

G. NON-RIPARIAN TALL SHRUBLANDS (SA)

25. Utah Serviceberry-Saskatoon Serviceberry Ecological Series

Table 25-1. Full and short names for the ecological types in the Utah-Saskatoon Serviceberry Ecological Series.

Ecological Type Code	Name	Plant Association Code	Short Name
SA1	Utah serviceberry/dryland sedge-sun sedge-Deep Argiborolls-Leeward upper backslopes and shoulders, < 9,100 ft	AMUT/CAGE-CAPEH	Utah serviceberry/sedge-Dark clay soils-Leeward
SA2	Utah serviceberry-mountain-mahogany/dryland sedge-sun sedge-Argiborolls-Protected colluvial backslopes and shoulders, < 8,700 ft	AMUT-CEMO2/CAGE-CAPEH	Utah serviceberry-mountain-mahogany/sedge-Dark clay soils-Protected
SA3	Serviceberry-Gambel oak/Sedge-Deep Argiborolls, little coarse on surface-Lees or other protected slopes, 7,600 - 8,600 ft	AMELA-QUGA/CAREX	Serviceberry-oak-Dark clay soils-Protected
SA4	Serviceberry/green needlegrass-spike-fescue-Deep Argiborolls, sometimes Pachic-Lee sides of ridges and mesas, 8,000-9,300 ft	AMELA/NAVI4-LEKI2	Serviceberry/green needlegrass-Deep clay soils-Lees
SA5	Saskatoon serviceberry/elk sedge-Deep Argiborolls and Argic Cryoborolls, often Pachic-Lee slopes on ridges and mesas, 8,500-9,900 ft	AMAL2/CAGE2	Saskatoon serviceberry/elk sedge-Deep dark soils-Lees
SA6	Saskatoon serviceberry/Thurber fescue-Deep Argic Cryoborolls, loam surface-subalpine slopes, 8,700-10,000 ft	AMAL2/FETH	Serviceberry/Thurber fescue-Deep dark cold loamy soils-Subalpine

The *Amelanchier utahensis*-*Amelanchier alnifolia* series is described as new here, based on the *Amelanchier alnifolia* series of Komárková (1986-1988) and on the *Quercus gambelii* series of Donart and others (1978), Hoffman and Alexander (1980), Hess and Wasser (1982), Alexander and others (1986), and Komárková (1986-1988). It

includes part of the Mountain Mahogany-Mixed Shrub series of Dick-Peddie (1993), but it is not the same as the eastern slope *Cercocarpus montanus* series of Hess (1981). Our series includes the *Acer glabrum* series and the *Padus virginiana* ssp. *melanocarpa* series of Komárková (1986).

Table 25-2. Climate and Soils

Characteristic	Value	Reference
Precipitation	Annual: 385 mm/yr (280-560 mm/yr) 15 in/yr (11-22 in/yr) mostly during the winter	Plummer and others (1968), Erdman and others (1969), Shepherd (1971), Yake and Brotherson (1979), Brown (1983), Kufeld (1983), Current (1984), Brotherson and others (1984), Austin and Urness (1986)
Growing season (May-Nov.) precipitation	210 - 260 mm/yr 8 - 11 in/yr	Welden and others (1988)
Growing period	136 da (120 to 160 da)	Brown (1958)
Soil degree days	162 (125 - 195)	Jensen (1989)
Growing season potential evapotranspiration (PET)	72 - 80 cm 28 - 32 in	Welden and others (1988)
Soil pH	pH 7.3 (6.9 - 7.9)	Brotherson and others (1984)
Mean annual air temperature	5 - 7°C 40 - 45°F	Erdman and others (1979), Current (1984)

The *Amelanchier utahensis*-*Amelanchier alnifolia* Series is common in the UGB as large or small patches in the lee of ridges or other obstructions, often where snow accumulates. Stands occupy sites that are usually long and narrow to oval, with the long axis perpendicular to the wind and parallel to westerly ridges. Sites in good condition, with at least some tall shrubs, are easy to distinguish on aerial photographs, but

early-seral sites are more difficult to separate from sagebrush sites. In many sites in the UGB, this type appears as a patchwork, with tall shrub serviceberry-oak-mountain mahogany patches typically alternating with sagebrush (either big sagebrush or black sagebrush; see Erdman and others 1969).

Most of the stands in studies referenced above support at least some serviceberry. The serviceberries are noted decreaseers when browsed by big game or livestock, which are the major impacts on these stands (Ellison 1960, Shepherd 1971, Majak and others 1980, Austin and Urness 1986). Gambel oak increases under almost any conditions (Hutchings and Mason 1970). The serviceberry species are therefore a better choice for the name of this series than Gambel oak. (See discussion under *Amelanchier alnifolia* and *Quercus gambelii* in the species section).

Vegetation, Climate, Soils

At late seral stages, either Utah serviceberry (on warmer sites at lower elevations) or Saskatoon serviceberry (on cooler sites at somewhat higher elevations) occurs, commonly with mountain snowberry in a lower shrub layer. Sometimes serviceberry occurs with Gambel oak or mountain-mahogany (*Cercocarpus montanus*), which tends to occur on steeper, rockier, coarser-soils within this series (Brotherson and others 1984). Gambel oak grows on slopes where hard spring frosts are not common. Common herbaceous associates (at late seral stages) include one or more mat sedges (dryland, pityophila, sun, elk sedges), green needlegrass, and spike-fescue.

Sites experience a significant excess of evapotranspiration over precipitation between mid-May and late August. Yake and Brotherson (1979) found that soil pH ranges from 7.4 to 7.9 on sites in northern Utah. In serviceberry-oak sites, total live cover is correlated with soil depth, pH, percent fines, and percent rock cover. Moisture levels are highest and bare soil is least in older, taller, denser stands (Yake and Brotherson 1979).

When these stands are in good condition, with conspicuous dominance by tall shrubs (3-5 m tall) and several layers of shrubs and herbs beneath, they are very valuable for their snow retention, erosion protection, and wildlife habitat qualities (Harper and others 1985).

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In watersheds dominated by tall shrublands of this series, various workers have estimated that 1-5 inches of additional runoff might be generated if the tall shrubs were removed and replaced by herbaceous vegetation (Harper and others 1985). However, if such a removal were done, with the intent of improving livestock forage or increasing water production, it would not be worth the investment, because in a very few years (\pm 3 years) invaders and increaseers such as Gambel oak or big sagebrush would return, soil erosion would be

considerably accelerated, and wildlife habitat would be much depleted.

In the UGB, no watershed ever supported tall shrublands as a major landscape dominant, though such watersheds occur to the west of here. Most serviceberry potential stands in the UGB now have been reduced in height to sagebrush dominance. These sites are all in areas protected from wind, often in the lee of ridges, where snow accumulates. Before settlement, large livestock herds, dramatic increases in elk populations, agricultural use of the bottoms, development, and construction, serviceberry stands of this series in the UGB were mostly in good condition, with a dense tall shrub layer 7-15 feet tall and a layer of shorter shrubs under them. These tall serviceberry stands had a much greater capacity to hold and retain snow, and a much greater ability to hold the water when the snow had melted, than the sagebrush-dominated stands that exist now.

This means that in the UGB of today, water runs off faster and earlier in the season than it once did, and there is less water upslope in late growing seasons. The early-season peak of water in the creeks and rivers is higher (probably 1-5 inches higher, as discussed above), considerably increasing soil erosion in the sagebrush-dominated stands and putting even more pressure on the riparian areas below to stabilize the increased flood flow. The riparian areas are under great stress already from use by wildlife and livestock. The slopes are dryer now, the creeks dry up earlier, and the hay farmers have less irrigation water for that late or second crop. Much of the good soil that was once on the slopes is now in the bottom of reservoirs.

Cedar apple rust disease is most common on Utah serviceberry at lower elevations and on steeper slopes (Yake and Brotherson 1979).

On these sites in the UGB, where the rich, brown topsoil has eroded off completely, yellow clay subsoil remains, which is considerably less fertile. Undisturbed, dense, tall serviceberry stands occur on very good soils, which hold water and build soil up relatively rapidly through litterfall. If the dense, tall serviceberry is removed, the soil is likely to move, especially because these sites accumulate snow and are wet in the spring and fall.

