

## 16. Grayleaf Willow-Barrenground Willow Ecological Series

Ecological Type		Plant Association	Short Name
Code	Name	Code	
RI8	Grayleaf-barrenground willows/water sedge–Deep to very deep Cryaquolls and Borohehists–U-shaped or flat-linear floodplains and benches, 9,500-12,100 ft	SAGL-SABR/CAAQ	Grayleaf willow/water sedge–Deep cold wet soils–High creek bottoms

The *Salix glauca*-*Salix brachycarpa* series is described as new here, based on the *Salix pseudolapponum* series of Hess (1981) and Hess and Wasser (1982) and the *Salix glauca* series of Komárková (1986). It is also based on the *Salix brachycarpa* series of Kittel and others (1994) and on the *Salix brachycarpa* Alliance of Kittel and others (1996). The name *Salix pseudolapponum* is now considered to be a synonym of *Salix glauca*.

Sites of this series are small to medium-sized, and usually isodiametric in shape. They are easily distinguished on aerial photographs. Stands occur in relatively protected, cold creek bottoms in the high subalpine and lower alpine (Padgett and others 1989), where the growing season is very short. Though sites are wet year-round, the water is seldom in liquid form. Many sites may freeze nearly every night, so the growing season is measured in hours, not days. The concept of “growing season” may not even be valid here.

### Vegetation, Climate, Soils

These short willows are usually covered with snow much of the year. Sites with good willow and sedge cover have high bank stability and can withstand floods without damage (Hansen and others 1988-1989). In good condition, such sites provide great natural watershed protection, and keep water in the stream that would not otherwise be there in late season.

Revegetation is difficult, and rehabilitation takes a long time, due to a very cold, unfavorable climate. If the willows have been removed, snow will likely not stay on the slope, and the sites will be even colder than before. Managers would be well advised to prevent any disturbance. Insects and diseases in this series are not documented.

### Fire Management

Burning favors tufted hairgrass (*Deschampsia cespitosa*) where it occurs, but sites must be protected from grazing after burning, as young

hairgrass is very palatable (Hansen and others 1988).

### Range and Wildlife Management

Grazing by livestock decreases sedges to the benefit of more grazing-resistant plants such as tufted hairgrass. Continued heavy grazing reduces the production and vigor of tufted hairgrass, and results in invasion by exotics such as Kentucky bluegrass or others. These sites are mostly too high in elevation for practical grazing by cattle, but they can be used by domestic sheep. Grazing should be limited to light to moderate levels, only in seasons when the soil is dry (Hansen and others 1988).

Stands are used by bighorn sheep in high-elevation ranges. They are components of bighorn range that is neither summer nor winter range in the Buffalo Peaks area, northeast of the UGB. Much bighorn summer range is in the alpine, above these sites. Willows (*Salix*) and sedges (*Carex*) are significant parts of bighorn sheep diet (Shepherd 1975).

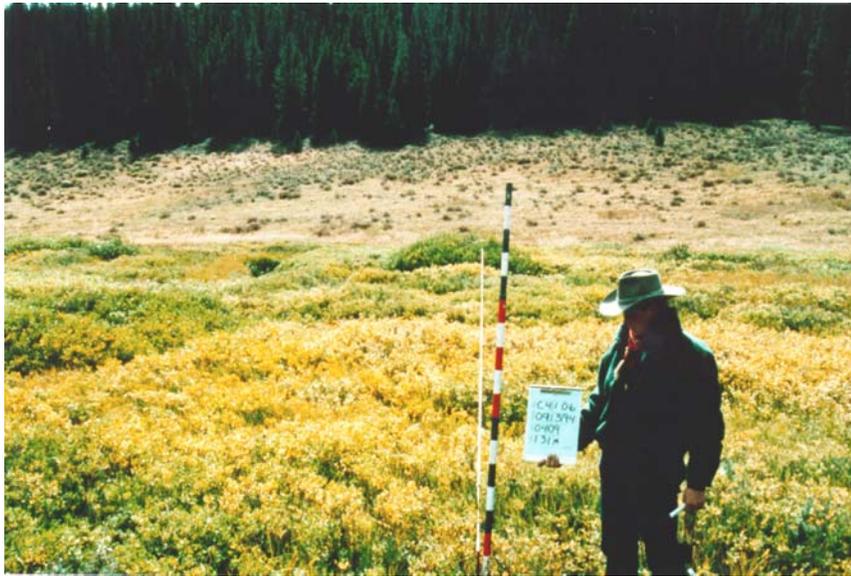
### Recreation, Roads & Trails, Scenery

Sites are unsuitable for roads or construction because of wet soils in summer and frost heave in winter. Level crossings could be ripped or stabilized with rock, or the riparian area could be bridged. Fills should have high rock content and require a culvert.

