A Vegetative Key to the Willows of Colorado©

By Gwen Kittel (March 6, 2016)

This key uses only vegetative characteristics that are mature (or fully expanded). As The characteristics of willows are highly variable, be sure to look at several leaves and twigs on one shrub to get an overall feel (an average) for the size, shape and color. Leaf characteristics and measurements refer to the leaf blade only, unless otherwise noted.

Ignore stipules (paired bracts at the base of leaf petioles) and leaves of sucker shoots (unusually large). Stipules occur on most *Salix* species, are very temporary and do not aid in distinguishing among them. Sucker shoots are vigorous, non-flowering twigs that grow from the base of the shrub, and can have really huge leaves, far beyond the parameters listed here.

While this key is based only on vegetative characters, distinguishing catkin characteristics are occasionally noted. Two catkin characteristics are useful even when the catkin is over mature: the stipe length and the catkin length. I often find catkins late in the season still dangling on the shrub, or lying on the ground underneath the shrub.

Key to Groups

1. Trees. Either large shade trees or at least tall, large diameter single trunk (occasionally split into two or more) up 30 feet (10 meters) in height, generally at lower elevations on the eastern plains and western valleys. ..... **Group A**

1. Shrubs. Usually multi-stemmed, if single trunk than diameter not more than 10 inches (5 cm). Height from less than 10 cm creeping on the ground to large shrubs of stream banks and floodplains, up to 15 feet (5 meters) tall 2

2. Tall shrubs, usually > 3-4 feet (1.5-2 meters), often over 8 feet (2.25 meters), occurring at plains, foothills and montane altitudes.....**Group B**

2. Shrubs generally 3 feet or less, can be as tall as 5 feet, restricted to subalpine and alpine habitats. 3

3. Shrubs at least 0.5- 5 feet (>10 cm – 2 meters) tall, usually in subalpine environments, can occur in alpine environments up to 1 foot tall ..... **Group C**

3. Shrubs creeping on the ground, < 5 inches (< 10 cm) in height, restricted to alpine environments ..... **Group D**

Group A—Tree willows

1. Tree crown is nearly spherical, as if pruned. Gardens and lawns in urban settings in the lower Arkansas and Colorado River valleys..... globe willow, *Salix matsudana* (introduced)

1. Tree crown may form a large shade canopy, but not nearly a perfect sphere.....2

2. Branches and leaves pendulous, leaves long and linear, leaf blade not more than 1.5 cm wide, long acuminate tips. Only found in cultivated gardens, lawns and other landscaped places .... weeping willow, *Salix babylonica* (introduced)

2. Branches not pendulous, or if so only at their tips, leaves may or may not be pendulous, otherwise not as above in all respects 3

3. Leaves linear to oblong to lanceolate, blades usually more than 10 cm in length, with no obvious widening in the middle 4

3. Leaves lanceolate, elliptic, to ovate, blades usually less than 10 cm long, if longer, then not linear nor oblong, but obviously wider in the middle or below. Leaf petiole weak, causing the leaf to dangle from the petiole attachment. Leaves with finely serrate margins, acuminate tip, pale green, thin, and glaucous on the back. Bark is dark and furrowed, trunk almost never straight and upright tree, often twisted or lying horizontally on the ground before reaching upwards. (Crosses observed between this and the next have petioles that dangle like *S. amygdaloides*, while the leaf size, teeth coarseness and leaf thickness were more like *S. fragili*s.). .....peach-leaf willow, *Salix amygdaloides*

4. Leaves coarsely serrate, thick, strongly glaucous on the back, twigs olive, yellowish-brown, to bright orange-yellow, brittle, easily snapping off at the base..... .....crack willow, brittle willow, *Salix fragilis* (introduced)

4. Leaves serrulate, not coarse and thick, not glaucous on the back, 1-2 cm wide. Native to Utah, coming into Colorado in Mesa and Montrose counties. Apparently part of the *Salix nigra* complex. .....Gooding willow, *Salix gooddingii*

Group B – Tall (>1.5 m, 5 ft.), usually multi-stemmed, shrubby willows

1. Leaves mostly opposite or nearly so, branches erect. Leaves narrow (0.5-3.0 cm wide), escaping from cultivation along the Front Range.....basket willow, *Salix purpurea* (introduced)

