

D. RIPARIAN FORESTS (FR)

11. Narrowleaf Cottonwood Ecological Series

Table 11-1. Full and short names for the ecological types in the Narrowleaf Cottonwood Ecological Series.

Ecological Type Code	Name	Plant Association Code	Short Name
FR1	Cottonwood/Pacific willow-swamp bluegrass–Deep to very deep alluvial Fluvaquentic Endoaquolls–U-shaped draw bottoms and floodplains, < 9,400 ft	POAN3/SALUL- POPA2	Cottonwood/willow–Water-layered soils–Floodplains
FR2	Aspen-cottonwood/reedgrass-swamp bluegrass-cow-parsnip–Deep to very deep alluvial Endoaquolls and other Borolls–U-shaped draw bottoms and floodplains, <9,200 ft	POTR5-POAN3/ CACA4-POPA2- HESP6	Aspen-cottonwood–Deep alluvial soils–Floodplains

This is the *Populus angustifolia* (narrowleaf cottonwood) series of Hess (1981-1986), Hess and Wasser (1982), Moir (1983), Komárková (1986-1988), Fitzhugh and others (1987), Larson and Moir (1989), Muldavin and others (1990), Dick-Peddie (1993), and Kittel and others (1994). It also comprises the *Populus angustifolia* Alliance of Kittel and others (1996), and is considered a non-climatic series by Moir (1983). This series includes part of the *Alnus incana* ssp. *tenuifolia* Alliance of Kittel and others (1996).

Sites are typically long and narrow, following along streams, but sites in broad valley bottoms are large and nearly isodiametric. Some early seral sites were not associated with a stream channel, but were located on poorly drained benches.

Vegetation, Climate, Soils

Cottonwood stands in good, relatively undisturbed, condition support a number of layers of tall and medium shrubs such as Pacific willow (SALUL), Geyer willow (SAGE2), alder (ALINT), serviceberry (AMUT or AMAL2), red-osier (SWSE), maple (ACGL), chokecherry (PAV111), and currants (RIBES) (see Hansen and others 1989ab).

However, In the UGB, most cottonwood stands lack tall or medium shrubs, and have been reduced to cottonwood-Kentucky bluegrass (Hansen and others 1989ab) or cottonwood-tree juniper gullies, which have considerably reduced forage, wildlife habitat, and watershed values.

Where adjacent creeks are gullied and the water table has dropped, early seral stages may be dominated by unpalatable species such as coyote willow (SAEX), which is uncommon in the UGB, or Rocky Mountain juniper (JUSC2). Tree juniper invasion is an indicator of site dryness due to a lowered water table. Most cottonwood stands in the UGB have been grazed, often heavily, by elk, deer, and cattle, and such use continues. Many stands are used by recreating humans as well, so management of these uses must be coordinated if site condition is to improve.

Table 11-2. Climate and Soils

Characteristic	Value	Reference
Precipitation zone	250-380 mm/yr 10-15 in/yr	Local data

In the UGB, aspen dominates a few cottonwood sites in bottomlands. This occurs where cottonwood has been eliminated (usually by humans) and aspen has invaded from an adjacent lower slope (see Hansen and others 1989ab, Manning and Padgett 1989, Kittel and others 1994). Such sites often experience significant sediment accumulation from clay-bearing soils above.

Heavy use of these sites has made it very difficult to find a cottonwood stand in the UGB in good condition, with good cover of trees, shrubs, and graminoids, and several to many vegetation layers. Only about 1% of the sites in this series meet these conditions today. Hansen and others (1988-1989) strongly recommend that management should maintain a buffer strip of narrowleaf cottonwood around rivers and streams to protect from erosion. Soil compaction is a modest problem, since the soils are often gravelly or rocky. Erosion is a bigger problem, since these sites often experience seasonal flooding and the soils are quite moveable.

Replanting Pacific, Geyer, or Bebb willow from rooted cuttings can restore willow cover to a depleted site, which improves wildlife cover and browse, bank stability, and fisheries habitat (Hansen and others 1988). Rooted cuttings or nursery-grown seedlings of narrowleaf cottonwood may be available for planting. Such plants grow rapidly, but cuttings or seedlings must be protected from browsing by animals, domestic and wild (Hansen and others 1988).

In the broader valleys, cottonwood stands move laterally fairly often as river channels periodically migrate. This continual change ensures adequate regeneration of cottonwood. "These montane floodplain environments are a dynamic part of the

landscape, and with continued natural processes such as channel migration and flooding, will support a constantly changing patchwork of all age classes and [stand] types” (Kittel and Lederer 1993). Deposition and movement of ice in the winter also is important in many of the large floodplains of the UGB.

Typically, the mature cottonwood-shrub forest is 1-2 m vertically above high water, with earlier seral gravel-bar and other communities in between. Riparian water tables fluctuate with changes in the river stage. Such water tables are recharged by the river, so reduced flows, as from dams upstream, create drought stresses on riparian cottonwoods (Rood and others 1995). Irrigation from rivers creates additional problems in improving the condition of depleted sites: “the extensive commitment to irrigation...provides little opportunity for recovery of river flows along the lower [river] which would be required for restoration of the riparian cottonwoods” (Rood and others 1995).

Insects common in narrowleaf cottonwood (*Populus angustifolia*), Fremont cottonwood (*Populus deltoides* ssp. *wislizenii*), and their stable hybrid are listed and discussed in Floate and Whitham (1995).

Timber Management

Riparian sites of this series are not suitable for production management. Cottonwood is not usually considered a timber species (Hess and Alexander 1986), and post-sale management to avoid permanent watershed damage would be difficult. Narrowleaf cottonwood is useable as fuelwood, but does not split or dry well; other species are better suited for this purpose.

Fire Management

Hot fires may kill older cottonwood trees, but light- to moderate-intensity fires may be useful in regenerating cottonwood and palatable shrubs (Hansen and others 1989ab). As with all prescribed fire, sites must be protected afterwards. Protection of regeneration is critical in stands where animals congregate at any season, which is most of the stands.

Range and Wildlife Management

Forage production can be high at sites in mid- to upper-seral condition, where the shrub and herbaceous layers have not been severely depleted by past grazing and browsing. Where riparian areas are adjacent to upland rangelands, livestock may use riparian stands for watering, requiring protection of the stream and its banks, or installation of livestock-control barriers.

Heavy browsing and grazing by livestock and big game reduces shrub and sedge cover, removes cottonwood sprouts and smaller size classes of willows and other shrubs such as red-osier, maple, and serviceberry (because they are more palatable). Eventually, grazing will eliminate willows and cottonwood regeneration (Komárková and others 1988). With those changes in vegetation come bank instability, lowering of water tables, reduction in fisheries, loss of browse and cover for big game, loss of habitat for birds and small mammals, and invasion by plants such as Kentucky bluegrass (POPR), quackgrass (ELRE3), dandelion (TAOF), sagebrush (ARTEM), rabbitbrush (CHRY2), and exotic weeds (Blymyer 1987, Hansen and others 1989ab, Kittel and others 1994, Girard and others 1995).

Cattle will graze and browse these sites whenever the stands are accessible, and use them for shade in late summer and fall. Moderate to heavy grazing, especially in late summer and fall, often eliminates cottonwood regeneration (Padgett and others 1989). Stands with good shrub vertical diversity should be protected from grazing by changing to a more progressive grazing management system or livestock barriers.

Stands depleted by summer cattle grazing and winter browsing by deer and elk have considerably reduced wildlife habitat values. Many sites are within critical winter range for deer and elk, making the lack of sites in good condition especially important. Stands in good condition are also valued for their structural diversity as related to wildlife habitat, streambank protection, and shading of fish habitat (Youngblood and others 1989). Management should focus on maintenance of several palatable shrub layers to provide habitat for big game, livestock and birds, and on special management for cavity-nesting birds and raptors (Youngblood and others 1985).

Cottonwood stands in good condition are structurally very diverse and are exceptionally valuable habitat for a variety of wildlife, including big game, songbirds, small mammals, raptors, beaver, and waterfowl. Where a perennial stream is present, there is a high fisheries value as well (Hansen and others 1989ab, Manning and Padgett 1989, Padgett and others 1989). In the UGB, bald eagles nest in many stands, while great blue herons use sites located along major rivers and reservoirs.

In an attempt to increase growth, palatability, and production of livestock forage both herbicide sprays and mechanical means have been used to remove cottonwood and willows from some sites in the UGB. These practices are not recommended since they diminish site value by causing water tables to drop, radically reduce cover for wildlife and livestock, cause bank instability, and reduce the amount of available browse.

Recreation, Roads & Trails, Scenery

Large-acreage cottonwood sites are usually moderately suitable for dispersed camping, especially after flood seasons and before the slush season in the fall. However, because of floods, cottonwood sites are not very suitable for developed recreation, toilets, or other construction. Birds such as American robins, warbling vireos, and broad-tailed hummingbirds are favored by campground development in cottonwood stands, but willow flycatchers, black-capped chickadees, MacGillivray’s warblers, lazuli buntings, song sparrows, fox sparrows, and other shrub-nesting, ground-nesting or ground-foraging birds which also frequent cottonwood stands, are negatively impacted (Blakesley and Reese 1988) Populations of such birds can be maintained at some level in campgrounds by planning for patches or strips of riparian vegetation along streams and between campground units (Blakesley and Reese 1988). Where campground development does occur, a diversity of existing shrubs and saplings should be maintained throughout the campsites.

Roads and trails have often been built through these sites, yet they are moderately to poorly suitable for such development (Komárková and others 1988). Trails are more suitable than roads. Soils in these sites are more coarse (usually gravel) than most riparian soils, but they are often wet and moveable during floods, which then cause resource damage and road management problems. Many sites occur towards the bottoms of small watersheds, so the streams running through them may carry large volumes of water during floods. An unstabilized road or trail may be easily damaged in wetter seasons. Crossings used in spring, early summer, or early winter should be bridged.