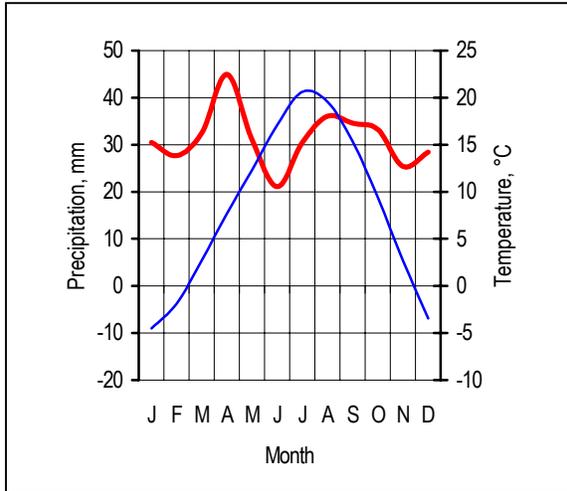


Figure 25-1. Precipitation and temperature in western Colorado, in the Gambel oak zone (Brown 1958). Note the significant drought from late May through August.

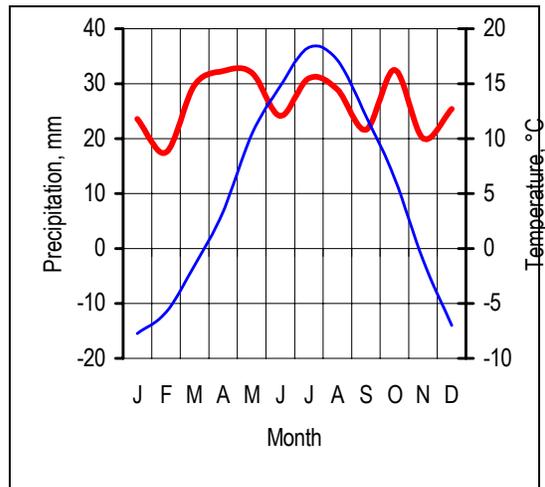


Figure 25-2. Precipitation and temperature in a serviceberry stand at Battle Mountain, south-central Wyoming (Current 1984). Temperatures are cooler, and precipitation is less.

Timber Management

Where Gambel oak is present in the warmer parts of the UGB, it has some value as fuelwood (Komárková 1988), but most stands in the UGB are too small for efficient fuelwood cutting. Gambel oak stands in warmer climates west of the UGB have greater potential for fuelwood (Harper and others 1985).

Fire Management

Burning increases oak at the expense of serviceberry and mountain-mahogany. Total forbs, graminoids, and other shrubs initially increase, then decrease between two and five years after burning, followed by a small increase again ten years after (Kufeld 1983, Komárková and others

1988). Gambel oak foliage emits volatile chemicals when burned which have recently been found to be significantly more volatile than previously thought, and that information may occasion a change in fuel models (Guenther and others 1996).

Stands of this series are classified as Fire Group 2, the Gambel oak habitat types (Crane 1982). Since fire causes vigorous resprouting of oak, burning these stands probably gives Gambel oak a big boost over other species. Fall fires, after the leaves have died but before they fall, carry best through pure oak stands (Crane 1982).

Most birds and mammals that frequent these stands are tolerant of or indifferent to burning, but accipiters and shrub-nesting birds are intolerant of hot burns (Steinhoff 1978, Komárková and others 1988).

Range and Wildlife Management

On many sites in the UGB, livestock grazing has traditionally occurred from April through November, but where sites are accessible, they were grazed year-round from about 1880-1960. Though sites are often located just below and to the lee of high ridges and thus away from water sources, many were used by livestock extensively before 1960 because the herds were so large (especially cattle) and the valleys lacked suitable forage. It is likely that cattle were also pushed up the sides of the mesas in the early days.

Serviceberry is the most palatable and preferred shrub species in the UGB, especially for mule deer and elk, but it is also browsed by cattle, sheep, and horses. Elk prefer serviceberry even over aspen sprouts in burned areas (Canon and others 1987). The most important factor influencing serviceberry reproduction is big game use, since seedlings are even more palatable than older plants.

Other factors, such as aspect, density of serviceberry shrubs, and percent grass in the understory interact so that the most productive sites are found on moister exposures where shrubs are dense (Yake and Brotherson 1979).

The correlation between serviceberry reproduction and density may be explained by the possibility that individual plants are browsed less in high-density stands, or that low-density stands experience poorer pollination, fruit formation, and germination. It is also possible that birds and small mammals eat a higher percentage of the fruit when shrubs are less dense, but that explanation is undocumented.

Browsing on serviceberry by deer and elk is influenced by aspect, soil depth, height of serviceberry plants, and elevation. The correlations with aspect, soil depth, and elevation are probably indirect, since production of serviceberry is greater on north aspects with deeper soils at higher elevations. The correlation with height is probably

related to the height at which browsing animals can no longer reach the serviceberry branches (Yake and Brotherson 1979).

These sites can be highly productive (Table 25-3, Figure 25-3; Kufeld 1983).

Growth Form	lb/ac/yr
Grasses & Palatable Forbs	564.7 (250 - 730)
Saskatoon Serviceberry	173.1 (140 - 225)
Total	1,966 (1,800 - 2,200)

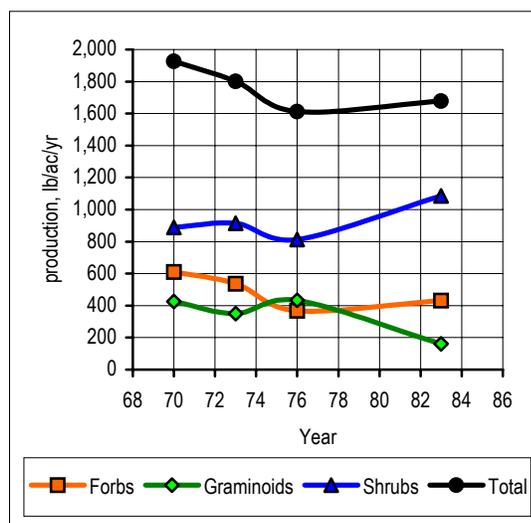


Figure 25-3. Variation in production in unmanaged, ungrazed stands in serviceberry-oak in western Colorado (Kufeld 1983).

Most of the production of livestock forage is in the small (microsite) openings rather than under dense shrub cover, up to twice as much (Harper and others 1985).

Species which increase under livestock grazing include Gambel oak (*Quercus gambelii*) and big sagebrush (*Artemisia tridentata*). Species that decrease with grazing include: serviceberry (*Amelanchier* spp.), and grasses and forbs (Austin and Urness 1986). Grazing by livestock tends to increase unpalatable shrubs, such as sagebrush or oak, at the expense of serviceberry (Kufeld 1983, Austin and Urness 1986, Komárková and others 1988).

The major browse species in mule deer diets are serviceberry, Gambel oak, snowberry, and aspen, in that order (Austin and Urness 1986). Deer prefer to forage on sites ungrazed by livestock when their own numbers are low, but this preference rapidly changes as deer numbers increase (Austin and Urness 1986).

Saskatoon serviceberry (*Amelanchier alnifolia*) is the most important browse plant for elk and mule deer in the UGB, followed closely by Utah serviceberry (*Amelanchier utahensis*). Most serviceberry plants in the UGB are stressed by browsing, and many are browsed to a short height. Heavy to severe browsing over several years reduces stand production, and extended browsing over a decade or more kills the shrubs and extirpates them from sites, which has happened in many UGB sites.

Shepherd (1971) recommends prescribed proper use on serviceberry to be < 60%. In measuring utilization of palatable shrubs, notice that utilization over 100% is possible and often occurs if the animals consume some of previous years' growth. Obviously, such use is destructive, because it usually destroys the buds.

Saskatoon serviceberry sprouts readily from root-crowns after top-killing fire, increasing stem density, number of twigs, and growth rates (Noste and Bushey 1987), provided the shrubs are protected from browsing.

In the UGB, sites of this series occupy large and important acreage within the critical winter ranges for mule deer and elk. This is also true of other valleys in western Colorado, Utah, and in Arizona (Terwilliger and Tiedeman 1978, Harper and others 1985, Tiedeman and others 1987, Komárková and others 1988). Most sites in the UGB have seen moderate to heavy use by elk, and at least moderate use by deer, all winter. In many serviceberry stands, if any serviceberry is left, it has been browsed down to the top of the average snowpack.