Deep-winter use for snowmobiling or skiing has little effect, but site and watershed damage may occur in the early spring and late fall-early winter, when the sites are still liquid but may not be accessible. Off-road vehicles (ORV) can cause extensive damage in the summer, and worse damage in early spring and late fall when sites are wettest. ORV use (except in deep winter) should be discouraged. Rutting can be severe from camping, hikers, or pack stock (Hansen and others 1989ab). Scenic values can be high, especially when sites are in good condition. Wildlife viewing values can be high (Hansen and others 1989ab).

Table 16-2. Characteristics of Ecological Types within Ecological Series 16 in the Upper Gunnison Basin.  
Numbers are shown in form *Average (Minimum-Maximum)*

Code Short Name	No. Samples	Elevation, ft	Avg. Aspect, °M (r) Slope, %	Soil Coarse, %	Depth, cm Mollic, cm	Surface: Coarse, % Bare, %	Cover, %: Trees Shrubs Graminoids Forbs	Total Live Cover, % No. Species TLC/NS, %
R18 Grayleaf willow/water sedge-Deep cold wet soils-High creek bottoms	7	10,774 (9,640-12,080)	289 (0.26) 7 (0-22)	37 (5-63)	87 (33-136) 52 (0-136)	3 (1-4) 2 (1-4)	0 (0-0) 103 (69-146) 66 (2-101) 65 (38-127)	234.1 (141.8-295.8) 28 (17-34) 8.9 (5.7-17.4)



A mixed grayleaf willow-barrenground willow site (Community Type A) in the high Subalpine. Almost complete cover by willows. Kim Parker trying to look warm. Water sedge 82% cover, grayleaf willow 65%, planeleaf willow 44%, Rocky Mountain hemlock-parsely 10%, tufted hairgrass 6%. Coarse Fragments Cover = 0%, Total Live Cover = 238%, Coarse Fragments in Soil = 41. Soil sampled as an Hydric Borohemist, Euc. Stewart Peak Quadrangle, elevation 10,700 ft, 3° 05' (NE) slope. September 13, 1994.

### GRAYLEAF WILLOW/WATER SEDGE–DEEP COLD WET SOILS–HIGH CREEK BOTTOMS

Grayleaf-barrenground willows/water sedge–Deep to very deep Cryaquolls and Borohemists–  
U-shaped or flat-linear floodplains and benches, 9,500-12,100 ft



Figure 16-1. Cross-section of vegetation structure of *Grayleaf willow/water sedge–Deep cold wet soils–High creek bottoms*. Slope angles average 7%.

*Grayleaf willow/water sedge–Deep cold wet soils–High creek bottoms* is a moderately common type in high elevation Subalpine cold creek bottoms. In the Gunnison Basin, it occurs on cold, high-Subalpine basins and wet slopes. This type is also known from the high mountains of western Colorado and in northern New Mexico. *Grayleaf willow/water sedge–Deep cold wet soils–High creek bottoms* is characterized by grayleaf willow (SAGL), sometimes associated with barrenground willow (SABR), water sedge (CAAQ), tufted hairgrass (DECE), and Jacob's ladder (POPU3); see Table 16-6 for common species names and codes. Other distinguishing features include location in the upper Subalpine zone, on streambanks and steep moist slopes, the short willows (grayleaf, barrenground), and very cold Histosols or Aquolls.

*Grayleaf willow/water sedge–Deep cold wet soils–High creek bottoms* is related to *Planeleaf willow/marsh-marigold–Cold, wet young soils–High bottoms*, which occurs at somewhat higher elevations on shallower soils, in somewhat warmer microsites. *Grayleaf willow/water sedge–Deep cold wet soils–High creek bottoms* is also related to *Fir-spruce/grayleaf willow treeline–Wind-scarred*, which occurs in more wind-exposed sites at treeline (timberline).