Cottonwood stands in good condition can be very scenic, especially during the fall color changes. During summer, they provide much sought-after shade.

Minerals Management

In some places, sites are used for gravel mining operations, for which they are usually suitable. On public lands, this use is probably not compatible with watershed protection or riparian management direction found in land management plans. Mining or construction activities in these sites may require a permit under the Clean Water Act. Where pits have been created by gravel mining, reclamation can develop fishery, wildlife, and recreational values (Bayha and Schmidt 1983).

Key to Ecological Types in the Narrowleaf Cottonwood Series

- 1. Cottonwood the only deciduous tree, sometimes a few conifers sharing dominance; aspen usually absent.
Soils water-layered (Fluvaquentic) FR1
- 1. Aspen prominent in the overstory, sometimes a few conifers sharing dominance; cottonwood codominant, occasional, or absent. Soils water-layered or not..... FR2

Table 11-3. Characteristics of Ecological Types within Ecological Series 11 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, %
FR1 Cottonwood/willow– Water-layered soils– Floodplains	33	8,369 (7,530-9,380)	236 (0.42) 6 (1-17)	27 (0-81)	100 (46-285) 72 (16-160)	13 (0-48) 14 (0-52)	23 (0-97) 53 (0-149) 84 (10-291) 49 (2-177)	210.6 (45.4-616.5) 34 (18-55) 7.0 (1.2-23.6)
FR2 Aspen-cottonwood– Deep alluvial soils– Floodplains	23	8,466 (7,900-9,160)	253 (0.50) 11 (1-30)	35 (7-70)	91 (43-160) 83 (19-160)	11 (0-48) 6 (0-15)	61 (10-126) 64 (7-150) 107 (16-236) 67 (2-226)	300.7 (120.0-557.5) 28 (14-51) 13.1 (2.7-27.1)



Looking south-southwest across Tomichi Creek from a point several miles west of Sargents. The confluence of Needle Creek is in the center middleground. The bottom of Tomichi Creek is all in the narrowleaf cottonwood type, now managed as pastures and hay meadows. Across the Creek, we can see the broad, largely non-forested, sagebrush-dominated Montane Zone, and above that the Subalpine fir-spruce forest.
July 14, 1992.



The highest-seral stand of cottonwood in the Upper Gunnison Basin (Community Type A), unique here because of the lack of browsing pressure. Notice the several layers of medium to tall shrubs. Cottonwood 58% cover, alder 2%, Bebb willow 6%, Pacific willow 2%, silvertop sedge 39%, swamp bluegrass 34%. Soil sampled as a Fluvaquentic Endoaquoll, Fine-Silty. Carpenter Ridge Quadrangle, elevation 7,610 ft, 4% SSW-facing slope.
July 30, 1990.



Another view in the same stand as at left.



Another relatively late-seral cottonwood stand (Community Type A), showing shrub cover and cottonwood regeneration. Cottonwood 91% cover, red-osier dogwood 22%, rose 25%, whitestem gooseberry 5%, Bebb willow 2%, Pacific willow 2%, silvertop sedge 30%, swamp bluegrass 26%, Kentucky bluegrass 45%. Soil sampled as a Typic Fluvaquent, Coarse-Loamy. Carpenter Ridge Quadrangle, elevation 7,645 ft, 5.5% SSW-facing slope.
July 31, 1990.



A cottonwood stand without willows (Community Type C), due to grazing by cattle over many decades and browsing by elk and deer in the last few decades. The whole tall shrub layer is missing. The undergrowth is made up of the mostly unpalatable rose and exotic herbs. Narrowleaf cottonwood 97% cover, rose 57%, Kentucky bluegrass 20%, elk sedge 7%, yarrow 6%. Coarse Fragments Cover = 0%, Total Live Cover = 231%, Coarse Fragments in Soil = 34. Soil sampled as a Fluvaquentic Endoaquoll. McIntosh Mountain Quadrangle, elevation 7,960 ft, 3% 259° (W) slope. June 28, 1994.



An early seral stage in the bench cottonwood type without a channel (Community Type G). Here, the plant community has been reduced to exotic grasses (Kentucky bluegrass, quackgrass) and invader natives (iris, Baltic rush). Kentucky bluegrass 82% cover, dandelion 55%, Baltic rush 45%, yarrow 40%, iris 13%, aster 6%, silvertop sedge 6%. Coarse Fragments Cover = 0%, Total Live Cover = 265%, Coarse Fragments in Soil = 13. Soil sampled as a Typic or Histic Endoaquoll, Fine-Loamy. Flat Top Quadrangle, elevation 8,380 ft, 6% 206° (SSW) slope. July 12, 1993.

Cottonwood/Pacific willow-swamp bluegrass–
Deep to very deep alluvial Fluvaquentic Endoaquolls–
U-shaped draw bottoms and floodplains, < 9,400 ft

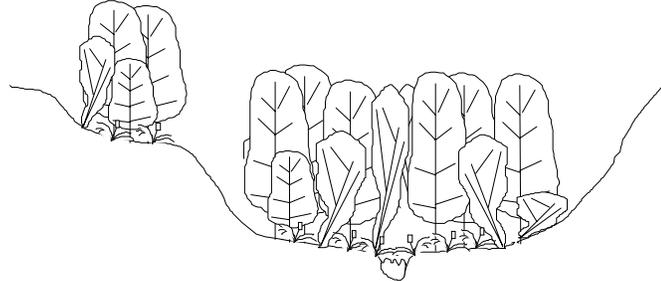


Figure 11-1. Cross-section of vegetation structure of Cottonwood/willow–Water-layered soils–Floodplains.

Cottonwood/willow–Water-layered soils–Floodplains is a very common type in draws, gulches, and floodplains throughout the lower elevations of the UGB, in the Submontane (Foothills) and Montane belts. The broad floodplains of the Gunnison River (above and below the town of Gunnison), Ohio Creek, Tomichi Creek, and Cebolla Creek at Powderhorn all support this type. Many tributaries of these streams and of Blue Mesa Reservoir, such as Quartz Creek, lower Cochetopa Creek, Fourmile Creek, Cabin Creek, Willow Creek, Lost Cabin Creek, and East Elk Creek also support this type. *Cottonwood/willow–Water-layered soils–Floodplains* is also known from elsewhere on the western slope of Colorado, northern Utah and southern Wyoming. It may have an even wider distribution than has been measured, since many of these sites have been depleted and may not be recognizable.

Soils usually occur in horizontal layers formed through the action of flowing water (Fluvaquentic). In good condition (near potential, community type A), *Cottonwood/willow–Water-layered soils–Floodplains* is characterized by narrowleaf cottonwood (POAN3), Pacific willow (SALUL), thinleaf alder (ALINT), and swamp bluegrass (POPA2). Other community types may have conspicuous river hawthorn (CRRI), yellow willow (SALU2), or rose (ROWO). Early seral stages may support shade-tolerant exotic species such as Kentucky bluegrass (POPR), dandelion (TAOF), or white Dutch clover (TRRE3), or native sun-loving invaders such as shrubby cinquefoil (PEFL15), Baltic rush (JUARA4), or yarrow (ACLA5). See Table 11-7 for common species names and codes.

Despite the common occurrence of this type, very few sites are near potential (at most, 2–3%); most stands have depleted understories and lack willows and young cottonwood. Some lack cottonwood, or populations are reduced to a few isolated individuals. *Cottonwood/willow–Water-layered soils–Floodplains* is often highly diverse in species. Sites with 45 to 50 species per plot (375 m²) are not unusual. This type is distinguished by its location in stream channels and draws,

Fluvaquentic soils (Endoaquolls), and its riparian character.

The plant association *Populus angustifolia/Salix lucida* ssp. *lasiandra-Poa palustris* is described as new here. It is based in part on *Populus angustifolia/Alnus incana* ssp. *tenuifolia-Swida sericea* of Johnston (1987). *Populus angustifolia/Salix lucida* ssp. *lasiandra-Poa palustris* phase *Betula fontinalis*, described as new here, is based on *Populus angustifolia/Betula fontinalis* (Johnston 1987). *Populus angustifolia/Salix lucida* ssp. *lasiandra-Poa palustris* phase *Crataegus rivularis* is described as new here.

Cottonwood/willow–Water-layered soils–Floodplains is related to *Aspen-cottonwood–Deep alluvial soils–Floodplains*, which is dominated by aspen and sometimes lacks cottonwood. *Cottonwood/willow–Water-layered soils–Floodplains* is also related to *Spruce-cottonwood–Sandy wet soils–Terraces*, which occurs in narrower valleys (above Almont, for example), and in which blue spruce (PIPU) is present to codominant with cottonwood.

Cottonwood/willow–Water-layered soils–Floodplains is often adjacent to *Yellow willow–Deep alluvial soils–Concave bottoms and swales*, which tends to occur at lower slope angles (and on lower stream gradients), lacks cottonwood, and less often has Fluvaquentic soils. Wyoming big sagebrush or big sagebrush (not mountain) types adjoin this one on better-drained slopes and benches laterally above these bottoms. Serviceberry shrublands occur on adjacent better-drained slopes above. Yellow willow communities occur on more poorly-drained, lower-gradient sites upstream or downstream. Blue spruce-cottonwood types are found upstream at somewhat higher elevations, on cooler sites, and at slightly higher gradients.

Primary succession takes many decades, sometimes millennia, as the many-layered Fluvaquentic soil forms. A site at Sheep Gulch, northeast of Gunnison, has a soil > 3 m thick, with 17 to 20 horizons and four to five distinct charcoal-

bearing layers. Assuming a sere of 150 years and a presettlement flood frequency of 100 years, this soil is at least 800 years old, more likely 1,500 - 2,500 years old. Not all climax cottonwood stands have a soil this old (see photo after Table 11-6).