Large concentrations of elk began around 1960 and have increased to the present, whereas the deer concentrations are much more cyclic, having peaked last in the early to middle 1950's. A deep crash in the mule deer population was reported in the middle to late 1950's, resulting in a peak cattle use of serviceberry stands during and just after World War II, combined with a coincidental peak in the deer population cycle. The serviceberry stands were very heavily browsed and many were lost during that time. The deer literally "ate themselves out of house and home," losing their food and their cover.

The effective browse line for mule deer is 1.5-1.8 m (5.0-6.0 ft) on mountain mahogany (Brotherson and others 1984). The most important factor influencing serviceberry reproduction is big game use, since seedlings are even more palatable than older plants.

Characteristics of stands dominated by Gambel oak, their responses to various treatments, and the concurrent responses by mammals and birds, are detailed in Steinhoff (1978). In Gambel oak stands, there is no correlation between annual precipitation and annual aboveground production,

neither for the oak overstory nor for the understory (Harper and others 1985).

Many birds and small mammals use serviceberry and oak-serviceberry stands (Steinhoff 1978). More wildlife species and more habitats occur on the more mesic sites and along the moister edges than along the drier edges of stands (Harper and others 1985). Most stands have no shrubs large enough for cavity-nesting birds or mammals, so development of snags from mortality of the few trees such as ponderosa pine, aspen, or Douglas-fir that may be on the site or adjacent to it, is a management action that would enhance habitat for such species (Harper and others 1985). In a big sagebrush stand seral to Utah serviceberry, rodents browsing the shrubs can contribute significantly to the litter layer (Parmenter and others 1987).

Recreation, Roads & Trails, Scenery

Sites are not suitable for roads, trails, or construction due to steep slopes, high erosion potential (especially after disturbance), and potential for mass movement. Planned roads and trails should be moved to gentler slopes, locations



Saskatoon serviceberry/Thurber fescue in early seral (Community Type C), with the serviceberry becoming invisible among the invading sagebrush, and even the sagebrush browsed. This site is used by several *large* herds of elk and deer in fall, spring, and mild winters. Big sagebrush 40% cover, blunt sedge 31%, Saskatoon serviceberry 21%, aspen peavine 13%, elk sedge 8%, Arizona fescue 5%. Coarse Fragments Cover = 21%, Total Live Cover = 173%, Coarse Fragments in Soil = 42. Soil sampled as an Argic Cryoboroll, Clayey-Skeletal, Mixed. Signal Peak Quadrangle, elevation 9,925 ft, 34° 09' (E) slope. July 7, 1994.

lower on the same slope, or to the ridgetop above. Sites are unsuitable for dispersed or developed recreation for the same reasons, and because they are usually far from water and exposed to wind. However, these stands can be highly scenic, especially when viewed from below, and when the leaves change color in the fall, the effect is dramatic.

Revegetation and Rehabilitation

Steep slopes and moveable soils limit successful revegetation, though the deep, fertile soils and long growing season enhance revegetation possibilities (Tiedeman 1978). Reseeding potential is high (Harper and others 1985). Application of mulch is desirable and may be necessary to conserve soil moisture and minimize soil erosion. Seeding may have to be broadcast (Tiedeman 1978). Surface soil should be stockpiled if major disturbance is to take place. On steep slopes, small terraces may have to be established for slope stabilization and revegetation. Planted areas must be fenced for protection from livestock and especially deer and elk (Tiedeman 1978).



A Utah serviceberry-mountain-mahogany/sedge stand (Community Type B), here mixed with Gambel oak. These tall shrubs, potentially 2-3x as tall, have been browsed down considerably. There is not much hiding cover left in this stand. Utah serviceberry 38% cover, muttongrass 25%, mountain-mahogany 21%, Gambel oak 6%. Coarse Fragments Cover = 36%, Total Live Cover = 155%, Coarse Fragments in Soil = 31. Soil sampled as a Typic Argiboroll, Clayey-Skeletal, Mixed. Carpenter Ridge Quadrangle, elevation 7,600 ft, 47° 02' (NNE) slope. June 17, 1994.

Key to the Ecological Types in the Serviceberry Series

- 1. Mountain-mahogany >10% cover..... (2)
 - 1. Mountain-mahogany usually absent, sometimes <10% cover (4)

 - 2. Green needlegrass present and >1%.....SA4
 - 2. Green needlegrass usually absent (3)

 - 3. Elk sedge present, >1% cover. Higher elevations, >8,800 ftSA5
 - 3. Elk sedge absent. Other sedge species sometimes conspicuous. Lower elevations, <8,800 ft.....SA2

 - 4. Oak >5% cover, often >20%. Oak is clonal, so the distribution of oak may well be patchy(5)
 - 4. Oak usually absent, occasionally <5% cover(7)

 - 5. Spike-fescue >10%.....SA4
 - 5. Spike-fescue usually absent, rarely <5% cover..... (6)

 - 6. Mountain-mahogany >10% cover (2)
 - 6. Mountain-mahogany absent or occasionally <10% cover.....SA3

 - 7. Ocean-spray, wax currant, or skunkbrush >15% on convex rock outcrops and rockslides. The rocks are really dominant, not the plants; no more than one other species besides the dominant shrub is >10%.....SA7
 - 7. Ocean-spray, wax currant, and skunkbrush usually absent..... (8)

 - 8. Green needlegrass or spike-fescue present and >1% cover..... (9)
 - 8. Green needlegrass and spike-fescue usually absent, rarely <1% cover..... (13)

 - 9. Oak >20% cover(10)
 - 9. Oak absent or <10% cover (11)

 - 10. Oak >70% cover. Green needlegrass >1% cover. Spike-fescue absent or <1%..... SA3
 - 10. Oak 20-50% cover. Spike-fescue >10% cover, Green needlegrass absent or <1% coverSA4

 - 11. Elk sedge >15% cover (12)
 - 11. Elk sedge absent or <15% coverSA4

 - 12. Green needlegrass >5% cover. Spike-fescue absent. Thurber fescue >25% coverSA6
 - 12. Spike-fescue >5% cover. Green needlegrass absent or <1% cover. Thurber fescue absent or <5% coverSA4

 - 13. Elk sedge absent and elevation <8,900 ft.....(14)
 - 13. Either elk sedge present and >1% cover, or elevation >8,900 ft.....(12)

 - 14. Green needlegrass or spike-fescue present and >1% cover (12)
 - 14. Green needlegrass and spike-fescue usually absent, rarely one of them <1% cover (15)

 - 15. Oak >20% cover(10)
 - 15. Oak absent or <10% cover.....(16)

 - 16. Thurber fescue present and >2% cover. Somewhat higher elevations, 8,700-10,000 ftSA6
 - 16. Thurber fescue usually absent, rarely <2% cover (17)

 - 17. Green needlegrass or spike-fescue present and >1% cover (12)
 - 17. Green needlegrass and spike-fescue usually absent, rarely <1% cover (18)