1. Leaves clearly alternate.....2

2. Most twigs pruinose (with a waxy powdery, usually whitish, coating on the surface. Like that on a plum, it can be easily rubbed off). Thickness of coating ranges from thick to thin and may be limited to areas behind buds. Twigs also glabrous, or if hairy only sparsely so (use a lens) 3

2. All twigs without a pruinose coating, may or may not be pubescent (use a lens), and may have semi-transparent exfoliating skin 6

3. Twigs red to dark red, pruinose coating thin, may be restricted to last year's branches or behind the buds and does not obscures the twig color. Leaves glabrous, shiny, entire, glaucous below. Montane and subalpine elevations .....*Salix planifolia*

3. Twigs not dark red, may be reddish or red on only one side of twig. Can be so strongly pruinose they appear white. Twig color is green, yellow or gray, never dark red 4

4. Twigs pruinose usually only on previous year's growth, not so on the current year twig (terminal end) creating a notable contrast, although some specimens do have it on all stems, if so than leaf margins are toothed. Bud scales can be black. Leaves are long and linear, dark green. Grows only in the foothills and plains ..... bluestem willow, *Salix irrorata*

4. Twigs pruinose on current year's growth (terminal end of branch). If pruinose on older twigs and leaf margins toothed, go to *S. irrorat*a, above.....5

5. Average leaf blades greater than 13 mm wide (about the width of a pinky finger), dark green. Often on steep (>8%) gradient, bouldery streams, but also known from low gradient floodplains and stream banks. Catkins >1.5 cm long .....Drummond willow, *Salix drummondiana*

5. Average leaf blades never more than 13 mm wide, light to pale yellowish green. Generally found on low gradient floodplains, catkins <1.5 cm long, almost never on steep streams..... .....Geyer willow, *Salix geyeriana*

6. Leaves linear, long and narrow, several times (6 x) longer than wide 7

6. Leaves not linear, or if so then not as much as 6 x long as wide 8

7. Leaves glabrous or nearly so, serrulate, sometimes entire, western slope and mountain counties, not on the Front Range or eastern plains ..... Dusky willow, *Salix melanopsis*

7. Leaves pubescent, rarely glabrous. If glabrous then of eastern slope counties, foothills and plains. The most common willow in Colorado, grayish-green color, usually forms loose thickets from rhizomes. Woody stems pinkish to pale-reddish, often with a thin, exfoliating layer of whitish to transparent skin .....coyote willow, sandbar willow, *Salix exigua*

Two subspecies (where they come together there are many intermediates):

a. Leaves glabrous or glabrate, prominently toothed, more veiny than the next, on the eastern plains ..... sandbar willow, *S. exigua* ssp. *interior*
b. Leaves persistently pubescent, sometimes entire, or nearly so, in the mountains and foothills ..... coyote willow, *S. exigua* ssp. *exigua*

8. Leaves lanceolate or eliptical, long acuminate tips, with shiny upper surfaces, bright green, may or may not be glaucous underneath 9

8. Leaves elliptic, oblong, oblanceolate, rarely lanceolate, leaves not particularly shiny or if so dark green, or otherwise not as above.....10

9. Leaf blades 3-20 cm long (average 8 cm), shiny upper surface, with a long acuminate tip (average length 2.6 cm), serrate to serrulate (average 10 teeth per cm), petioles 1.3-3.0 cm long, a few hairs may be present. Widespread, tall (>2.5 m) shrub of the mountains, foothills, and western valleys. Tall stature (often taller than surrounding willow species) and long, shiny leaves that catch the sunlight makes this willow stand out.....whiplash willow, *Salix lasiandra*

Two varieties:

a. Leaves glaucous underneath ..... var. *lasiandra*

b. Leaves not glaucous underneath .....var. *caudata*

9. Leaves 4-10 cm long (average 6 cm), shiny upper surface, with a short acuminate tip (average length 0.7 cm) (not as long as *S. lasiandra*) finely-glandular serrate (average 14 teeth per cm), petioles 4-11 mm long, glabrous. Rare willow of cold marshes and peatlands. The most reliable distinguishing characteristics are floral— catkins mature after August 1st, often well into September, much later than any other willow in Colorado. Capsules glabrous, 6-12 mm long. Currently known from only a few populations in Boulder, Larimer, Park, and Routt counties ..... autumn willow, *Salix serissima*

