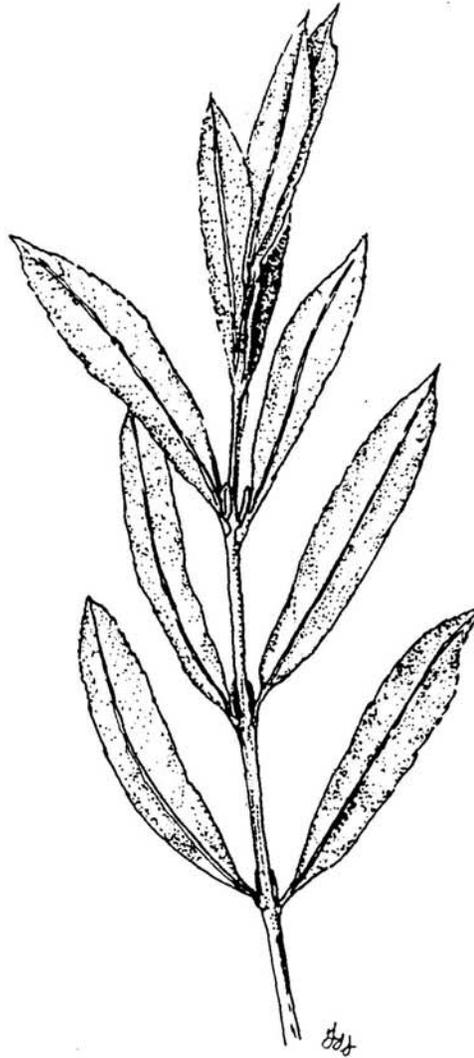
*Salix sitchensis*  
'PLUMAS' Sitka Willow