 - 18. Mountain-mahogany >15% cover. Somewhat protected slopes, not always in the lee of ridges or mesas..... (2)
 - 18. Mountain-mahogany usually absent, sometimes <10% cover. Lees of ridges or mesas..... SA1
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Table 25-3. Characteristics of Ecological Types within Ecological Series 25 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, %
SA1 Utah serviceberry/ sedge- Dark clay soils-Leeward	37	8,525 (8,000-9,036)	54 (0.35) 22 (1-64)	53 (14-76)	48 (20-74) 32 (0-66)	20 (0-50) 14 (1-55)	0 (0-5) 58 (22-124) 44 (1-148) 18 (1-87)	119.1 (43.4-317.3) 36 (16-53) 3.6 (1.3-8.8)
SA2 Utah serviceberry- mountain- mahogany/sedge-Dark clay soils-Protected	16	8,303 (7,600-8,640)	348 (0.61) 35 (12-53)	53 (20-79)	49 (13-85) 27 (0-85)	23 (5-66) 6 (0-24)	0 (0-2) 91 (57-147) 51 (11-96) 13 (0-27)	155.1 (88.7-218.6) 32 (23-46) 4.9 (2.6-8.0)
SA3 Serviceberry-oak-Dark clay soils-Protected	16	8,176 (7,600-8,600)	304 (0.10) 26 (10-40)	48 (16-84)	50 (35-69) 31 (20-37)	4 (2-7) 1 (0-24)	2 (0-12) 86 (38-203) 38 (4-95) 13 (0-81)	139.6 (70.0-369.6) 23 (13-41) 6.4 (1.7-12.2)
SA4 Serviceberry/green needlegrass-Deep clay soils-Lees	23	8,561 (8,000-9,250)	29 (0.36) 24 (8-54)	50 (17-84)	82 (31-183) 31 (4-64)	8 (0-65) 9 (0-24)	0 (0-0) 90 (32-189) 64 (5-109) 19 (0-62)	172.4 (57.6-332.4) 32 (19-45) 5.7 (1.5-9.8)
SA5 Saskatoon serviceberry/elk sedge-Deep dark soils- Lees	26	9,113 (8,580-9,840)	108 (0.17) 25 (6-75)	46 (11-82)	58 (14-99) 28 (12-63)	12 (0-65) 5 (0-15)	1 (0-10) 73 (10-216) 70 (9-135) 25 (4-69)	169.2 (83.8-306.4) 36 (14-48) 5.2 (2.1-15.3)
SA6 Serviceberry/Thurber fescue-Deep dark cold loamy soils-Subalpine	8	9,084 (8,780-9,925)	57 (0.35) 34 (17-50)	52 (5-78)	64 (48-78) 42 (24-75)	8 (3-20) 6 (1-14)	0 (0-0) 67 (22-110) 91 (47-140) 45 (14-78)	203.7 (173.3-254.3) 37 (28-43) 5.6 (4.1-7.1)



A Utah serviceberry-mountain-mahogany/sedge site in good condition (Community Type A). Mountain-mahogany 69% cover, Utah serviceberry 32%, snowberry 22%, big sagebrush 12%, Gambel oak 7%. Coarse Fragments Cover = 6%, Total Live Cover = 217%, Coarse Fragments in Soil = 52. Soil sampled as a Lithic Haploboroll, Loamy, Mixed. McIntosh Mountain Quadrangle, elevation 8,600 ft, 27° 028° (NNE) slope. June 28, 1994.

Utah serviceberry/dryland sedge–sun sedge–Deep Argiborolls–
Leeward upper backslopes and shoulders, < 9,100 ft

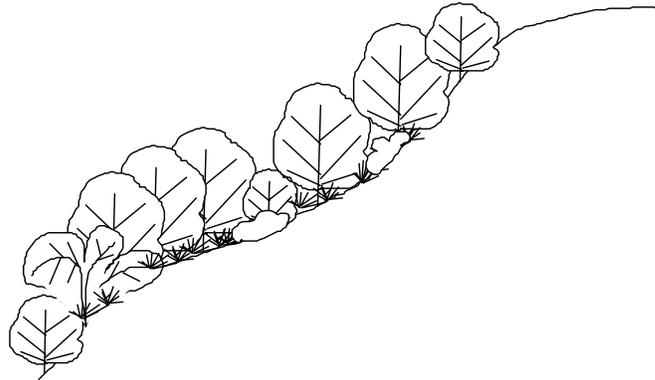


Figure 25-4. Cross-section of vegetation structure of *Utah serviceberry/sedge–Dark clay soils–Leeward*. The tallest shrub layer typically averages 5.2 ft tall. Aspects are usually easterly, and slope angles average 23%.

Utah serviceberry/sedge–Dark clay soils–Leeward is a common type on leeward (easterly) upper backslopes and shoulders of ridges, mesas, and hills, outside the deep rainshadows. It occurs on upper, protected, leeward slopes in the lower part of the Gunnison Basin. This type probably also occurs on the lower mountain slopes of western Colorado and eastern Utah, and has been observed in northern New Mexico and northern Arizona.

At later seral stages, *Utah serviceberry/sedge–Dark clay soils–Leeward* is characterized by tall Utah serviceberry (AMUT) and shorter snowberry (SYRO) which form a moist, shaded environment. Dryland sedge (CAGE) and/or sun sedge (CAPEH) grow in the shaded understory. Where serviceberry has been removed by browsing herbivores, stands are noticeably dryer and sunnier, with conspicuous big sagebrush (ARTR2), muttongrass (POFE), and pine needlegrass (ACPI2). Other distinguishing features include location on upper leeward slopes which are protected from wind, and deep loamy soils. See Table 25-7 for common species names and codes.

These stands, especially those in good condition, are important parts of a healthy watershed. Stands in good condition collect much snow and retain the moisture well into the growing season, preventing erosion downslope and providing more water in the streams late in the growing season. When stands are in poor condition, runoff is rapid and accelerates erosion downslope, and streams dry up in late season.

Utah serviceberry/sedge–Dark clay soils–Leeward is related to *Utah serviceberry–mountain-mahogany/sedge–Dark clay soils–Protected*, which occurs on steeper, more northerly slopes, and has mountain-mahogany (CEMO2) mixed with serviceberry. *Utah serviceberry/sedge–Dark clay soils–Leeward* is also related to *Serviceberry–oak–Dark clay soils–*

Protected, which includes Gambel oak, has less coarse fragment cover on the surface, and occurs on slightly warmer sites, where there is no threat of a hard freeze in the spring. *Utah serviceberry/sedge–Dark clay soils–Leeward* is also related to *Serviceberry/green needlegrass–Deep clay soils–Lees*, which occurs at higher elevations on deeper soils with fewer coarse surface fragments, and either green needlegrass (NAVI4) or spike-fescue (LECI2) is present.

The plant association *Amelanchier utahensis/Carex geophila–Carex pensylvanica ssp. heliophila* (AMUT/CAGE-CAPEH) is described as new here.

Wyoming big sagebrush or big sagebrush (not mountain) communities occur on adjacent, more exposed slopes with shallower soil. Aspen or Douglas-fir forests adjoin this type on better-drained northerly slopes. *Utah serviceberry/sedge–Dark clay soils–Leeward* never occurs adjacent to riparian areas.

Utah serviceberry is one of the most palatable browse plants in the UGB. Browsing on these sites reduces serviceberry cover, especially if animals are concentrated or if browsing continues for a decade or more. Eventually serviceberry will be eliminated, because browsing stimulates the production of longer, more succulent leaders the following season, which causes the animals to be more dedicated each year to searching out every serviceberry plant. As the serviceberry disappears, so do the shade-tolerant species such as mat sedges and green needlegrass. Sagebrush and rabbitbrush invade the site. Other tall shrubs that occur with serviceberry are palatable as well, such as chokecherry and mountain-mahogany.

Deer and elk are the primary browsers on serviceberry, but it is palatable to cattle and domestic sheep as well. Many serviceberry stands

are far from water, but the ones that are closer receive heavy use by livestock. Livestock browsing in serviceberry stands was more intense before the turn of the 20th century, when fences were few and large herds of cattle over-wintered in the valley bottoms. In those days, cattle moved up to whatever they could reach as the snow receded. Moderately-heavy to heavy grazing by cattle, sheep, deer, or elk tends to decrease shrub cover, especially of serviceberry.

Horizontal obstruction varies from low to very high. Hiding cover is high to very high in community type A, moderate to high in community type B, moderately low to moderately high in community types E and G, and low to moderately low in community types C, D, and F. In good condition, these stands provide good cover and browse for deer and elk. Deer make extensive use of these stands year-round, but elk use most of the sites in the winter only. Stands in good condition,

with >40% cover of tall serviceberry, are critically important as mule deer habitat in the UGB. Deterioration of many of these stands because of long-term cattle grazing (especially before World War II) and sharp increases in elk populations in recent decades have resulted in a significant decline in the quality of mule deer habitat in the last 30-40 years.

Less than 20% of this type is in good enough condition now to provide good mule deer habitat. Restoration of deteriorated stands to condition good enough to provide effective mule deer habitat should be a management priority. Midseral communities such as community type C or community type E can be important sage grouse nesting and brood rearing sites because of the sagebrush cover and other shrubs (like snowberry) that help hide nests. Deep, loamy soil produces forbs which are good nestling food.