Secondary succession occurs in a much shorter time frame, with a sere of 130 to 160 years. Early-seral sites have usually lost significant amounts of soil, especially the upper organic layers, and natural soil restoration takes 60 to 80 years. Larger narrowleaf cottonwood trees, which establish following soil restoration, tend to be 75 to 95 years old.

The very early seral stage lacks trees and shrubs. Exotics such as Kentucky bluegrass, quackgrass, and forbs and weeds are common. The early seral stage is dominated by dry-site shrubs such as big sagebrush, rabbitbrushes, shrubby cinquefoil, snowberry, or coyote willow. Herbaceous plants are usually characteristic of fallen water tables and depleted water-holding ability, such as Baltic rush, asters, and exotics such as Kentucky bluegrass, quackgrass, or dandelion. Sometimes a few old remnant cottonwood trees or heavily-hedged broadleaf willows exist, but these apparently do not reproduce. When the water table has dropped a long way, the early seral expression is entirely dry, including sagebrush and dry-site grasses such as native bluegrasses, needlegrasses, or even Arizona fescue.

Midseral stages include many community types. Generally, some reproduction occurs in cottonwoods or broadleaf willows at this stage, but these have not yet reached full dominance. Willows and other palatable shrubs have been kept from dominance by removal or browsing. The most palatable species (Pacific willow, yellow willow, serviceberry, chokecherry, maple) are usually absent or very minor. The less palatable shrubs are sometimes conspicuous, such as hawthorn or cinquefoil. Herbaceous layers consist of a mix of exotics (Kentucky bluegrass, quackgrass, dandelion), or dry-site species such as native bluegrasses, needlegrasses, and asters. Remnants of climax species such as silvertop sedge, bluejoint, swamp bluegrass, or wet-site sedges may persist.

The late midseral stage also includes many community types with a generous, even mix of early-seral and climax species. Heavy livestock grazing may create a closed-canopy cottonwood forest with mixed shrub layers, including some palatable species which still minimally reproduce, but the herbaceous layers are depleted, including only exotics such as Kentucky bluegrass and quackgrass. Late seral and potential natural communities are dominated by climax species in all layers. A closed-canopy cottonwood forest slightly

overtops four to six highly diverse shrub layers. Herbaceous layers are also diverse, with dominance by species such as swamp bluegrass and silvertop sedge. The soil surface in most areas (except recent gravel bars and streams) is completely covered with litter.

Horizontal obstruction varies from high (community types A and B) to very low (community type G); see Table 11-3. Hiding cover potential for deer and elk is high in later seral stages, and low to very low in earlier seral stages. Many of these stands are within critical deer and elk winter range. Sage grouse use many sites extensively as summer range, especially sites in earlier seral stages, which are more open and have more sagebrush, or around the edges of midseral stands. Most of the sites have too much cover or are too wet for sage grouse during other seasons.

Cattle grazing tends to remove the graminoids first, then the palatable shrubs such as willows and serviceberry. Community type C is the result, with no shrubs or graminoids except those that are resistant to cattle grazing. Cattle use graminoids and palatable forbs in the open in spring and early summer, but in the late summer and fall they turn to shaded stands, where they browse shrubs. Cattle grazing has occurred in these cottonwood stands for about 120 years.

Elk use these stands only on their winter range, but their effects can be considerable where the animals are concentrated. Elk graze herbaceous plants (graminoids and forbs) in addition to browsing, but in the winter the herbaceous plants are unavailable, so they concentrate on shrubs, sometimes in total disregard to supposed palatability. Concentrated elk use of these stands has occurred for the last 40-45 years and has increased markedly in the last 20 years. Mule deer use these stands year around, but their numbers are not as concentrated as elk or cattle, and their use is limited to certain times of the day. Deer tend to browse shrubs more than they graze herbaceous plants, and deer numbers fluctuate more widely from year to year than do those of cattle or elk.

Humans use these stands as well. A number of cottonwood stands were removed by early ranchers to improve cattle forage. Several towns were built in cottonwood stands (Gunnison, Powderhorn, Parlin). Many roads still go right through them, and the stands are favored for dispersed camping. Under just one of these uses (cattle, elk, deer, humans), the cottonwood stands in the UGB would probably not suffer damage, but the problem of their condition is complicated by the fact that most cottonwood stands are subject to two or three uses, and sometimes one or more of these is heavy.

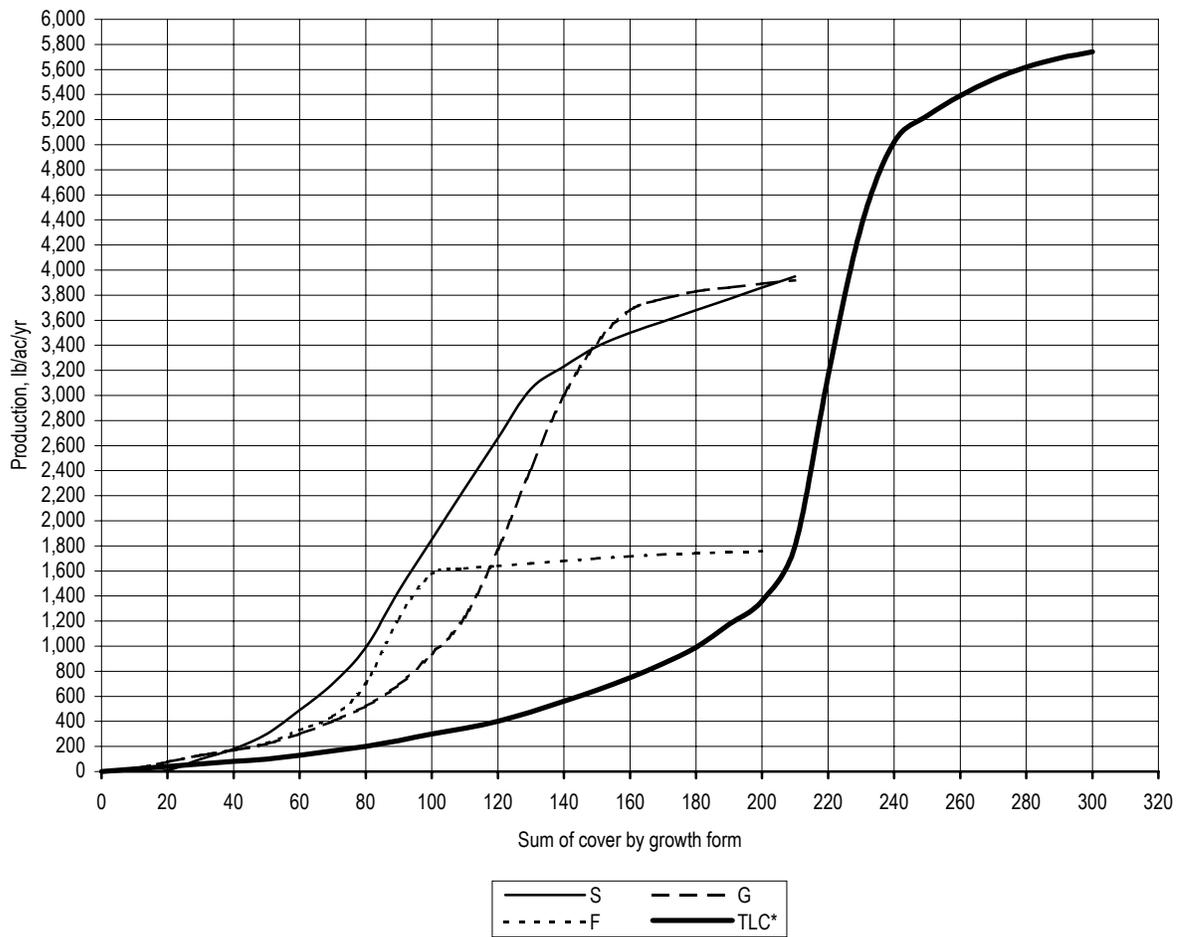


Figure 11-2. Relationship of cover by growth form and production. This is the POANSALU (POAN3-SALUL) model. S = shrubs, G = graminoids, F = forbs, and TLC* = Total live cover (except trees).

Summary of Ecological Type Characteristics

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

NUMBER OF SAMPLES	28, soil descriptions from 21 of these; one more not assigned to a CT (total 29)
ELEVATION	8,321 ft (7,530-9,380 ft); 2,536 m (2,295-2,859 m)
AVERAGE ASPECT	239°M (r = 0.46)
LITHOLOGY	A wide variety, with shale-sandstone-siltstone [48%], tuff-breccia-basalt-granite [42%] prominent
FORMATIONS ¹	A wide variety
LANDFORMS	Mostly draws and floodplains [67%], with some slumps, benches, swales, and ravines
SLOPE POSITIONS	Bottoms [93%]
SLOPE SHAPES	U-shaped [63%] to flat [16%]
SLOPE ANGLE	5.2% (1-17%)
SOIL PARENT MATERIAL	Mostly alluvium [81%]
COARSE FRAGMENTS	9.4% (0-48%) cover on surface, 27.3% (0-81%) by volume in soil
SOIL DEPTH	100 cm (46-285 cm); 39.3 in (18-112 in)
MOLLIC THICKNESS	72 cm (16-160 cm); 28.2 in (6-63 in)
TEXTURE	A wide variety of surface textures; subsurfaces have a wide variety of textures and coarse fraction, in water-deposited layers
SOIL CLASSIFICATION	Predominantly Endoaquolls [84%]; some of these are Fluvaquentic
TOTAL LIVE COVER	227.0% (45.4-616.5%)
NUMBER OF SPECIES	33.7 (18-55)
TOTAL LIVE COVER/NO. SPECIES	7.6% (1.2-23.6%)
CLIMATE	Warm, dry air, but well-watered soil. The weather station for Gunnison (see Climate chapter) is in an open area, that at one time was a cottonwood stand.
WATER	Water flows through these layered soils, horizontally parallel to the stream, and horizontally perpendicular to the stream. Water almost never ponds except within the streambanks.