10. Leaves not glaucous underneath (use a lens).....11

10. Leaves glaucous, strongly or weakly, underneath (use a lens).....12

11. Leaves mostly not toothed, not hairy (except when very young), not involute, not pruinose on the twigs, not particularly yellow, red, or any distinct color, just a plain green willow— "boring boothii" ..... Booth willow, *Salix boothii*

11. Leaves with serrulate (finely toothed) margins, ovate to broadly elliptic or obovate, rounded or heart-shaped base. Upper leaf surfaces without hairs, except at the mid-rib, underside not glaucous. Young twigs are yellow-green, red-brown, or brown in color, with dense hairs. Branches of previous years are often bright red, giving it a resemblance to manzanita (*Arctostaphylos*). Most likely to be confused with *Salix boothii.* Known only from one location in Conejos County, at 10,320 feet (more common in New Mexico, Arizona and Utah). .... Arizona willow, *Salix arizonica*

12. Leaves consistently obovate, with obtuse tips, leaf bases sharply cuneate, grows away from stream banks, usually on forested slopes, freshly stripped bark can have a skunk- like odor..... ..... Scouler willow, *Salix scouleriana*

12. Leaves broadly elliptic to obovate, tips acute, leaf bases often rounded, but can be cuneate, never grows on shaded hill slopes, always in full sun, streamside, floodplain, lake or beaver pond habitats 13

13. Leaf margins toothed (most leaves have obvious teeth, look at several leaves)..... 14

13. Leaf margins entire (some leaves with few teeth, but not consistently so on all leaves) 15

14. The difference between the next two species (actually, this would apply to any choice of willows) depends upon the "preponderance of the evidence". Rather than a dichotomous choice, several factors must "add up". You need to get 4-5 "Clues", in any order, to match the species. The clues are listed in order of least variation, however, ANY COMBINATION of AT LEAST 4 will get you to the species. Clue #1: Leaves coarsely to finely serrate to serrulate; Clue #2: leaves are elliptical to elliptic-ovate (distinctly broader at the middle); Clue #3: leaf bases usually rounded (but not always); Clue #4: leaf tips usually sub-acute to obtuse (not as sharp as the next), Clue #5: Leaf color yellowish-green; Clue #6: young twigs yellowish (both species can have one side of the twig with a reddish streak, as if sunburned, discount this color, and look for the predominant twig color over the entire shrub). Very common, multi-stemmed willow forming

large thickets around beaver ponds, narrowly lining lower gradient streams on relatively wide floodplains in the mountains ..... mountain or yellow willow, *Salix monticola*

14. Clue #1: Leaves finely serrulate, to sub-entire; Clue #2: leaves oblong elliptical, strap-shaped, or lanceolate (not broadest at the middle, with nearly parallel margins); Clue #3: Leaf bases often cuneate (but not always); Clue #4: leaf tips often acute (sharply so, the way a young child draws the roof of a house, with a classic steep pitch " ^ "); Clue #5: Leaf color darker and more bluish-green than *S. monticola* (green and blue are more predominant in the leaf than yellow or pale greens); Clue #6: young twigs reddish to greenish. (both species can have one side of the twig with a reddish streak, as if sunburned, discount this color and look for the predominant twig color over the entire shrub). Clue #7: Older twigs can be densely pubescent with very thick, coarse hair (trichomes) (but this is an uncommon feature in Colorado). A common willow generally found near stream edges, but can form floodplain thickets .... strapleaf willow, *Salix eriocephala* var. *ligulifolia* (= *S. ligulifolia*)

15. Current year twigs pubescent at maturity (use a lens) 16

15. Current year twigs glabrous at maturity (use a lens) 17

16. Leaves small, 1-4 (7) cm long, and more or less of a consistent size on the shrub. Most mature leaves (at least 4-6 weeks old, not just emerging from the bud) and twigs pubescent with a fine peach fuzz type hair (sometimes not at the very tip, look at several leaves), individual hairs not distinguishable with the unaided eye. Surface of the leaf is textured, the veins impressed into the leaf's upper surface (this more easily seen by bending the leaf over your finger), leathery. Petioles are pink to red. Previous years twigs are streaked (red and tan, as the thin bark is beginning to split). Hint: the catkins have distinctive, very long (> 3 mm) stipes (stalk that holds the individual flower), such that the flowers stand away from the main axis of the catkin. This is easily seen with the naked eye, even on old twigs already fallen on the ground. ..... Bebb willow, *Salix bebbiana*