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	33, soil descriptions from 30; 1 not assigned to a community type (total 34)
ELEVATION	8,490 ft (8,000 - 8,880 ft); 2,588 m (2,430 - 2,710 m)
ASPECT	Usually easterly. Leeward commonly [80%]
LITHOLOGY	Most commonly Tuff-welded Tuff [45%] or Shale-Sandstone-Mudstone [35%]. Basalt [15%] and Breccia [15%] also represented
FORMATIONS ¹	Taf most often [45%], or Km-Jm-Kjdj [30%], Tbb [15%] or Tpl [5%] sometimes; Tos rarely
LANDFORMS	Soil creep slopes [45%] and ridges [25%] commonly. Mesas [15%], slump earthflows [5%], and benches [5%] less often
SLOPE POSITIONS	Usually upper backslopes and shoulders [60%]. Backslopes and lower backslopes less often [30%]; other positions rarely.
SLOPE SHAPES	Usually linear horizontally [75%], concave [50%] or linear [35%] vertically
SLOPE ANGLE	23% (1 - 64%)
SOIL PARENT MATERIAL	The surface is usually colluvial [80%]; sometimes that colluvium is over residuum [25%]. Rarely residual [10%] or old alluvial [5%]
COARSE FRAGMENTS	21% (0 - 50%) cover on surface, 53% (14 - 76%) by volume in soil
SOIL DEPTH	48 cm (20 - 74 cm); 19 in (7 - 29 in)
MOLLIC THICKNESS	32 cm (0 - 66 cm); 13 in (0 - 26 in)
TEXTURE	<i>Surface:</i> Usually gravelly [65%]. Clay loam [30%], loam [25%], sandy loam [10%], sandy clay loam [10%], silt loam [10%], lesser amounts of loamy sand and silty clay loam. <i>Subsurface:</i> Predominantly [70%] with clay >27% (textures of C, CL, and SC). Most common textures are clay [35%], clay loam [20%], and sandy clay [15%]. Less often sandy clay loam [10%], sandy loam [9%], or loamy sand [6%]
SOIL CLASSIFICATION	Most often Argiborolls [75%], sometimes Haploborolls [20%], or rarely Eutroboralfs [6%]. Almost half of these [46%] are Pachic
TOTAL LIVE COVER	119.4% (43 - 318%)
NUMBER OF SPECIES	35 (16 - 52)
TOTAL LIVE COVER/NO. SPECIES	3.6% (1.3 - 8.8%)
CLIMATE	In moderate rainshadow or outside rainshadow. Warm, moderately exposed to sun, protected from wind. In good condition, with >60% cover of tall shrubs, these sites provide a microclimate that is significantly moister and cooler than depleted sites, with sagebrush dominant.
WATER	In good condition, with >60% cover of tall shrubs, these sites trap large amounts of snow from the wind blowing over the ridges to the west. In depleted condition, with sagebrush dominant, the snow is scattered, melts faster and runs off faster. Since many of these sites are in depleted condition, the effect on watersheds is that much less water is held upslope now than 150-200 yr ago. No permanent water on or near sites.

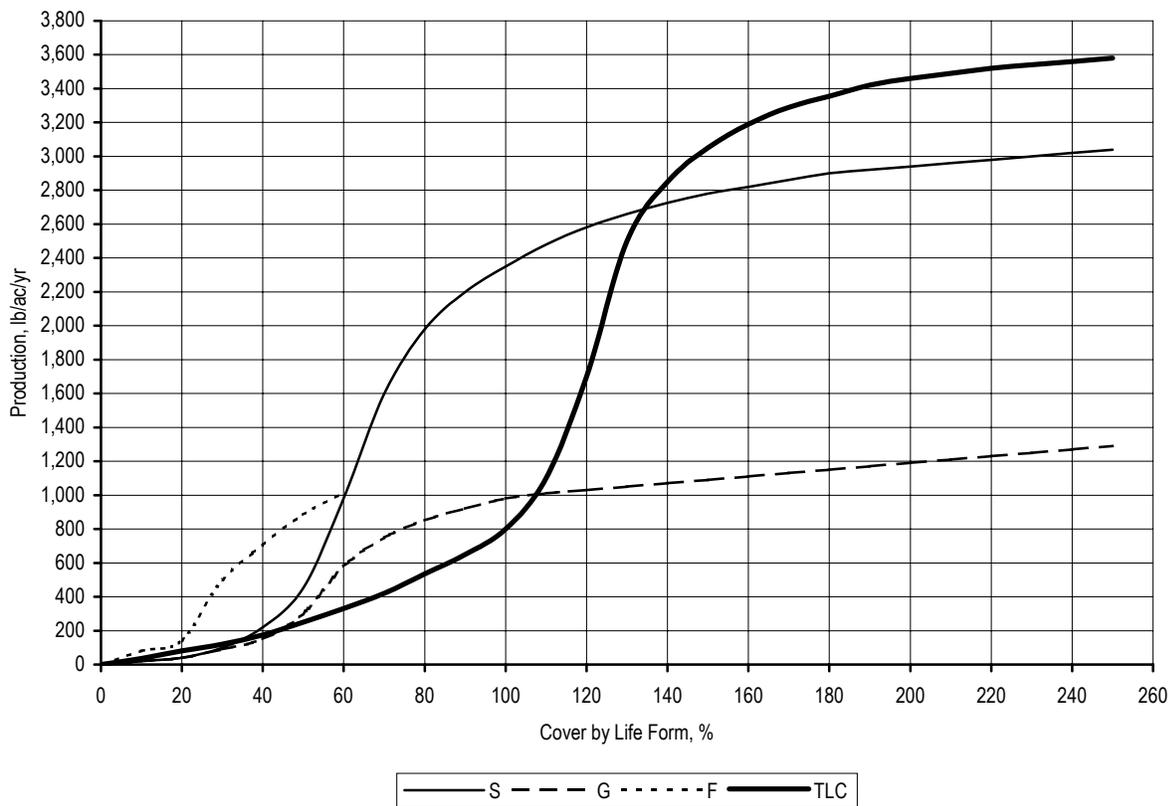


Figure 25-5. Relationship of cover by growth form and production. This is the AMUTCAGE (AMUT-CAGE) model. S = shrubs, G = graminoids, F = forbs, and TLC = Total live cover.

Table 25-4. Resource Values for *Utah serviceberry/sedge-Dark clay soils-Leeward*. Resource values were calculated from the numbers in Table 25-4, 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	Community Type						
	A	B	C	D	E	F	G
Potential Cattle Forage Production	3	0	3-4	1-2	3	0-2	0-2
Grazing Suitability	1-2 ¹	0 ¹	2 ¹	1 ¹	2 ¹	1 ¹	2
Wetland	No	No	No	No	No	No	No
Riparian Area	No	No	No	No	No	No	No
Developed Recreation	ns ²	ns ²	ns ²	ns ²	ns ²	ns ²	ns ²
Dispersed Recreation	ns ²	ns ²	ns ²	ns ²	ns ²	ns ²	ns ²
Scenic	1-2	1-2	1	1	1	1	1
Road & Trail Stability	1 ²	1 ²	0 ²				
Construction Suitability	ns ²	ns ²	ns ²	ns ²	ns ²	ns ²	ns ²
Deer & Elk Hiding Cover	5-6	3-5	1-3	1-2	2-3	1-2	2-4
Deer & Elk Forage & Browse	5-6	4-5	3	3	2-3	2-3	2-3
Need for Watershed Protection	5-6	5-6	5	5	5	4-5	4-5
Soil Stability	2	2	2	2	2	2	2
Risk of Soil Loss-Natural	1-2	2-3	3-4	3-4	3-4	3-4	3-4
Risk of Soil Loss-Management	4-5	4-5	4-5	4-5	4-5	4-5	4-5
Risk of Permanent Depletion-Range	4-5	3-4	2-3	2-3	2-3	2-3	2-3
Risk of Permanent Depletion-Wildlife	4-5	4-5	3-4	3-4	3-4	3-4	3-4
Resource Cost of Management	4-5	4-5	4-5	4-5	4-5	4-5	4-5
Cost of Rehabilitation	5	5	5	5	5	5	5

1. Steep, far from water. 2. Too steep, slumpy. ns = Not suitable.

Key to Community Types

1. Total graminoid cover >70%(2)
 1. Total graminoid cover <70%(3)

 2. Sun sedge conspicuous, >25% cover. Utah serviceberry dominant, >30% cover**A**
 2. Sun sedge absent. Utah serviceberry <20% cover **C**