Key to Community Types

1. Narrowleaf cottonwood >35% cover, often >50% cover (2)
1. Narrowleaf cottonwood absent or <30% cover (4)
2. Pacific willow present, often >10% cover. Swamp bluegrass present and >3% cover. Silvertop sedge (CAFO3), or reedgrass (CACA4 or CAST36) sometimes >10% cover. Alder always present, T-25% cover **A**
2. Pacific willow usually absent, rarely up to 45% cover. Swamp bluegrass usually absent, sometimes up to 5% cover. Silvertop sedge absent or <20%. Reedgrass absent or <5%. Alder sometimes absent (but sometimes up to 80% cover) (3)
3. River hawthorn present and >30% cover. Cottonwood sometimes absent, 0-90% cover **B**
3. River hawthorn absent or <10% cover **C**
4. River hawthorn present and >30% cover. Cottonwood sometimes absent, 0-90% cover **B**
4. River hawthorn absent or <10% cover (5)
5. Cottonwood present and >5% cover (6)
5. Cottonwood absent or <5% cover (8)
6. Kentucky bluegrass absent or <10% cover **D**
6. Kentucky bluegrass conspicuous, >10% cover (7)

Key to Community Types (continued)

7. Cottonwood >6% cover, often >20% cover. Total willow cover 0-10%. Rose often >20% cover **C**
7. Cottonwood <10% cover, often <% cover. Total willow cover 5-65%. Rose never <20% cover **E**
8. Alder conspicuous, >50% cover. Yellow willow >40% cover, total willow cover >60% **F**
8. Alder absent or <10% cover. Yellow willow absent or <25%, willows absent or total willow cover up to 65%, usually <50% (9)
9. Willows absent (10)
9. Willows present, total willow cover usually >5%. Shrubby cinquefoil present, usually >5% cover **E**
10. Cottonwood present and >5% cover. Rose >5% cover **D**
10. Understory dominated by moist-site exotics or invaders, such as quackgrass, Baltic rush, Kentucky bluegrass, and dandelion. Cottonwood absent or <5% cover. Big sagebrush (ARTR2) present, often >5% cover. Douglas rabbitbrush (CHV18) often present, sometimes >10% cover. Other prominent species may include dry grasses such as bottlebrush (ELEL5), western wheatgrass (PASM), or muttongrass (POFE) **G**
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Community Type Descriptions

- A** *Cottonwood-Pacific willow-alder-swamp bluegrass* is dominated by cottonwood at >35% tall cover, often >55% cover. Pacific willow is always present and >1% cover, often >10% cover. Swamp bluegrass is always present and >3%, often >10% cover. Sedges (silvertop, Bebb's [CABE2]) are often conspicuous, as are reedgrasses. Total sedge plus reedgrass cover is always >10%. One plot had conspicuous red-osier dogwood (swSE) at >20% cover, which could be called the Cottonwood/red-osier type in other places (Baker 1989a, for example) but our only such plot had similar soils to the rest of this ET.
- B** *River hawthorn-rose-Kentucky bluegrass* has river hawthorn conspicuous at >30%. Two plots lacked cottonwood, which was probably manually removed long ago. The third plot was dominated by cottonwood (>80% cover), but in other respects was similar to the other two plots. There are no willows. Kentucky bluegrass and rose are conspicuous in the understory.
- C** *Cottonwood-rose-Kentucky bluegrass-bedstraw-dandelion* is dominated by cottonwood at >40% cover. Rose, Kentucky bluegrass, and quackgrass (ELRE3) are evident in the understory. Northern bedstraw (GASE6) is always present. Willows are absent to sparse with <10% total willow cover.
- D** *Cottonwood-rose-snowberry-western wheatgrass* has a moderately sparse overstory of cottonwood, at 5-20% cover. Rose and snowberry (SYRO) are evident shrubs, but Kentucky bluegrass has <10% cover. Western wheatgrass is always present and >1% cover. Willows are absent.
- E** *Shrubby cinquefoil-sparse cottonwood-Kentucky bluegrass-Baltic rush* has a sparse cottonwood overstory, with Trace to 10% cover. Shrubby cinquefoil is always present, Trace to 20% cover. Total willow cover is always >5%, usually >10% cover.
- F** *Alder-yellow willow-Kentucky bluegrass-Baltic rush* is dominated by thinleaf alder at >70% cover, mixed with yellow and Geyer willows. The understory is dominated by exotics and invaders, such as Kentucky bluegrass, Baltic rush, quackgrass, and little barley.
- G** *Big sagebrush-quackgrass-Baltic rush-Kentucky bluegrass-dandelion* has prominent big sagebrush usually >10% cover. The understory is dominated by moist-site exotics and increasers such as Kentucky bluegrass, Baltic rush, quackgrass, and dandelion. One plot was dominated by quackgrass, and had only a trace of sagebrush.

Communities Not Assigned to a Community Type

- A community dominated by cottonwood, with sparse willows and exotic grasses, but with river birch (BEFO2) prominent on a south-facing slope. This is an outlier of the eastern slope narrowleaf cottonwood/willow-birch type.
-

Table 11-4. Community types within *Cottonwood/willow-Water-layered soils-Floodplains*.

Community Type	No. samples	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Layer Height, m			Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. ¹ , 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		Avg Layer Cvr %				
A. Cottonwood-Pacific willow-alder-swamp bluegrass	6	7,664 (7,570-7,840) 3.1 (1-5)	23 (0-52) 93 (70-155) 53 (16-145)	5 (1-16) 5 (1-10) LS	T1	21.9 (15-30)	58.1	69 (46-91) 48 (17-85) 81 (62-107) 36 (27-47)	32 (28-41) 236 (196-294) 7.6 (5.5-10.5)	17-1289 136-1427 15-235	100 90 90 80 90
					T2	9.3 (2.0-15)	14.6				
					S1	6.0 (3.0-9)	11.8				
					S2	3.2 (0.8-7)	19.4				
					T3	2.6 (0.5-5)	22.0				
					S3	1.0 (0.5-3.5)	17.4				
					GF	0.6 (0.0-1.3)	82.0				
B. River hawthorn-rose-Kentucky bluegrass	3	8,370 (7,530-8,790) 7.0 (1-11)	28 (11-49) 99 (93-112) 68 (46-112)	1 (1-2) 16 (16-17) MS-EM	T1	25	28.9	29 (0-88) 93 (66-120) 72 (68-80) 56 (37-89)	28 (18-35) 251 (187-314) 10.4 (5.3-17.5)	670-2560 207-461 95-1076	100 100 95 100 99
					T2	12	5.1				
					S1	3.5	31.1				
					S2	2	60.3				
					T3	3	T				
					S3	0.7	21.4				
					GF	0.4	79.5				
C. Cottonwood-rose-Kentucky bluegrass-bedstraw-dandelion	4	8,340 (7,960-8,760) 3.6 (3-5)	18 (4-25) 74 (57-107) 74 (57-107)	8 (0-18) 6 (0-17) MS-EM	T1	20	81	51 (8-97) 37 (13-57) 74 (36-107) 59 (36-92)	37 (28-46) 221 (182-277) 6.3 (4.0-8.3)	13-448 90-1399 83-1133	33 (25-50) 35 (25-50) 45 (40-55) 88 (85-90) 50 (45-61)
					T2	6	48				
					S1	Missing	M				
					S2	1.5	T				
					T3	Missing	M				
					S3	0.6	56				
					GF	0.3	67				
D. Cottonwood-rose-snowberry-western wheatgrass	2	8,040 (7,920-8,160) 4.5 (4-5)	55 (29-81) 86 (81-91) 81 (81-81)	37 (37-38) 16 (11-21) EM	*			15 (9-22) 35 (17-53) 11 (10-12) 14 (8-21)	45 (39-50) 76 (45-106) 1.6 (1.2-2.1)	16-360 65-80 4-11	13 (10-15) 28 (25-30) 80 (75-85) 50 (20-80) 43 (38-48)
					T1	Missing	M				
E. Shrubby cinquefoil-sparse cottonwood-Kentucky bluegrass-Baltic rush	7	8,666 (8,380-9,280) 9.3 (1-17)	47 46 46	17 (0-48) 11 (1-20) EM-ES	T1	Missing	M	2 (0-9) 40 (15-67) 73 (41-137) 43 (19-92)	38 (27-46) 160 (101-228) 4.4 (2.5-6.8)	15-698 86-2706 10-1122	19 (0-100) 22 (0-100) 31 (0-100) 71 (25-100) 36 (6-100)
					T2	5.1 (3.0-8)	0.6				
					S1	Missing	M				
					S2	2.7 (1.5-5)	8.5				
					T3	0.6 (0.1-1.5)	3.3				
					S3	0.6 (0.0-1.5)	41.1				
					GF	0.3 (0.0-0.6)	56.8				
F. Alder-yellow willow-Kentucky bluegrass-Baltic rush	2	* *	* *	* *	*			1 (1-1) 149 (149-149) 291 (291-291) 176 (175-177)	27 (26-28) 616 (615-617) 22.8 (22.0-23.6)	3346 4053 1799	*
					T1	Missing	M				
G. Big sagebrush-quackgrass-Baltic rush-Kentucky bluegrass-dandelion	9	8,694 (8,210-9,380) 4.8 (2-9)	23 (3-39) 132 (62-285) 90 (22-160)	10 21 (2-52) ES	T1	Missing	M	0 (0-0) 45 (0-78) 74 (39-158) 37 (2-119)	32 (20-55) 155 (96-265) 5.5 (2.5-12.2)	0-1067 92-3420 1-1551	0 (0-0) 0 (0-0) 17 (0-75) 65 (35-100) 20 (9-44)
					T2	Missing	M				
					S1	Missing	M				
					S2	Missing	M				
					T3	Missing	M				
					S3	0.9 (0.3-1.4)	45.5				
					GF	0.4 (0.0-1.2)	66.5				

*. Unknown: measurements were not taken in this CT.