The plant association *Salix glauca–Salix brachycarpa/Carex aquatilis* is described as new here. *Salix glauca–Salix brachycarpa/ Carex aquatilis* phase *Deschampsia cespitosa*, described as new here, is based on *Salix brachycarpa/Deschampsia cespitosa* (Webber 1976) and on *Salix pseudolapponum/Deschampsia cespitosa* (Hess 1981-1982, Johnston 1987).

Succession usually involves vegetation, land, water, and soil. In this very cold climate, these sites are usually distinguishable as riparian communities even in early seral stages, even though some sites are located on steep slopes. Spruce-fir krummholz communities border this type on drier, better-drained benches and slopes. Thurber fescue grasslands occur adjacent to this type on deeper, loamier, better-drained uplands.

Cattle will very seldom graze here; it is too wet and too cold. Horizontal obstruction is moderately high to very high. Deer and elk may use these sites for browse and cover near timberline during the warmest time of the year. Deer and elk use of all community types is moderate in summer for browse, cover, and overnight.

## Summary of Ecological Characteristics

1. Explanation of symbols in Appendix A. Percentages in [brackets] indicate the percentage of plots sampled that have that characteristic.

<b>Number of Samples</b>	7, soil descriptions from 5 of these (total 7)
ELEVATION	10,774 ft (9,640-12,080 ft); 3,284 m (2,938-3,682 m)
AVERAGE ASPECT	289°M (r = 0.26)
LITHOLOGY	Mostly igneous, with tuff [33%], granite [25%], breccia, rhyolite, and gneiss
FORMATIONS <sup>1</sup>	Taf-Tpl-Tiql [64%], also Xg, Tmi, Xfh
LANDFORMS	Floodplains and draws [67%], benches and soil creep slopes [22%]. One frost creep slope
SLOPE POSITIONS	Bottoms
SLOPE SHAPES	Flat [56%] to U-shaped [33%]
SLOPE ANGLE	7.1% (0-22%)
SOIL PARENT MATERIAL	Alluvium [75%] or colluvium [25%]
COARSE FRAGMENTS	0.7% (0-4%) cover on surface, 36.8% (5-63%) by volume in soil
SOIL DEPTH	87 cm (33-136 cm); 34.1 in (13-54 in)
MOLLIC THICKNESS	52 cm (0-136 cm); 20.5 in (0-54 in)
TEXTURE	Organic [75%] or loam surface; subsurfaces are clay-clay loam [63%], sandy loam-sandy clay loam [37%]
SOIL CLASSIFICATION	Cryaquolls [50%], Borohemists [33%], and one Cryumbrept
TOTAL LIVE COVER	234.1% (141.8-295.8%)
NUMBER OF SPECIES	28.1 (17-34)
TOTAL LIVE COVER/NO. SPECIES	8.9% (5.7-17.4%)
CLIMATE	Very cold, dominated by cold-air drainage, upper Subalpine and lower Alpine.
WATER	Water is not frozen for very little of the year and very little of the day.



A mixed grayleaf willow-barrenground willow stand (Community Type B), right at timberline near the Alpine Tunnel. Grayleaf willow 62% cover, barrenground willow 40%, alpine avens 23%, tufted hairgrass 16%, whiproot clover 15%. Coarse Fragments Cover = 0%, Total Live Cover = 256%, Coarse Fragments in Soil = 62. Soil sampled as a Pergelic Cryaquoll, Sandy-Skeletal. Cumberland Pass Quadrangle, elevation 11,800 ft, 22% 292° (WNW) slope. August 25, 1994.

Key to Community Types

1. Water sedge conspicuous, >30% cover.....**A**  
 1. Water sedge usually absent, sometimes up to 5% cover .....**B**

Description of Community Types

- A** *Grayleaf willow-water sedge-tufted hairgrass* is dominated by grayleaf willow at 15-85% cover, which is sometimes codominant with planeleaf willow (SAPL2); smaller amounts of other willows and shrubby cinquefoil (PEFL15) are possible. Water sedge is conspicuous with >30% cover, often >50%. Tufted hairgrass (DECE) is always present at 5-20% cover. Total graminoid cover is >75%.  
**B** *Grayleaf-barrenground willows-tufted hairgrass* is usually dominated by grayleaf willow alone at >60% cover, but sometimes barrenground willow shares dominance. Water sedge is absent or minor; tufted hairgrass is sometimes absent or up to 20% cover. Total graminoid cover is <75%.