 3. Total graminoid cover 55-70%. Total sedge cover < 5% **E**
 3. Total graminoid cover <55%. Total sedge cover 0-20%(4)

 4. Utah serviceberry cover >20%. Total graminoid cover <25% **B**
 4. Utah serviceberry cover <20%. Total graminoid cover 2-55% (5)

 5. Big sagebrush cover 20-30%, Utah serviceberry cover 0-10%, total graminoid cover 30-50% **D**
 5. Big sagebrush cover <20% or >30%, Utah serviceberry cover 0-20%, total graminoid cover 2-55%(6)

 6. Big sagebrush cover <20% **F**
 6. Big sagebrush cover >30% **G**
-

Description of Community Types

- A** *Utah serviceberry-snowberry-sun sedge* is characterized by total graminoid cover >80%, >30% cover of tall Utah serviceberry, snowberry cover >40%, and sun sedge cover 30%. Big sagebrush cover is <15%, usually less. One of the two plots had >20% cover of dryland sedge (CAGE).
- B** *Utah serviceberry-sparse* Total graminoid cover is sparse (<25%) under a good canopy (>20% cover) of Utah serviceberry; total sedge cover is <5%. Snowberry is <10% cover, and big sagebrush ranges from absent to 40% cover.
- C** *Big sagebrush-snowberry-dryland sedge-sparse Utah serviceberry* Total graminoid cover is >70% under moderate cover of big sagebrush (usually <20%), with a sparse taller layer of Utah serviceberry (T-15% cover). Total sedge cover is always <20%, often <10%. One of the four plots had significant cover (>50%) of Arizona fescue (FEAR2). Snowberry cover is usually >20%.
- D** *Big sagebrush-sparse Utah serviceberry-pine needlegrass* is dominated by a layer of big sagebrush (20-30% cover) and sparse serviceberry (T-6%). Total graminoid cover is 30-50%. Total sedge cover is <10%. Snowberry cover is sparse, <5%.
- E** *Big sagebrush-muttongrass-sparse snowberry* is dominated by a layer of big sagebrush (25-50% cover), some serviceberry (usually 10-20%), and total graminoid cover of 55-70%; the only community type with graminoid cover this high. Snowberry varies from minor to codominant (2-20% cover). Total sedge cover is <5%.
- F** *Big sagebrush-sparse Utah serviceberry-rabbitbrush-sparse snowberry-Indian ricegrass* has a moderate to sparse sagebrush canopy (T-20% cover). Total graminoid cover is sparse (3-45%). Utah serviceberry is usually sparse (<5%). Total sedge cover is usually sparse (<5%), but one of the five plots had 15-20% cover of sedges. Snowberry cover varies from sparse to moderately sparse (T-15%).
- G** *Big sagebrush-sparse Utah serviceberry-rabbitbrush-sparse snowberry* has a dense layer of big sagebrush (30-60% cover), sparse Utah serviceberry (<10% cover), and sparse to moderate graminoids (10-55% cover). Snowberry is usually noticeable (5-15% cover).

Communities Not Assigned to a Community Type

- One community dominated by Utah serviceberry, chokecherry, and snowberry had very little graminoid cover. It occurred near springs, where chokecherry established because of available ground water. Proximity to water probably leads to the understory being heavily grazed.
-

Table 25-5. Community types within *Utah serviceberry/sedge–Dark clay soils–Leeward.*

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 Layr Cvr %	T				
A. Utah serviceberry-snowberry-sun sedge	2	8,615 (8,550-8,680) 46.2 (28-64)	61 (54-69) 53 (45-60) 45 (30-60)	4 (1-8) 2 (1-3) LS	S1 4.0 (2.5-5) S2 1.8 (0.4-3) S3 1.0 (0.5-1.5) GF 0.6 (0.0-1.1) S4 0.3 (0.0-0.9)	T 32.0 37.0 88.2 65.4	2 (0-5) 122 (120-124) 95 (89-102) 68 (48-87)	37 (36-38) 287 (257-317) 7.8 (6.8-8.8)	2644-2682 893-982 812-1266	73 (45-100) 75 (50-100) 78 (55-100) 98 (95-100) 81 (61-100)	
B. Utah serviceberry-sparse	3	8,473 (8,280-8,740) 32.6 (24-48)	62 (56-67) 57 (49-66) 33 (0-66)	21 (5-37) 12 (4-24) MS-LM	S1 Missing S2 1.7 (1.0-3) S3 0.6 (0.4-1.1) GF 0.2 (0.0-0.6) S4 0.4 (0.0-0.6)	M 38.3 34.2 14.5 10.4	0 (0-0) 75 (52-100) 10 (1-22) 5 (1-13)	25 (18-36) 90 (80-101) 3.8 (2.4-4.6)	799-2312 3-66 8-196	10 (0-30) 25 (0-50) 52 (15-75) 93 (85-100) 45 (25-60)	
C. Big sagebrush-snowberry-dryland sedge-sparse Utah serviceberry	4	8,533 (8,400-8,880) 21.2 (15-33)	54 (45-70) 54 (52-58) 40 (14-53)	11 (0-22) 10 (3-18) EM-MS	S1 2.8 (1.5-4.5) S2 1.6 (0.9-2.3) S3 0.6 (0.4-1.4) GF 0.3 (0.0-1.0) S4 0.2 (0.0-0.5)	0.3 32.5 3.1 76.6 15.0	0 (0-0) 54 (26-79) 95 (75-148) 24 (20-26)	35 (28-52) 172 (122-223) 5.5 (2.4-7.7)	59-1751 754-1094 309-390	0 (0-0) 2 (0-5) 28 (0-50) 77 (40-100) 27 (10-39)	
D. Big sagebrush-sparse Utah serviceberry-pine needlegrass-sparse snowberry	7	8,603 (8,000-9,018) 16.3 (5-32)	48 (20-70) 40 (20-59) 29 (10-38)	19 (9-31) 17 (8-32) EM	S1 Missing S2 Missing S3 0.5 GF 0.4 S4 0.2	M M 24 15 5	0 (0-0) 44 (27-59) 41 (33-49) 22 (8-51)	43 (37-53) 107 (81-136) 2.5 (1.9-3.4)	62-1054 126-380 122-858	0 (0-0) 0 (0-0) 8 (0-25) 74 (55-100) 20 (14-31)	
E. Big sagebrush-muttongrass-sparse snowberry	4	8,758 (8,570-9,022) 21.7 (1-49)	38 (14-50) 51 (45-61) 41 (31-51)	11 (4-24) 10 (2-15) ES	S1 3.0 (2.0-5) S2 Missing S3 0.9 (0.5-1.3) GF 0.3 (0.0-0.9) S4 Missing	T M 38.8 52.3 M	0 (0-0) 65 (57-76) 63 (57-67) 13 (4-21)	30 (24-35) 141 (126-153) 4.9 (4.0-6.4)	972-1659 501-649 59-323	0 (0-0) 0 (0-0) 20 (5-40) 88 (65-100) 27 (18-35)	
F. Big sagebrush-sparse Utah serviceberry-rabbitbrush-sparse snowberry-Indian ricegrass	5	8,354 (8,100-8,700) 17.4 (9-28)	45 28 28	36 (16-50) 22 (8-55) ES-EM	S1 Missing S2 1.7 (1.2-2.2) S3 0.5 (0.3-0.8) GF 0.3 (0.0-0.9) S4 0.2 (0.0-0.3)	M 14.3 12.3 35.2 14.1	0 (0-0) 32 (22-43) 24 (4-46) 15 (9-24)	42 (28-50) 71 (43-90) 1.7 (1.3-2.0)	50-476 11-328 136-357	0 (0-0) 4 (0-15) 6 (0-25) 61 (30-80) 18 (8-29)	
G. Big sagebrush-sparse Utah serviceberry-rabbitbrush-sparse snowberry	12	8,467 (8,140-9,036) 19.9 (9-34)	57 (27-76) 46 (20-74) 26 (0-50)	21 (2-41) 13 (2-39) ES	S1 Missing S2 1.1 (0.9-1.4) S3 0.4 (0.3-1.0) GF 0.3 (0.0-0.6) S4 0.1 (0.0-0.2)	M T 37.0 38.0 5.1	0 (0-1) 60 (43-83) 30 (11-52) 11 (2-45)	34 (16-44) 101 (72-130) 3.1 (1.8-4.8)	445-1892 34-432 28-746	3 (0-25) 4 (0-30) 16 (0-55) 76 (15-95) 25 (6-51)	

Table 25-6. Wildlife values (relative to the whole UGB) for the principal wildlife species using *Utah serviceberry/sedge–Dark clay soils–Leeward.* “|” means the same as above.