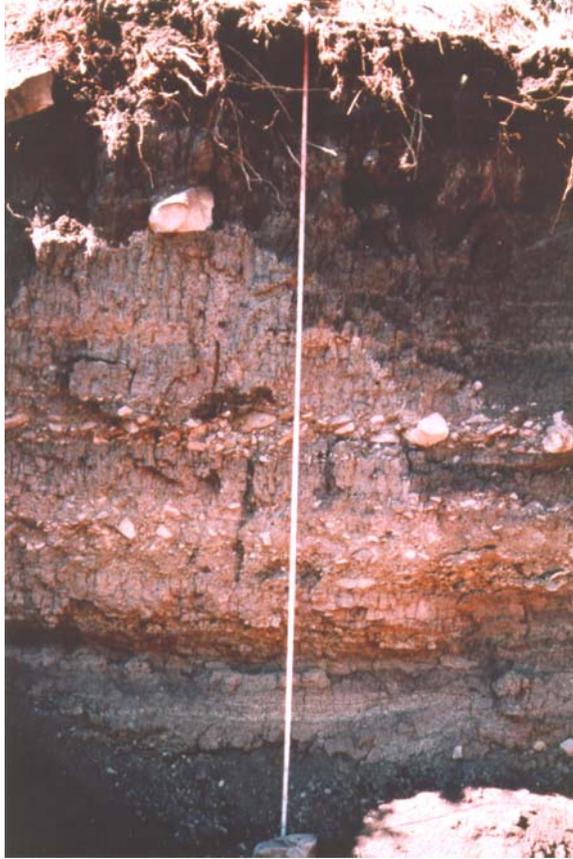
CT	Sage Grouse	Mule Deer	Elk
	Season–Preference	Season–Preference	Season–Preference
A	Spring– Mod. Low (Lek) Nesting– Low Summer– Moderate	Winter, Mild– High to Very High (Browse, Rest) Winter, Severe– Mod. High (Browse, Rest) Spring/Fall– Moderate (Water, Browse)	Winter, Mild– High to Very High (Forage, Browse, Rest) Winter, Severe– Mod. High (Forage, Browse, Rest) Spring/Fall– Low to Very Low
B, C, D	Spring– Mod. Low (Lek) Nesting– Low Summer– Moderate (B); Mod. Low	Winter, Mild– Mod. High (Browse, Rest) Winter, Severe– Moderate (Browse, Rest) Spring/Fall– Moderate (Water, Browse)	Winter, Mild– Mod. High (Browse, Rest) Winter, Severe– Moderate (Forage, Browse, Rest) Spring/Fall– Low to Very Low
E	Spring– Mod. High (Lek) Nesting– Low Summer– Mod. High	Winter, Mild– Mod. Low (Browse, Rest) Winter, Severe– Low (Browse, Rest) Spring/Fall– Mod. High (Water, Browse)	Winter, Mild– Mod. Low (Forage, Browse, Rest) Winter, Severe– Low Spring/Fall– Low to Very Low
F	Spring– Mod. Low (Lek) Nesting– Low Summer– Mod. Low	Winter, Mild– Mod. High (Browse, Rest) Winter, Severe– Moderate (Browse, Rest) Spring/Fall– Moderate (Water, Browse)	Winter, Mild– Moderate (Forage, Browse, Rest) Winter, Severe– Low Spring/Fall– Low to Very Low
G	Spring– Mod. High (Lek) Nesting– Mod. High Summer– High	Winter, Mild– Low Winter, Severe– Low Spring/Fall– Mod. Low (Water)	Winter, Mild– Low Winter, Severe– Low Spring/Fall– Low to Very Low

Table 11-6. Resource Values for Cottonwood/willow–Water-layered soils–Floodplains. Resource values were calculated from the numbers in Table 11-4, 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	C o m m u n i t y T y p e						
	A	B	C	D	E	F	G
Potential Cattle Forage Production	2-3	1-2	2-4	0-1	2-4	5	3-5
Grazing Suitability	1	1	0-1	0-1	ns ¹	0-1	ns ¹
Wetland	Seldom	Seldom	No	No	No	No	No
Riparian Area	Yes	Yes	Yes	Yes	Usually	Usually	Usually
Potential Timber Production	6	0-5	4-5	4-5	2	0-1	0-1
Timber Suitability	ns ¹	ns ¹	ns ¹	ns ¹	ns ¹	ns ¹	ns ¹
Developed Recreation	0	0	0	0	0	0	0
Dispersed Recreation	2	2	2	1	1	2	2
Scenic	4-5	3-5	4-5	4-5	2-3	2-3	0-1
Road & Trail Stability	1	1	1	0-1	0-1	1	1
Construction Suitability	0	0	0	0	0	0	0
Deer & Elk Hiding Cover	6	4-6	3-4	2-3	2-4	3-4	0-2
Deer & Elk Forage & Browse	5-6	4-5	3-4	2-3	1-2	3-4	1-2
Need for Watershed Protection	4	5-6	5-6	5-6	5-6	5-6	5-6
Soil Stability	1-2	1-2	1-2	1-2	1-2	1-2	1-2
Risk of Soil Loss-Natural	4-5	4-5	4-5	4-5	4-5	4-5	4-5
Risk of Soil Loss-Management	4	4	4	4	4	4	4
Risk of Permanent Depletion-Range	5	5	3-4	2	ns ¹	2	ns ¹
Risk of Permanent Depletion-Wildlife	5	4	4	3	2	2	1-2
Risk of Permanent Depletion-Timber	ns ¹	ns ¹	ns ¹	ns ¹	ns ¹	ns ¹	ns ¹
Resource Cost of Management	5-6	5-6	5-6	5-6	5-6	5-6	5-6
Cost of Rehabilitation	4-5	4-5	4-5	4-5	4-5	4-5	5-6

1. ns = Not suitable.



The soil profile created by a gully in a former cottonwood stand, now dominated by big sagebrush. The terrace created by the gully is at the top of the picture. Cans and bottles (estimated at 50-60 yr old) have been found in the upper 50-60 cm (1.6-2.0 ft) of this profile. This means that this whole 3.2 m (10.5 ft) gully has been cut since then. This profile illustrates a typical characteristic of cottonwood soils: it is *Fluvaquentic*, with water-deposited alternating layers of gravel and finer-textured soils. There are at least three distinct layers in this profile with cottonwood charcoal in them. Soil sampled as a Fluvaquentic Argiaquoll, Fine-Loamy, Mixed. elevation 8,210 ft, 2.5% 286° (WNW) slope. July 14, 1994.