Figure 4



Salix hookeriana  
'CLATSOP' Hooker Willow

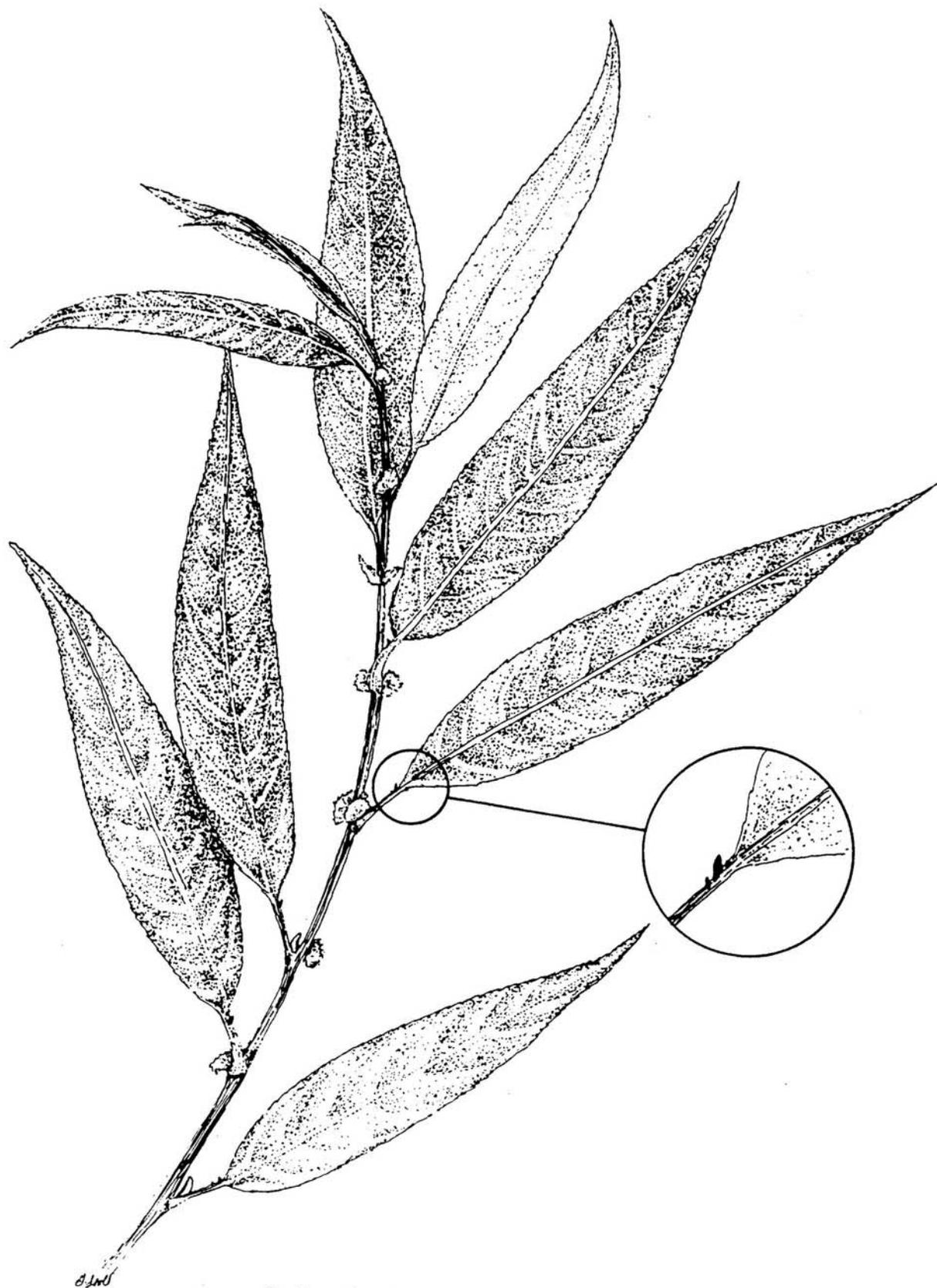
Figure 5



Salix purpurea

'STREAMCO' Purpleosier Willow

Figure 6



*Salix lasiandra*  
'NEHALEM' Pacific Willow

Figure 7



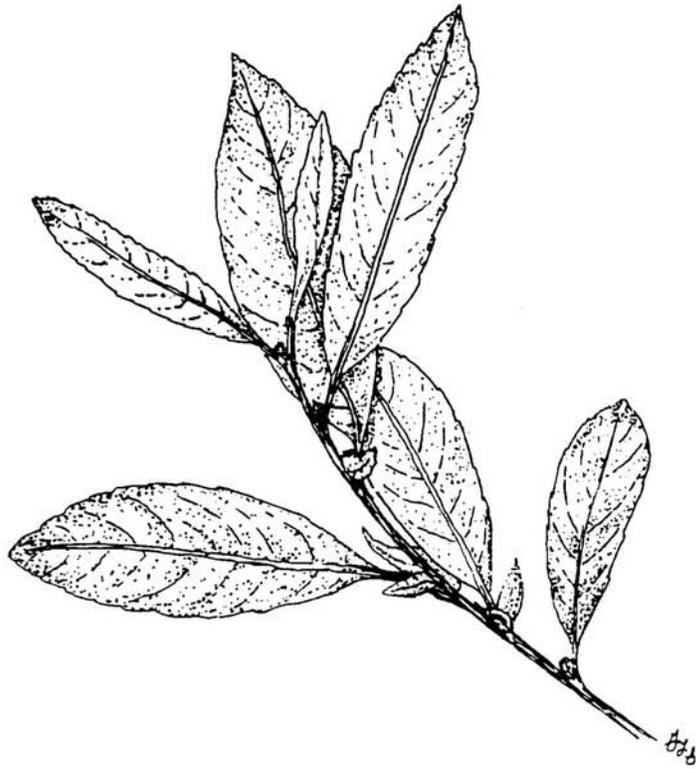
*Salix X cottetii*  
'BANKERS' Cottet Willow

Figure 8



*Salix ligulifolia*  
'PLACER' Erect Willow

Figure 9



Salix lasiolepis  
'ROGUE' Arroyo Willow

Figure 10



Salix piperi

Piper Willow

East & Arnold

GLOSSARY OF TERMS FOR VEGETATIVE WILLOW KEY

- ACUMINATE: With reference to the apex of the leaf; tapering gradually to a sharp, elongated point.
- ACUTE: With reference to the apex of the leaf; ending in a point that is less than a right angle, distinct and sharp but not drawn out.
- ALTERNATE: Having only one leaf at each node on a stem.
- BOTANICAL VARIETY: A taxonomic category below species, not to be confused with cultivated variety or cultivar.
- CULTIVAR: Short for cultivated variety, not a taxonomic level of plant classification.
- CORDATE: With reference to the base of a leaf blade where the petiole is attached; heart shaped with a notch at the base.
- CUNEATE: With reference to the base of a leaf blade where the petiole is attached; wedge shaped, gradually narrowing toward the point of attachment.
- DECUMBENT: Branches lying flat on the ground but turned up at the end.
- ELLIPTIC: A leaf blade that is in the shape of a flattened circle, more than twice as long as wide and widest near the middle.
- ENTIRE: Smooth, without any indentations, wavy margins, or teeth.
- GLABROUS: Smooth, without hairs or pubescence of any kind.
- GLAUCOUS: Having a white, waxy coating or bloom.
- LANCE-LINEAR: A leaf blade that is midway between a lanceolate and linear shape.
- LANCEOLATE: Lance shaped leaf blade, tapering from a broad base to the leaf apex, much longer than wide.
- LINEAR: Long and narrow leaf blade with nearly parallel sides.
- LINEAR-ELLIPTIC: A leaf blade that is midway between a linear and elliptic shape.
- OBLANCEOLATE: Lanceolate shaped leaf blade, but with the broadest part toward the leaf apex, past the midway point.
- OBLIQUE: With reference to the base of a leaf blade where the petiole is attached; asymmetrical or unequal, having the blade attached lower on one side of the petiole than the other.

- OBOVATE:** Egg shaped leaf blade but with broadest part near the leaf apex.
- OPPOSITE:** Two leaves attached directly opposite each other, i.e. paired together on the stem.
- PETIOLATE:** Having petioles.
- PETIOLE:** The stalk of a leaf that attaches the blade to the stem or branch.
- PUBESCENT:** Covered with short, soft hairs.
- SERRATE:** Having teeth on the edge of the leaf that point toward the apex of the leaf.
- SESSILE:** Lacking a petiole or leaf stalk, thus the leaf blade appears to be attached directly to the stem.
- STIPULE:** One of a pair of leafy appendages attached to either side of the base of a leaf petiole.
- SUBOPPOSITE:** Two leaves that are almost paired together on the stem, but not quite.
- SUBSESSILE:** Almost but not quite sessile, thus a very short petiole is barely apparent.
- SUBSPECIES:** A taxonomic level of classification below that of species.