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



Utah serviceberry/mat sedges (Community Type A), with sagebrush and rabbitbrush invading the site. Such sites may occasionally be used for sage grouse nesting habitat. Utah serviceberry 48% cover, snowberry 43%, sun sedge 31%, bitterbrush 15%, big sagebrush 10%. Coarse Fragments Cover = 1%, Total Live Cover = 257%, Coarse Fragments in Soil = 48. Soil sampled as a Typic Argiboroll, Loamy-Skeletal, Mixed. Big Mesa Quadrangle, elevation 8,550 ft, 28° 06'6" (ENE) slope. August 1, 1994.



Utah serviceberry/mat sedges site in early seral stage (Community Type G). There are a few, very heavily browsed serviceberry shrublets in this site, and the soil has apparently lost 6-10 inches of dark soil surface from heavy grazing and browsing by livestock and big game over the last century or so, followed by heavy big game browsing in recent decades. Big sagebrush 45%, bitterbrush 24%, muttongrass 22%, pityophila sedge 6%, snowberry 6%, Utah serviceberry <1%. Coarse Fragments Cover = 18%, Total Live Cover = 128%, Coarse Fragments in Soil = 44. Soil sampled as an "Aridic Eutroboralf, Clayey-Skeletal, Smectitic," which used to be the subsoil under a Typic Argiboroll. Signal Peak Quadrangle, elevation 8,460 ft, 27° 07'9" (ENE) slope. July 8, 1994.

Table 25-7. Common Species in *Utah serviceberry/sedge-Dark clay soils-Leeward*, 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	G	
Code	Species	Ccv(Con) N = 2	Ccv(Con) 3	Ccv(Con) 4	Ccv(Con) 7	Ccv(Con) 4	Ccv(Con) 5	Ccv(Con) 12	Common Name
SHRUBS									
AMUT	<i>Amelanchier utahensis</i>	40(100)	31(100)	7(100)	2 (86)	22 (50)	5(100)	2 (92)	Utah serviceberry
ARTR2	<i>Artemisia tridentata</i>	6(100)	35 (67)	17(100)	24(100)	38(100)	11(100)	43(100)	big sagebrush
CHDE2	<i>Chrysothamnus depressus</i>	-	1 (33)	-	T (14)	-	T (40)	T (42)	dwarf rabbitbrush
CHV18	<i>Chrysothamnus viscidiflorus</i>	1(100)	T (67)	5(100)	5 (86)	5 (75)	5(100)	4(100)	Douglas rabbitbrush
LEPU	<i>Leptodactylon pungens</i>	-	-	T (25)	1 (71)	1 (25)	T (40)	1 (42)	granite gilia
MARE11	<i>Mahonia repens</i>	-	1 (33)	1 (50)	2 (57)	T (25)	1 (80)	T (17)	Oregon-grape
OPPO	<i>Opuntia polyacantha</i>	-	-	T (25)	T (43)	-	T (20)	T (42)	plains prickly-pear
PUTR2	<i>Purshia tridentata</i>	15 (50)	19 (67)	T (25)	12 (71)	5 (75)	-	6 (58)	antelope bitterbrush
SYRO	<i>Symphoricarpos rotundifolius</i>	54(100)	4(100)	20(100)	1(100)	8(100)	5(100)	5(100)	mountain snowberry
TECA2	<i>Tetradymia canescens</i>	-	4 (33)	7 (25)	2 (86)	-	4 (60)	T (42)	gray horsebrush
GRAMINOIDS									
ACHY	<i>Achnatherum hymenoides</i>	-	11 (67)	3 (25)	2 (43)	-	2(100)	2 (42)	Indian ricegrass
ACNE9	<i>Achnatherum nelsonii</i>	14(100)	-	14 (50)	-	-	-	-	Nelson's needlegrass
ACPI2	<i>Achnatherum pinetorum</i>	1 (50)	-	18 (75)	2 (86)	7 (75)	5 (80)	5 (92)	pine needlegrass
CAFO3	<i>Carex foenea</i>	21 (50)	-	-	-	-	-	-	silvertop sedge
CAGE	<i>Carex geophila</i>	-	1 (67)	6(100)	5 (57)	2 (50)	2 (80)	4 (67)	dryland sedge
CAOB4	<i>Carex obtusata</i>	-	-	-	-	-	19 (20)	-	blunt sedge
CAPEH	<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	40(100)	-	-	-	1 (25)	-	-	sun sedge
ELEL5	<i>Elymus elymoides</i>	1(100)	2(100)	5(100)	3 (86)	7(100)	1(100)	3 (92)	bottlebrush squirreltail
FEAR2	<i>Festuca arizonica</i>	T (50)	-	60 (25)	8 (14)	7 (25)	-	-	Arizona fescue
HECO26	<i>Hesperostipa comata</i>	4 (50)	-	-	14 (29)	T (25)	1 (20)	2 (25)	needle-and-thread
KOMA	<i>Koeleria macrantha</i>	9 (50)	-	3 (50)	2 (71)	8 (75)	2 (80)	5 (33)	prairie junegrass
PASM	<i>Pascopyrum smithii</i>	-	2 (33)	27 (25)	14 (29)	5 (25)	4 (80)	2 (58)	western wheatgrass
POFE	<i>Poa fendleriana</i>	16(100)	-	21 (75)	18 (86)	34(100)	7 (80)	14 (92)	muttongrass
POSE	<i>Poa secunda</i>	-	-	41 (25)	-	-	1 (20)	21 (8)	Sandberg bluegrass
FORBS									
ACLA5	<i>Achillea lanulosa</i>	6 (50)	T (33)	T (25)	9 (14)	1 (50)	T (40)	3 (17)	western yarrow
ANSE4	<i>Androsace septentrionalis</i>	-	-	T (25)	1 (86)	1 (25)	2 (40)	1 (50)	northern rock-jasmine
ANPA4	<i>Antennaria parvifolia</i>	-	-	-	1 (57)	-	T (20)	1 (33)	smallleaf pussytoes
ARFR4	<i>Artemisia frigida</i>	-	T (33)	3 (50)	1 (14)	-	1 (80)	3 (17)	fringed sagewort
ASTRA	<i>Astragalus</i>	-	3 (33)	-	T (43)	T (25)	5 (20)	1 (17)	milkvetch
CACH7	<i>Castilleja chromosa</i>	-	-	-	T (43)	-	2 (20)	T (33)	wavyleaf paintbrush
CAL14	<i>Castilleja linariifolia</i>	12 (50)	T (33)	T (25)	T (29)	1 (75)	3 (20)	T (33)	Wyoming paintbrush
EREA	<i>Erigeron eatonii</i>	-	-	1 (75)	2 (71)	1 (25)	1 (80)	1 (67)	Eaton fleabane
ERRA3	<i>Eriogonum racemosum</i>	-	-	T (25)	T (57)	T (50)	T (20)	T (33)	redroot buckwheat
ERUM	<i>Eriogonum umbellatum</i>	25 (50)	T (33)	6 (50)	2 (43)	8 (25)	T (60)	1 (67)	sulfur buckwheat
LALE2	<i>Lathyrus leucanthus</i>	-	-	-	11 (14)	-	-	-	aspen peavine
LUAR3	<i>Lupinus argenteus</i>	25 (50)	-	1 (25)	T (43)	5(100)	1 (60)	T (25)	silvery lupine
LUSE4	<i>Lupinus sericeus</i>	5 (50)	-	17 (50)	-	-	-	-	silky lupine
PECA4	<i>Penstemon caespitosus</i>	T (50)	T (33)	1 (50)	2 (86)	1 (50)	1 (60)	1 (83)	beardtongue
PHHO	<i>Phlox hoodii</i>	-	-	1 (25)	5 (57)	-	2 (80)	2 (67)	Hood's phlox
PHMU3	<i>Phlox multiflora</i>	-	T (33)	1 (25)	7 (29)	-	T (40)	5 (17)	flowery phlox
SPCO	<i>Sphaeralcea coccinea</i>	-	-	T (25)	1 (29)	-	T (40)	T (25)	scarlet globe mallow
TRGY	<i>Trifolium gymnocarpum</i>	-	1 (33)	8 (50)	1 (71)	-	2 (80)	2 (67)	holly-leaf clover
FORB	forb unknown	-	-	T (25)	T (43)	-	1 (20)	1 (25)	unknown forb
GROUND COVER									
.BARESO	bare soil	2(100)	12(100)	10(100)	17(100)	10(100)	22(100)	13 (92)	
.LITTER	litter and duff	93(100)	64(100)	78(100)	62(100)	78(100)	41(100)	61 (92)	
GRAVEL	gravel 0.2-10 cm	T	7	5	10	4	14	11	
.COBBLE	cobble 10-25 cm	1 (50)	5(100)	2 (75)	4 (71)	12 (25)	7(100)	5 (67)	
.STONES	stone > 25 cm	7 (50)	6 (33)	2 (25)	5 (43)	1 (25)	7 (80)	4 (33)	
.MOSSON	moss on soil	-	-	-	2 (14)	1 (25)	T (20)	2 (17)	
LICHENS	lichens on soil	-	-	-	4	T	2	1	