Table 11-7. Common Species in Cottonwood/willow–Water-layered soils–Floodplains, 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	Species	C O M M U N I T Y T Y P E							Common Name
		A Ccv(Con) N = 6	B Ccv(Con) 3	C Ccv(Con) 4	D Ccv(Con) 2	E Ccv(Con) 7	F Ccv(Con) 2	G Ccv(Con) 9	
TREES									
JUSC2	Juniperus scopulorum	2 (83)	T (33)	T (25)	8 (50)	- -	- -	T (11)	Rocky Mountain juniper
POAN3	Populus angustifolia	67(100)	88 (33)	51(100)	11(100)	3 (71)	1(100)	T (22)	narrowleaf cottonwood
SHRUBS									
ALINT	Alnus incana ssp. tenuifolia	3(100)	- -	T (25)	- -	T (14)	80(100)	- -	thinleaf alder
ARTR2	Artemisia tridentata	- -	- -	- -	1(100)	4 (57)	- -	23(100)	big sagebrush
CHNA2	Chrysothamnus nauseosus	- -	- -	T (50)	- -	T (43)	- -	4 (33)	rubber rabbitbrush
CHV18	Chrysothamnus viscidiflorus	- -	- -	3 (25)	3 (50)	1 (14)	- -	17 (78)	Douglas rabbitbrush
CRR1	Crataegus rivularis	T (50)	49(100)	- -	- -	- -	- -	- -	river hawthorn
PAVI11	Padus virginiana	T (33)	32 (67)	- -	- -	T (29)	- -	- -	common chokecherry
PEFL15	Pentaphylloides floribunda	T (17)	- -	2 (75)	- -	9(100)	1(100)	4 (11)	shrubby cinquefoil
RIIN2	Ribes inerme	1 (67)	1 (67)	- -	- -	- -	1(100)	T (11)	whitestem currant
RILE	Ribes leptanthum	- -	- -	- -	- -	18 (14)	- -	- -	trumpet gooseberry
ROWO	Rosa woodsii	11(100)	21(100)	29(100)	23(100)	4(100)	- -	T (33)	Woods rose
SABE2	Salix bebbiana	11 (67)	- -	4 (50)	- -	T (14)	- -	- -	Bebb willow
SALUL	Salix lucida ssp. lasiandra	18(100)	- -	- -	- -	15 (43)	5(100)	- -	Pacific willow
SALU2	Salix lutea	- -	- -	5 (25)	- -	10 (43)	50(100)	- -	yellow willow
SWSE	Swida sericea	23 (17)	- -	- -	- -	- -	- -	- -	red-osier
SYRO	Symphoricarpos rotundifolius	3 (17)	2 (67)	T (50)	5(100)	1 (43)	- -	3 (78)	mountain snowberry
GRAMINOIDS									
AGROS2	Agrostis	- -	- -	- -	- -	- -	30(100)	- -	bentgrass
BRCA10	Bromopsis canadensis	1 (33)	1 (33)	4 (50)	T (50)	1 (14)	- -	1 (22)	fringed brome
CAST36	Calamagrostis stricta	11 (33)	- -	- -	- -	- -	- -	- -	Northern reedgrass
CAFO3	Carex foenea	30 (67)	- -	- -	- -	14 (43)	- -	6 (11)	silvertop sedge
CASTE3	Carex stenophylla ssp. eleocharis	- -	- -	- -	- -	8 (14)	- -	6 (67)	needleleaf sedge
CRBR12	Critesion brachyantherum	- -	- -	1 (25)	- -	1 (14)	20(100)	- -	little barley
DECE	Deschampsia cespitosa	4 (17)	- -	- -	- -	24 (14)	- -	- -	tufted hairgrass
ELEL5	Elymus elymoides	- -	- -	2 (25)	T(100)	T (43)	- -	7 (67)	bottlebrush squirreltail
ELRE3	Elytrigia repens	9 (50)	6 (33)	2(100)	- -	3 (71)	10(100)	24 (44)	creeping quackgrass
FEAR2	Festuca arizonica	- -	- -	- -	- -	- -	- -	19 (11)	Arizona fescue
FESA	Festuca saximontana	- -	- -	- -	- -	- -	- -	11 (11)	Rocky Mountain fescue
JUARA4	Juncus arcticus ssp. ater	1 (67)	7 (67)	19 (75)	- -	10(100)	80(100)	45 (11)	Baltic rush
KOMA	Koeleria macrantha	- -	- -	- -	- -	T (29)	- -	6 (56)	prairie junegrass
MUFI	Muhlenbergia filiculmis	- -	- -	- -	- -	- -	- -	16 (22)	slimstem muhly
PASM	Pascopyrum smithii	4 (17)	13 (67)	2 (75)	3(100)	6 (71)	- -	13 (78)	western wheatgrass
PHPR3	Phleum pratense	1 (17)	- -	1 (75)	- -	8 (43)	50(100)	T (11)	common timothy
POFE	Poa fendleriana	- -	4 (67)	- -	T (50)	22 (29)	- -	12 (67)	muttongrass
POPA2	Poa palustris	18(100)	- -	2 (50)	- -	1 (29)	- -	T (11)	swamp bluegrass
POPR	Poa pratensis	36 (67)	53(100)	41(100)	5 (50)	28(100)	100(100)	32 (44)	Kentucky bluegrass
FORBS									
ACLA5	Achillea lanulosa	6 (83)	6(100)	10(100)	4(100)	4(100)	70(100)	15 (56)	western yarrow
ASFO	Aster foliaceus	10 (33)	20 (33)	- -	- -	14 (29)	- -	2 (11)	leafybract aster
ASJU	Aster junciformis	- -	- -	- -	- -	- -	- -	36 (11)	rush aster
ASSP16	Aster spatulatus	- -	31 (67)	30 (50)	1 (50)	12 (57)	- -	4 (11)	western aster
GASE6	Galium septentrionale	2 (33)	1 (67)	3(100)	- -	4 (57)	- -	T (22)	northern bedstraw
IRMI	Iris missouriensis	T (17)	T (33)	4 (75)	- -	4 (57)	1(100)	13 (11)	wild iris
LERAA2	Lepidium ramosissimum	- -	11 (33)	- -	- -	- -	- -	- -	branched peppergrass
POPU9	Potentilla pulcherrima	- -	- -	- -	T (50)	1 (57)	- -	1 (33)	beauty cinquefoil
TAOF	Taraxacum officinale	2 (83)	4(100)	6(100)	- -	12 (71)	30(100)	15 (44)	common dandelion
TRRE3	Trifolium repens	9 (50)	- -	3 (75)	1 (50)	13 (29)	70(100)	1 (11)	white Dutch clover
VIAM	Vicia americana	5(100)	2(100)	9(100)	5 (50)	5 (43)	- -	3 (11)	American vetch
FORB	forb unknown	- -	- -	1 (25)	1(100)	T (29)	- -	15 (22)	unknown forb
GROUND COVER									
.BARESO	bare soil	5 (33)	16 (67)	6 (75)	16(100)	11(100)	- -	21(100)	
.LITTER	litter and duff	93(100)	88(100)	84(100)	46(100)	69(100)	- -	68(100)	
GRAVEL	gravel 0.2-10 cm	2	1	5	18	2	- -	6	
.COBBLE	cobble 10-25 cm	3 (50)	- -	2 (75)	11(100)	4 (71)	- -	3 (22)	
.STONES	stone > 25 cm	- -	- -	4 (50)	8(100)	16 (71)	- -	- -	
.MOSSON	moss on soil	3 (17)	- -	- -	- -	3 (29)	- -	2 (67)	
LICHENS	lichens on soil	- -	- -	1	- -	1	- -	1	

Aspen-cottonwood/reedgrass-swamp bluegrass-cow-parsnip-
Deep to very deep alluvial Endoaquolls and other Borolls-
U-shaped draw bottoms and floodplains, <9,200 ft

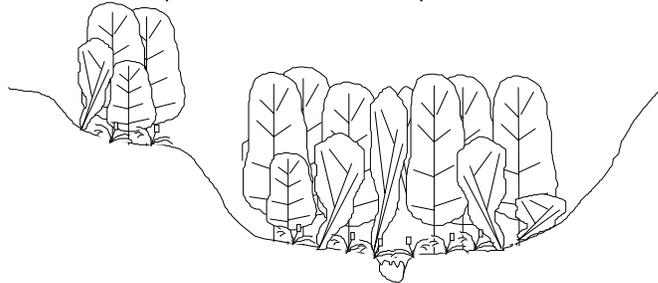


Figure 11-3. Cross-section of vegetation structure of *Aspen-cottonwood-Deep alluvial soils-Floodplains*. The tallest shrub layer typically averages 1.6 ft tall. Aspects are non-northerly, and slope angles average 12%.

Aspen-cottonwood-Deep alluvial soils-Floodplains is an uncommon type in clayey bottoms, especially where two major tributaries of a creek flow together, usually outside the deep rainshadows. Its distribution elsewhere is unknown. In later seral stages, *Aspen-cottonwood-Deep alluvial soils-Floodplains* is characterized by aspen (POTR5), bluejoint reedgrass (CACA4), and swamp bluegrass (POPA2). Narrowleaf cottonwood (POAN3) and rose (ROWO) are common also. See Table 11-11 for common species names and codes. Location in clayey bottoms is also a distinguishing feature.

Aspen-cottonwood-Deep alluvial soils-Floodplains is closely related to *Cottonwood/willow-Water-layered soils-Floodplains*, which lacks aspen. Sites now occupied by *Aspen-cottonwood-Deep alluvial soils-Floodplains* may represent places where *Cottonwood/willow-Water-layered soils-Floodplains* have experienced significant clay deposition, often from eroded soils in the watersheds above, combined with proximity of an aspen clone. Additional clay has reduced transverse (or horizontal) flow of water through the soil, and cottonwood has declined as a result. The infusion of clay into the soil also makes it possible for the adjacent aspen clone to expand into the bottom, displacing the cottonwood. On soil and landform grounds, these sites differ from those of *Cottonwood willow-Water-layered soils-Floodplains*, and management should differ as well.

The plant association *Populus angustifolia/Salix lucida* ssp. *lasiandra* phase *Populus tremuloides-Heracleum sphondylium* is described as new here. Aspen/serviceberry communities are adjacent on more protected slopes above. Douglas-fir communities border this type on dryer slopes. Sagebrush types occur on adjacent flats.

Cattle grazing tends to remove the graminoids first, then the palatable shrubs such as willows and serviceberry. Community Type C is the result, with no shrubs or graminoids except those that are resistant to cattle grazing. Cattle eat graminoids and palatable forbs in the open in spring and early summer, but in late summer and fall they turn to shaded stands and browse more shrubs. Elk use these stands only as winter range, but most of these stands occur in canyons where snow deposition prevents elk and deer use during most winters. These stands occur at too low elevations for elk summer range. Mule deer use these stands year around, but their numbers are not as concentrated as elk or cattle, and their use is limited to certain times of the day. Deer tend to browse more than they graze.

Horizontal obstruction varies from low to high, usually moderately low. Elk use of community types A and D is moderate in mild winters for cover, forage, and browse, but very low in severe winters and low spring through fall. Elk do not generally use the other community types. Deer use of community types A and D is moderate during mild winters and spring through fall for cover, forage and browse, but low during severe winters. Deer make moderately low use of community types B and E for cover, forage, and browse during mild

winters and spring through fall, but low use during severe winters. Deer make moderately low use of community types C and F during mild winters for cover, forage and browse, but their use is low during severe winters and spring through fall. Sage grouse rarely use these sites because the canopies are usually closed and steep canyon walls are often adjacent. Grouse use of community types A and D is very low in spring and for nesting, and moderately low in summer. They do not use the other community types at all.