16. Leaves generally larger than the former and more variable is size. Mature twigs pubescent but leaves glabrous. Twigs reddish to greenish (often one side of the twig has a reddish streak, as if sunburned, discount this color and look for the predominant twig color over the entire shrub). Older twigs (last year's growth) can be densely pubescent with very thick, coarse hair (trichomes). Leaves finely serrulate, to sub-entire; oblong elliptical, strap-shaped, or lanceolate (not broadest at the middle, with nearly parallel margins); leaf bases often cuneate (but not always); leaf tips often acute (sharply so, the way a young child draws the roof of a house, with a classic steep pitch " ^ "); leaf surface not textured, veins not impressed into leaf surface. A common willow generally found near stream edges, but can form floodplain thickets .... strapleaf willow, *Salix eriocephala* var. *ligulifolia* (= *S. ligulifolia*)

17. Leaves dark shiny green, glaucous beneath, often slightly involute, thickish. Twigs red, ranging from bright red to dark blood red to nearly purple-black, and consistently shiny. Twigs can be slightly glaucous (best seen behind buds), especially if in the vicinity of glaucous-twigged willows, with which it hybridizes..... plane-leaf willow, *Salix planifolia*

17. Leaves lighter green, not noticeably thickish, and not as above in all respects.....18

18. The difference between the next two species of willow (actually, this would apply to any

choice of willows) depends upon the "preponderance of the evidence". Rather than a dichotomous choice, several factors must "add up". You need to get 4-5 "Clues", in any order, to match the species. The clues are listed in order of least variation, however, ANY COMBINATION of AT LEAST 4 will get you to the species. Clue #1: Leaves with no teeth, but if you find some, they are coarsely to finely serrate to serrulate; Clue #2: leaves are elliptical to elliptic-ovate (distinctly broader at the middle); Clue #3: leaf bases usually rounded (but not always); Clue #4: leaf tips usually sub-acute to obtuse (not as sharp as the next), Clue #5: Leaf color yellowish-green; Clue #6: young twigs yellowish (both species can have one side of the twig with a reddish streak, as if sunburned, discount this color, and look for the predominant twig color over the entire shrub). Very common, multi-stemmed willow forming large thickets around beaver ponds, narrowly lining lower gradient streams with relatively floodplains in the mountains ..... mountain or yellow willow, *Salix monticola*

18. Clue #1: Leaves with no teeth; Clue #2: leaves oblong elliptical, strap-shaped, or lanceolate (not broadest at the middle, with nearly parallel margins); Clue #3: Leaf bases often cuneate (but not always); Clue #4: leaf tips often acute (sharply so, the way a young child draws the roof of a house, with a classic steep pitch " ^ "); Clue #5: Leaf color darker and more bluish-green than *S. monticola* (green and blue are more predominant in the leaf than yellow or pale greens); Clue #6: young twigs reddish to greenish. (both species can have one side of the twig with a reddish streak, as if sunburned, discount this color and look for the predominant twig color over the entire shrub). Clue #7: Older twigs can be densely pubescent with very thick, coarse hair (trichomes) (but this is an uncommon feature in Colorado). A common willow generally found near stream edges, but can form floodplain thickets..... ..... strapleaf willow, *Salix eriocephala* var. *ligulifolia* (= *S. ligulifolia*)

Group C—Low stature willows (less than 5 feet tall).

1. Leaves pubescent, obviously hairy, rarely glabrate 2

1. Leaves glabrous, or nearly so.....7

2. Leaves entire (occasionally sparingly toothed), glaucous underneath, margins slightly revolute, thickish, petioles 3-13 mm long, twigs dark red to purple-black, glabrous, shiny. Generally glabrous, sometimes with scattered hairs. Common willow forming extensive thickets in the subalpine basins above 10,000 ft. and below, where it occurs as a much taller shrub (>1 m) .... plane-leaf willow, *Salix planifolia*

2. Not like above in all respects 3

3. Leaves densely white-wooly, or long hairy underneath, strongly revolute margins, thick twigs upper surface of leaf can be dark, shiny green. Rare, on hummocks of nutrient-rich fens and in thickets at the edges of ponds and stream banks .....silver willow, *Salix candida*