Table 16-3. Community types within *Grayleaf willow/water sedge-Deep cold wet soils-High creek bottoms*.

Community Type	No. samples	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Layer Height, m			Cover, %:			No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs	Obstruct'n %: 1.5-2.0 m 1.0-1.5 m 0.5-1.0 m 0.0-0.5 m Total<2m
					Lr	m	%	Trees	Shrubs	Graminoids			
A. Grayleaf willow-water sedge-tufted hairgrass	4	10,474 (9,720-11,000) 4.2 (3-5)	32 (5-63) 93 (70-136) 74 (38-136)	4 (1-4) 1 (1-2) LS	S1	1.3 (0.5-2.0)	37.7	0 (0-0)	30 (28-33)	1377-2198	50 (10-75)		
					S2	0.5 (0.0-0.8)	88.3	104 (69-146)	626-918	63 (40-75)			
					GF	0.4 (0.0-0.7)	82.9	90 (78-101)	72-95	70 (50-80)			
					M	0.0	22.0	42 (38-51)	98 (95-100)				
B. Grayleaf-barrenground willows-moist forbs	3	11,173 (9,640-12,080) 10.8 (0-22)	54 (54-54) 74 (33-114) 9 (0-18)	1 (1-1) 3 (1-4) LM-MS	S1	0.9 (0.4-1.4)	99	0 (0-0)	25 (17-34)	1941-2048	15		
					S2	Missing	M	102 (98-108)	11-509	65			
					GF	0.2 (0.0-0.6)	82	34 (2-68)	78-489	100			
					M	0.0	3	95 (42-127)	100				
										70			

Table 16-4. Resource Values for *Grayleaf willow/water sedge-Deep cold wet soils-High creek bottoms*. Resource values were calculated from the numbers in Table 16-3, relative to the whole UGB.

The numbers in this table can be translated: 0 = Very Low, 1 = Low, 2 = Moderately Low, 3 = Moderate, 4 = Moderately High, 5 = High, and 6 = Very High.

Resource Value	Community Type		Resource Value	Community Type	
	A	B		A	B
Potential Cattle Forage Production	3-4	0-2	Deer & Elk Forage & Browse	3-4	3-4
Grazing Suitability	ns <sup>1</sup>	ns <sup>1</sup>	Need for Watershed Protection	5	5
Wetland	Yes	Mostly	Soil Stability	2	2
Riparian Area	Yes	Yes	Risk of Soil Loss-Natural	2-3	2-3
Developed Recreation	ns <sup>1</sup>	ns <sup>1</sup>	Risk of Soil Loss-Management	4-5	4-5
Dispersed Recreation	0-1	0-1	Risk of Permanent Depletion-Range	ns <sup>1</sup>	ns <sup>1</sup>
Scenic	4-5	4-5	Risk of Permanent Depletion-Wildlife	2-3	2-3
Road & Trail Stability	0-1	0-1	Resource Cost of Management	4-5	4-5
Construction Suitability	ns <sup>1</sup>	ns <sup>1</sup>	Cost of Rehabilitation	5-6	5-6
Deer & Elk Hiding Cover	4-6	5-6			

Table 16-5. Wildlife values (relative to the whole UGB) for the principal wildlife species using *Grayleaf willow/water sedge-Deep cold wet soils-High creek bottoms*.

CT	Mule Deer	Elk
	Season-Preference	Season-Preference
All	Summer- Moderate (Browse, Cover, Overnight)	Summer- Moderate (Browse, Cover, Overnight)

Table 16-6. Common Species in *Grayleaf willow/water sedge–Deep cold wet soils–High creek bottoms*, where Characteristic cover > 10% or Constancy > 20%. "-" means that the species is not found. Dead cover is not listed. Ccv = Characteristic Cover, Con = Constancy. If Avc = Average Cover, then these are related using the formula  $Avc = Ccv \cdot 100\% / Con$ .