Summary of Ecological Type Characteristics

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

NUMBER OF SAMPLES	23, soil descriptions from 6 of these (total 23)
ELEVATION	8,466 ft (7,900-9,160 ft); 2,580 m (2,408-2,792 m)
AVERAGE ASPECT	253°M (r = 0.50)
LITHOLOGY	A wide variety, including several mixed sites
FORMATIONS ¹	A wide variety
LANDFORMS	Draws [50%], floodplains [17%], and swales [17%]
SLOPE POSITIONS	Bottoms
SLOPE SHAPES	U-shaped [83%]
SLOPE ANGLE	10.7% (1-30%)
SOIL PARENT MATERIAL	Alluvium [70%] or colluvium [30%]
COARSE FRAGMENTS	4.8% (0-20%) cover on surface, 34.6% (7-70%) by volume in soil
SOIL DEPTH	91 cm (43-160 cm); 35.6 in (17-63 in)
MOLLIC THICKNESS	83 cm (19-160 cm); 32.8 in (7-63 in)
TEXTURE	A variety, with loam [50%] leading on the surface; subsurface is more clayey
SOIL CLASSIFICATION	Endoaquolls [67%], some Fluvaquentic
TOTAL LIVE COVER	300.7% (120.0-557.5%)
NUMBER OF SPECIES	27.7 (14-51)
TOTAL LIVE COVER/NO. SPECIES	13.1% (2.7-27.2%)
CLIMATE	Warm, dry air, but well-watered soil.
WATER	Water may be ponded at times in these sites.

Key to Community Types

- 1. Cottonwood >10% cover, codominant with aspen **B**
- 1. Cottonwood usually absent, rarely up to 10% cover (2)
- 2. Bluejoint reedgrass (CACA4) >20% cover. Swamp bluegrass always present, >10% cover. Kentucky bluegrass absent to <5% cover. Total willow cover >25%..... **A**
- 2. Bluejoint reedgrass usually absent, sometimes <20% cover. Swamp bluegrass usually absent, sometimes up to 30% cover. Kentucky bluegrass usually >10% cover, rarely absent or <5%. Willows absent or sparse, sometimes up to 40% cover (3)
- 3. Baltic rush (JUARA4) conspicuous, >30% cover. Kentucky bluegrass >60% cover **C**
- 3. Baltic rush absent or <30% cover. Kentucky bluegrass sometimes absent, 0-100% cover (4)
- 4. Alder (ALINT) prominent, >10% cover, often >20% (5)
- 4. Alder absent to very minor (6)
- 5. Exotic grasses such as smooth brome (BRIN7) or field timothy (PHPR) prominent, >20%..... **C**
- 5. Exotic grasses absent or minor **D**
- 6. Kentucky bluegrass prominent, >50% cover (7)
- 6. Kentucky bluegrass absent or up to 40% cover (8)
- 7. Bush honeysuckle (DIIN5) conspicuous, >10% cover **D**
- 7. Bush honeysuckle usually absent..... **F**
- 8. Total sedges >5% cover. Oak (QUGA) absent..... **D**
- 8. Sedges absent or total <3% cover. Oak often present..... **E**

Community Type Descriptions

- A** *Aspen-reedgrass-swamp bluegrass-cow-parsnip-vetch* is dominated by aspen, without cottonwood. Blue willow (SALU2) or Pacific willow (SALUL) are prominent at >25% cover. Bluejoint reedgrass cover is >20%, and swamp bluegrass cover is >10%.
- B** *Cottonwood-aspen-rose-Kentucky bluegrass* Narrowleaf cottonwood cover is >10%, and shares dominance with aspen. Total willow cover is <10%. Bluejoint reedgrass is usually absent, but sometimes as much as 20% cover. Swamp bluegrass is absent or sometimes up to 10% cover.
- C** *Aspen-Kentucky bluegrass* is dominated by aspen with no cottonwood. One or more gooseberry or currant species is usually present at 5-20% cover. Alder may be prominent. Kentucky bluegrass is prominent with >60% cover. Bluejoint reedgrass and swamp bluegrass are absent. Some increasers may be conspicuous, such as Baltic rush or western wheatgrass (PASM). Exotic grasses such as smooth brome or field timothy may also be conspicuous.
- D** *Aspen-rose-Kentucky bluegrass-dandelion* Aspen is dominant, with honeysuckle or rose prominent.
- E** *Aspen-tree juniper-sparse dandelion-sparse rose* Aspen is codominant with Rocky Mountain juniper (JUSC2), Kentucky bluegrass is absent or <10% cover.
- F** *Aspen-rose-snowberry-Kentucky bluegrass-quackgrass-dandelion* Aspen is dominant, with rose and Kentucky bluegrass dominating the understory.

Table 11-8. Wildlife values (relative to the whole UGB) for the principal wildlife species using *Aspen-cottonwood-Deep alluvial soils-Floodplains*. "I" means the same as above.

CT	Sage Grouse	Mule Deer	Elk
	Season-Preference	Season-Preference	Season-Preference
A, D	Spring- Very Low Nesting- Very Low Summer- Mod. Low	Winter, Mild- Moderate (Cover, Forage, Browse) Winter, Severe- Low Spring/Fall- Moderate (Cover, Forage, Browse)	Winter, Mild- Moderate (Cover, Forage, Browse) Winter, Severe- Very Low Spring/Fall- Low
B, E		Winter, Mild- Mod. Low (Cover, Forage, Browse) Winter, Severe- Low Spring/Fall- Mod. Low (Cover, Forage, Browse)	
C, F		Winter, Mild- Mod. Low (Cover, Forage, Browse) Winter, Severe- Low Spring/Fall- Low	

Table 11-9. Community types within *Aspen-cottonwood-Deep alluvial soils-Floodplains*.

Community Type	No. samples	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Avg Layer		Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. ¹ , 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						
A. Aspen- reedgrass- swamp bluegrass- cow-parship- vetch	2	8,755 (8,350-9,160) 3.1 (1-5)	27 (22-32) 83 (76-89) 83 (76-89)	* 2 LS	T1	3.7 (2.0-4.0)	37	46 (44-47) 76 (42-111) 60 (59-60) 62 (45-79)	40 (40-40) 244 (191-297) 6.1 (4.8-7.4)	147-2261 114-120 214-864	75 (50-100) 75 (50-100) 100(100-100) 100(100-100) 88 (75-100)	
					S1	1.8 (0.8-3.0)	27					
					T2	1.5 (0.9-2.5)	10					
					T3	0.6 (0.0-0.9)	4					
					S2	0.4 (0.2-0.8)	19					
					GF	0.2 (0.0-0.4)	98					
					S3	0.1 (0.0-0.2)	12					
B. Cottonwood- aspen-rose- Kentucky bluegrass	3	8,572 (8,360-8,880) 4.6 (4-5)	57 (47-70) 62 (43-77) 43 (19-66)	12 (1-20) 7 (2-11) LM	T1	12	81	62 (35-106) 67 (37-89) 56 (35-67) 37 (18-73)	42 (38-51) 222 (137-281) 5.5 (2.7-7.4)	93-1460 158-203 10-756	62 (15-90) 68 (30-90) 78 (65-90) 93 (85-100) 75 (49-90)	
					S1	5.5 (2.0-8.0)	28					
					T2	4.5 (3.0-8.0)	23					
					T3	2.0 (0.0-4.0)	8					
					S2	0.9 (0.5-2.1)	39					
					GF	0.3 (0.0-1.3)	56					
					S3	0.2 (0.0-1.0)	14					
C. Aspen- Kentucky bluegrass	8	8,350 20	* * *	* * MS	*	83 15 47 1 M 62 51	55 (10-100) 66 (10-116) 185 (160-236) 101 (43-226)	19 (14-22) 410 (298-557) 21.2 (14.2-27.1)	9-2420 3468-3946 176-1808	*		
D. Aspen- rose-Kentucky bluegrass- dandelion	4	8,528 (8,255-8,800) 5	16 160 160	* 9 EM	T1	27 (20-30)	83	79 (45-126) 93 (59-150) 87 (16-145) 70 (20-105)	25 (14-36) 332 (223-389) 15.6 (6.2-24.3)	488-3377 106-3013 11-1355	55 60 85 100 75	
					S1	16 (12-18)	15					
					T2	4 (2.5-6)	47					
					T3	2.2 (1.5-3)	1					
					S2	Missing	M					
					GF	0.2 (0.0-0.9)	62					
					S3	0.3 (0.1-0.5)	51					
E. Aspen-tree juniper-sparse dandelion- sparse rose	3	8,067 (7,900-8,160) 25.0 (20-30)	* * *	* * EM	*	83 15 47 1 M 62 51	56 (17-91) 44 (19-82) 29 (17-38) 7 (2-16)	26 (17-33) 136 (120-145) 5.7 (4.4-8.4)	18-1196 112-179 1-8	*		
F. Aspen- rose- snowberry- Kentucky bluegrass- quackgrass- dandelion	3	8,563 (8,350-8,740) 6.4 (1-15)	17 (7-28) 107 (76-137) 107 (76-137)	7 7 EM-ES	*	83 15 47 1 M 62 51	67 (47-80) 29 (7-46) 89 (76-112) 65 (30-88)	33 (28-38) 251 (198-285) 7.7 (5.8-10.2)	7-217 354-1618 18-1046	10 0 0 55 16		

*. Unknown: measurements were not taken in this CT.