3. Not like above in all respects 4

4. Leaves hairy to glabrate and glaucous (may be weakly so) below.....5
4. Leaves hairy and not at all glaucous below 6

5. Leaves generally hairy on both sides of leaf, sometimes unevenly so (use hand lens), glaucous below, grayish-green, upper surface not shiny, twigs not especially thick. Leaf blades 2-4 cm long , petioles 1-3 (4) mm long. Common willow of moist to wet but well drained habitats, often forming very large thickets in subalpine basins. This willow can grow at lower elevations, and when it does, it grows taller. The leaf characteristics, however, distinguish this willow regardless of its height ..... short-fruit willow, barren willow, *Salix brachycarpa* .....(intergrades with *Salix glauca*)

5. Leaves hairy to sparsely hairy to glabrous, glaucous on underside. Leaf blades 3-8 cm long, petioles 3-10 mm long, not as common as above, but probably over looked..... .....Gray willow, *Salix glauca* var. *villosa*

6. Leaves generally hairy on both sides, sometimes unevenly so, not glaucous below, tips are acute to acutish, olive-green color, leaves narrowly elliptic to elliptic. Common willow of wetter habitats in subalpine valleys, forming small patches on the eastern side of the Continental Divide and up to very large thickets on the western slope ..... Wolf willow, *Salix wolfii*

6. Leaves sparsely villous or pilose to glabrescent below, glaucous underneath, 1.5-3 cm wide, young twigs densely hairy, less than 0.5m tall. Rare, on rocky limestone at 12,000 ft elevation..... .....lime-loving willow, *Salix lanata* ssp. *calcicola*

7. Leaves entire (occasionally sparingly toothed), glaucous underneath, margins slightly revolute, thickish, petioles 3-13 mm long, twigs dark red to purple-black, glabrous, shiny. Common willow forming extensive thickets in the subalpine basins above 10,000 ft. and below, where it occurs as a much taller shrub (>1 m) .....plane-leaf willow, *Salix planifolia*

7. Leaves finely serrate, sometimes only toward the base 8

8. Leaves glaucous on underside, mostly elliptic to oblanceolate, 3-8 cm long, hairy to glabrous. Petioles 3-10 mm long .....Gray willow, *Salix glauca* var. *villosa* .....(intergrades with *Salix brachycarp*a, whose leaves are usually quite pubescent)

8. Leaves not glaucous underneath 9

9. Leaves not glaucous to slightly glaucous underneath, obovate to elliptic sometimes lanceolate, 1.5-5 cm long, petioles 1.5-8 mm long, young twigs not shiny red, sparsely short pubescent. Rare, found only in calcareous fens .....low blueberry willow, *Salix myrtillifolia*

9. not like above in all respects.....10

10. Leaves ovate to broadly elliptic or obovate, rounded or heart-shaped base, 1 to 5 cm long, 0.5 to 3 cm wide, with serrulate (finely toothed) margins. Upper leaf surfaces are generally shiny, without hairs, except at the mid-rib, underside not glaucous. Young twigs are yellow-green, red-brown, or brown in color, with dense hairs. Branches of previous years are often bright red, giving it a resemblance to manzanita (*Arctostaphylos*).. ..... *Salix arizonica* .....Rare, known only from one location in Conejos County, at 10,320 feet.

10. Leaves mostly not toothed, not hairy (except when very young), not involute, not glaucous underneath. Twigs not pruinose, not particularly yellow, red, or any distinct color, just a plain green willow— "boring boothii" ..... Booth willow, *Salix boothii*

Group D—Alpine willows (prostrate, creeping, less than 10 cm tall)

1. Leaf apex generally obtuse, leaves oval to suborbicular to elliptic, glaucous below, strongly reticulate below. Leaves clustered at the ends of creeping, slender branches, 10,500 to 12,500 ft in elevation.....snow willow, *Salix reticulata* ssp. *nivalis*

1. Leaf apex generally acute, leaves elliptic, not glaucous to only slightly glaucous below, veins less pronounced below. Long, heavy, woody horizontal stems, 11,000 to 13,500 ft. in elevation ... .arctic willow, alpine willow, *Salix arctica* var. *petraea*