Code	Community Type Species	A		B	Common Name
		Ccv (Con) N = 4		Ccv (Con) 3	
SHRUBS					
PEFL15	<i>Pentaphylloides floribunda</i>	7 (75)		2 (33)	shrubby cinquefoil
SABR	<i>Salix brachycarpa</i>	–		40 (33)	barrenground willow
SADR	<i>Salix drummondiana</i>	12 (25)		–	blue willow
SAGE2	<i>Salix geyeriana</i>	15 (75)		–	Geyer willow
SAGL	<i>Salix glauca</i>	53 (100)		83 (100)	grayleaf willow
SAPL2	<i>Salix planifolia</i>	39 (75)		7 (67)	planeleaf willow
GRAMINOIDS					
CACA4	<i>Calamagrostis canadensis</i>	T (25)		6 (33)	bluejoint reedgrass
CAAQ	<i>Carex aquatilis</i>	71 (100)		–	water sedge
CAEB	<i>Carex ebenea</i>	–		36 (33)	ebony sedge
CAEG	<i>Carex egglestonii</i>	1 (50)		–	Eggleston sedge
DECE	<i>Deschampsia cespitosa</i>	8 (100)		9 (67)	tufted hairgrass
ELTR7	<i>Elymus trachycaulus</i>	4 (25)		T (33)	slender wheatgrass
ELRE3	<i>Elytrigia repens</i>	4 (50)		–	creeping quackgrass
POPR	<i>Poa pratensis</i>	T (25)		32 (33)	Kentucky bluegrass
TRSP2	<i>Trisetum spicatum</i>	–		T (67)	spike trisetum
FORBS					
ACLA5	<i>Achillea lanulosa</i>	8 (100)		5 (100)	western yarrow
ACROT	<i>Acomastylis rossii</i> ssp. <i>turbinata</i>	–		12 (67)	alpine avens
ANNAZ3	<i>Anemonastrum narcissiflorum</i> ssp. <i>zephyrum</i>	–		11 (67)	narcissus anemone
AQCO	<i>Aquilegia coerulea</i>	–		3 (67)	Colorado columbine
ARAN7	<i>Argentina anserina</i>	1 (50)		–	silverweed
CACO6	<i>Cardamine cordifolia</i>	5 (50)		–	heartleaf bittercress
CLRH2	<i>Clematis rhodantha</i>	1 (25)		T (33)	rose crown
COSC2	<i>Conioselinum scopulorum</i>	3 (75)		–	Rocky Mountain hemlock-parsley
FRVI	<i>Fragaria virginiana</i>	1 (50)		49 (33)	Virginia strawberry
GERI	<i>Geranium richardsonii</i>	–		14 (33)	Richardson geranium
GEMA4	<i>Geum macrophyllum</i>	3 (75)		–	large-leaved avens
PEGR2	<i>Pedicularis groenlandica</i>	T (75)		–	elephantella
PEWH	<i>Penstemon whippleanus</i>	–		T (67)	beardtongue
POLEM	<i>Polemonium</i>	2 (50)		–	Jacob's ladder
POPU3	<i>Polemonium pulcherrimum</i>	4 (25)		8 (100)	Jacob's ladder
PODI2	<i>Potentilla diversifolia</i>	–		2 (67)	varileaf cinquefoil
PSLE	<i>Psychrophila leptosepala</i>	9 (75)		–	elkslip marsh-marigold
STCR	<i>Stellaria crassifolia</i>	4 (50)		–	fleshy starwort
SWPE	<i>Swertia perennis</i>	4 (50)		–	star gentian
TAOF	<i>Taraxacum officinale</i>	2 (50)		20 (33)	common dandelion
THFE	<i>Thalictrum fendleri</i>	5 (100)		4 (33)	Fendler meadow-rue
TRDA2	<i>Trifolium dasyphyllum</i>	–		15 (33)	whiproot clover
VIOLA	<i>Viola</i>	3 (50)		3 (33)	violet
VINU2	<i>Viola nuttallii</i>	–		14 (33)	Nuttall violet
FORB	forb unknown	1 (50)		14 (33)	unknown forb
GROUND COVER					
.BARESO	bare soil	1 (50)		3 (67)	
.LITTER	litter and duff	83 (100)		91 (100)	
GRAVEL	gravel 0.2-10 cm	–		–	
.COBBLE	cobble 10-25 cm	1 (25)		–	
.STONES	stone > 25 cm	3 (25)		–	
.MOSSON	moss on soil	22 (75)		3 (33)	
LICHENS	lichens on soil	6		–	