Table 11-10. Resource Values for <i>Aspen-cottonwood-Deep alluvial soils-Floodplains</i> .													
Resource values were calculated from the numbers in Table 11-9, 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	C	D	E	F		A	B	C	D	E	F
Potential Cattle Forage Prod.	1	1	5	2-4	1	2-4	Deer & Elk Hiding Cover	6	4-6	1-2	6	3-4	1-2
Grazing Suitability	ns ¹	ns ¹	2	1	ns ¹	1	Deer & Elk Forage & Browse	4-5	4	2-3	2-3	2-3	2
Wetland	Seldom	Seldom	No	No	No	No	Need for Watershed Protection	4-5	4-5	4-5	4-5	5	5
Riparian Area	Yes	Yes	Yes	Yes	Most	Most	Soil Stability	1	2	2	2	2	2
Potential Timber Production	4-5	3-4	3-4	4-5	3	3-4	Risk of Soil Loss-Natural	2	3	4	4	4-5	4-5
Timber Suitability	ns ¹	ns ¹	1	1	ns ¹	1	Risk of Soil Loss-Management	4	4	4	4	4	4
Developed Recreation	0	0	0	0	0	0	Risk Permanent Depletion-Range	5	4	3-4	3-4	3-4	3-4
Dispersed Recreation	1	1	1	1	1	1	Risk Permanent Depletion-Wildlife	3	3	3	2	2	2
Scenic	4-5	4-5	4-5	4	4	4	Risk Permanent Depletion-Timber	ns ¹	ns ¹	3	3	ns ¹	3
Road & Trail Stability	0-1	0-1	1	1	1	1	Resource Cost of Management	5	4	4	4	4	4
Construction Suitability	0	0	0-1	0-1	0-1	0-1	Cost of Rehabilitation	3	3	3	3	4	4

1. ns = Not suitable.



A stand of aspen-cottonwood/willow that is dominated by aspen (Community Type D), sometimes mixed with cottonwood. This type occurs just below stream confluences or steeper canyons, where fine-textured soil would deposit. For some reason (browsing or human removal) the cottonwoods have been removed; or perhaps the deposited soil is too fine-textured for cottonwood to regenerate. In any case, the site has become well-drained enough to allow an adjacent aspen clone to expand into the bottom. Aspen 57% cover, rose 36%, alder 15%, horsetail 10%, silvertop sedge 10%, Saskatoon serviceberry 7%, cow-parnsip 6%. Coarse Fragments Cover = 0%, Total Live Cover = 223%, Coarse Fragments in Soil = 23. Soil sampled as an Histic Endoaquoll. McIntosh Mountain Quadrangle, elevation 8,255 ft, 5.4° 124° (SE) slope. June 22, 1994.

Table 11-11. Common Species in *Aspen-cottonwood-Deep alluvial soils-Floodplains*, 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 $Avc = Ccv \cdot 100\% / Con$.

Community Type	A	B	C	D	E	F		
Code	Species	Ccv(Con) N = 2	Ccv(Con) 3	Ccv(Con) 8	Ccv(Con) 4	Ccv(Con) 3	Ccv(Con) 3	Common Name
TREES								
JUSC2	<i>Juniperus scopulorum</i>	T (50)	T (33)	5 (13)	T (25)	25(100)	4 (33)	Rocky Mountain juniper
POAN3	<i>Populus angustifolia</i>	- -	39(100)	5 (13)	- -	1 (33)	- -	narrowleaf cottonwood
POTR5	<i>Populus tremuloides</i>	46(100)	22(100)	51(100)	68(100)	30(100)	66(100)	quaking aspen
PSME	<i>Pseudotsuga menziesii</i>	- -	- -	20 (13)	23 (50)	1(100)	- -	Douglas-fir
SHRUBS								
ALINT	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	2 (50)	T (33)	42 (75)	45 (75)	- -	- -	thinleaf alder
AMAL2	<i>Amelanchier alnifolia</i>	- -	11 (67)	1 (50)	4 (75)	- -	- -	Saskatoon serviceberry
ARTR2	<i>Artemisia tridentata</i>	- -	6 (33)	3 (50)	15 (50)	25 (67)	T (33)	big sagebrush
JUCO6	<i>Juniperus communis</i>	- -	- -	7 (38)	23 (75)	- -	- -	common juniper
PEFL15	<i>Pentaphylloides floribunda</i>	T (50)	4 (33)	7 (63)	10 (50)	1 (33)	- -	shrubby cinquefoil
QUGA	<i>Quercus gambelii</i>	- -	- -	- -	- -	23 (67)	- -	scrub oak
RIIN2	<i>Ribes inerme</i>	- -	4 (33)	9 (75)	- -	1 (33)	- -	whitestem currant
RILA	<i>Ribes lacustre</i>	10 (50)	36 (33)	9 (38)	10 (25)	1 (33)	1 (33)	swamp black gooseberry
RILE	<i>Ribes leptanthum</i>	- -	- -	- -	- -	- -	11 (33)	trumpet gooseberry
ROWO	<i>Rosa woodsii</i>	49 (50)	36(100)	3 (63)	15(100)	1(100)	19(100)	Woods rose
SAGE2	<i>Salix geyeriana</i>	T (50)	- -	9 (38)	5 (25)	1 (33)	3 (33)	Geyer willow
SALUL	<i>Salix lucida</i> ssp. <i>lasiandra</i>	26 (50)	2 (33)	5 (50)	5 (25)	1 (33)	T (33)	Pacific willow
SALU2	<i>Salix lutea</i>	35 (50)	- -	5 (25)	- -	1 (33)	- -	yellow willow
SYRO	<i>Symphoricarpos rotundifolius</i>	- -	1 (33)	6 (88)	7 (75)	8 (67)	4(100)	mountain snowberry
GRAMINOIDS								
AGCR	<i>Agropyron cristatum</i>	- -	- -	40 (13)	- -	- -	T (33)	crested wheatgrass
BROMO	<i>Bromopsis</i>	- -	- -	20 (13)	- -	- -	- -	perennial brome
BRCA10	<i>Bromopsis canadensis</i>	4(100)	1 (67)	- -	1 (25)	- -	T (67)	fringed brome
BRIN7	<i>Bromopsis inermis</i>	- -	- -	26 (50)	1 (25)	- -	- -	smooth brome
CACA4	<i>Calamagrostis canadensis</i>	33(100)	17 (33)	- -	10 (25)	- -	1 (33)	bluejoint reedgrass
CAGE2	<i>Carex geyeri</i>	- -	- -	40 (13)	70 (25)	- -	1 (33)	elk sedge
CAUT	<i>Carex utriculata</i>	- -	- -	2 (38)	5 (25)	5 (33)	- -	beaked sedge
ELRE3	<i>Elytrigia repens</i>	1(100)	2 (67)	- -	5 (50)	- -	9(100)	creeping quackgrass
JUARA4	<i>Juncus arcticus</i> ssp. <i>ater</i>	- -	T (33)	66 (88)	40 (25)	10 (67)	7 (33)	Baltic rush
PASM	<i>Pascopyrum smithii</i>	- -	T (33)	15 (25)	- -	- -	- -	western wheatgrass
PHPR3	<i>Phleum pratense</i>	1 (50)	9 (67)	40 (13)	- -	- -	4(100)	common timothy
POPA2	<i>Poa palustris</i>	18(100)	7 (33)	- -	- -	- -	20 (33)	swamp bluegrass
POPR	<i>Poa pratensis</i>	1 (50)	35(100)	91(100)	68 (75)	30 (33)	57(100)	Kentucky bluegrass
FORBS								
ACLA5	<i>Achillea lanulosa</i>	6(100)	9(100)	28 (63)	14(100)	1(100)	8(100)	western yarrow
ACCO4	<i>Aconitum columbianum</i>	- -	- -	30 (13)	- -	- -	- -	Columbian monkshood
ASFO	<i>Aster foliaceus</i>	- -	- -	- -	- -	- -	12 (33)	leafybract aster
ASSP16	<i>Aster spathulatus</i>	- -	1 (33)	- -	- -	- -	58 (33)	western aster
BRAR	<i>Breea arvense</i>	- -	- -	50 (13)	- -	- -	- -	Canada thistle
COPA3	<i>Collinsia parviflora</i>	- -	- -	40 (13)	- -	- -	- -	smallflower blue-eyed Mary
ERIGE2	<i>Erigeron</i>	- -	- -	- -	20 (25)	- -	T (33)	fleabane
FRVI	<i>Fragaria virginiana</i>	- -	- -	- -	20 (25)	- -	- -	Virginia strawberry
GERI	<i>Geranium richardsonii</i>	8(100)	1 (67)	1 (13)	16 (50)	5 (33)	14 (33)	Richardson geranium
HESP6	<i>Heracleum sphondylium</i>	6(100)	T (67)	23 (25)	6 (25)	- -	8 (33)	cow-parsnip
IRMI	<i>Iris missouriensis</i>	T (50)	3 (67)	5 (75)	3 (50)	1 (33)	T (33)	wild iris
LUAR3	<i>Lupinus argenteus</i>	- -	1 (33)	- -	1 (25)	1 (67)	T (33)	silvery lupine
OSDE	<i>Osmorhiza depauperata</i>	- -	- -	- -	15 (25)	- -	- -	sweet cicely
TAOF	<i>Taraxacum officinale</i>	4(100)	4 (67)	42 (88)	20(100)	1(100)	12(100)	common dandelion
THFE	<i>Thalictrum fendleri</i>	3(100)	2 (33)	1 (25)	T (25)	- -	T (33)	Fendler meadow-rue
TRRE3	<i>Trifolium repens</i>	- -	4 (67)	55 (25)	- -	- -	- -	white Dutch clover
URGR3	<i>Urtica gracilis</i>	- -	- -	40 (13)	- -	1 (33)	T (33)	stinging nettle
VIAM	<i>Vicia americana</i>	11(100)	2 (67)	1 (25)	2 (50)	- -	4 (33)	American vetch
GROUND COVER								
.BARESO	bare soil	2(100)	7(100)	- -	9 (25)	- -	7 (67)	
.LITTER	litter and duff	95(100)	77(100)	- -	82 (25)	- -	91(100)	
.GRAVEL	gravel 0.2-10 cm	- -	7	- -	- -	- -	- -	
.COBBLE	cobble 10-25 cm	- -	2(100)	- -	- -	- -	- -	
.STONES	stone > 25 cm	- -	8 (67)	- -	- -	- -	7 (33)	
.MOSSON	moss on soil	- -	- -	- -	4 (25)	- -	- -	
LICHENS	lichens on soil	8	1	- -	- -	- -	- -	