UTAH SERVICEBERRY-MOUNTAIN-MAHOGANY/SEDGE-DARK CLAY SOILS-PROTECTED

Utah serviceberry-mountain-mahogany/dryland sedge-sun sedge-Argiborolls-
Protected colluvial backslopes and shoulders, < 8,700 ft

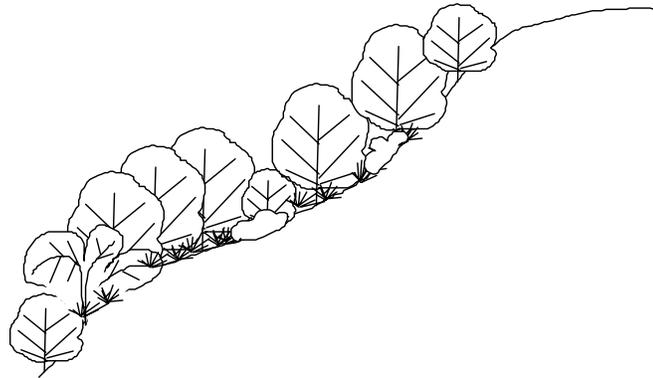


Figure 25-6. Cross-section of vegetation structure of *Utah serviceberry-mountain-mahogany/sedge-Dark clay soils-Protected*. Aspects are northwesterly, and slope angles average 35%.

Utah serviceberry-mountain-mahogany/sedge-Dark clay soils-Protected is a moderately common type on rocky, convex northwesterly slopes and ridges, on coarse to very coarse soils, usually outside the deep rainshadow climates. In the middle Gunnison Basin, this type occurs on steep northerly and easterly slopes, usually outside deep rainshadows. This type probably occurs elsewhere in western Colorado and eastern Utah.

Utah serviceberry-mountain-mahogany/sedge-Dark clay soils-Leeward is characterized by Utah serviceberry (AMUT) and mountain-mahogany (CEMO2) in the tall shrub layer, sometimes with chokecherry (PAV111). Earlier seral stages include such invaders as big sagebrush (ARTR2), muttongrass (POFE), and pine needlegrass (ACPI2). See Table 25-10 for common species names and codes. Other distinguishing features include mat sedges and location on leeward and northerly slopes.

Utah serviceberry-mountain-mahogany/sedge-Dark clay soils-Protected is related to *Utah serviceberry/sedge-Dark clay soils-Leeward*, which occurs on gentler, clearly easterly slopes, and lacks mountain-mahogany. *Utah serviceberry-mountain-mahogany/sedge-Dark clay soils-Protected* is also related to *Serviceberry-oak-Dark clay soils-Protected*, which occurs on slightly gentler slopes in microclimates where there is no threat of hard freeze in the spring, and oak is conspicuously mixed with serviceberry. *Utah serviceberry-mountain-mahogany/sedge-Dark clay soils-Protected* is also related to *Serviceberry/green needlegrass-Deep clay soils-Lees*, which occurs at higher elevations on deeper soils with fewer surface coarse fragments, and green needlegrass (NAVI4) or spike-fescue (LEKI2) is present.

The plant association *Amelanchier utahensis-Cercocarpus montanus/Carex geophila-Carex pensylvanica* ssp. *heliophila* is described as new here. This plant association does not seem to have been described previously.

Wyoming big sagebrush or big sagebrush (not mountain) communities adjoin this type on more exposed slopes with shallower soils. Aspen or Douglas-fir forests occur on adjacent, better-drained northerly slopes. This type rarely occurs adjacent to riparian areas.

Utah serviceberry is one of the most palatable plants in the UGB. Browsing reduces serviceberry cover, especially if animals are concentrated or if browsing continues for a decade or more. Serviceberry will eventually be eliminated, because browsing stimulates production of longer, succulent leaders the next season, so animals become more dedicated each year to searching out every serviceberry plant. Browsing decreases mountain-mahogany too, but much less dramatically, since it is more resistant to browsing. As the serviceberry disappears, so do the shade-tolerant species such as mat sedges and green needlegrass. Sagebrush and rabbitbrush invade the site. Other tall shrubs that occur with serviceberry are often palatable as well, including chokecherry and mountain-mahogany, which is especially palatable to deer.

Deer and elk are the primary browsers of serviceberry, which is also palatable to cattle and domestic sheep. Many serviceberry stands are far from water, but the ones that are closer are heavily browsed by livestock. Browsing by livestock was more intense before the turn of the 20th century, when there were few fences and large herds of cattle over-wintered in the valley bottoms. In those days, cattle moved up to whatever they could reach as the snow receded. Moderately-heavy to heavy

grazing by cattle, sheep, deer, or elk decreases shrub cover, especially of serviceberry and mountain-mahogany, decreases sedge cover (because of reduced shade), increases invader shrubs such as sagebrush and rabbitbrush, and increases dry-site grasses and forbs.

Horizontal obstruction varies from low to very high. Hiding cover is very high in community type A, moderately high to high in community type B, moderate to very high in community type C, and low to moderate in community type D. In good condition, these stands provide good cover and browse for deer and elk. Deer use these stands year-round, but elk use most sites only in the winter.

Stands of this type, especially those in good condition with >40% cover of tall shrubs, are important mule deer habitat in the UGB. Most stands are in good enough condition now to provide good mule deer habitat, but all stands could use improvement, especially to increase the proportion of serviceberry in the shrub mix.

Midseral sites, like community type C or community type D, may be used by sage grouse for nesting and brood rearing because of the sagebrush cover and other shrubs (like snowberry) that provide cover for nests. Deep loamy soils produce forbs that are good nestling food.

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	15, soil descriptions from 14; one not assigned to a community type (total 16)
ELEVATION	8,285 ft (7,600-8,640 ft); 2,525 m (2,315-2,640 m)
ASPECT	Aspects center around northwest, usually on lower slopes if windward, and so at least moderately protected from wind
LITHOLOGY	A wide variety, including Tuff - Welded Tuff [43%], Sandstone - Mudstone - Shale [33%], and Breccia - Basalt [24%]
FORMATIONS ¹	Taf [45%], Tpl [20%], Jj - Kd - Km - Kjdm [30%]
LANDFORMS	Mostly soil creep slopes [53%], with some mesas and ridges [41%]. Others are minor
SLOPE POSITIONS	Mostly backslopes - upper backslopes - shoulders [82%]
SLOPE SHAPES	Mostly linear [81%] horizontally, Linear [50%] to convex [31%] vertically.
SLOPE ANGLES	35% (12-53%)
SOIL PARENT MATERIAL	Mostly colluvium [56%] or colluvium over residuum [38%]
COARSE FRAGMENTS	25% (5-66%) cover on surface, usually cobbly, very gravelly, or stony. Coarse fragments are 44% (7-67%) by volume in soil
SOIL DEPTH	49 cm (13-85 cm); 19 in (5-34 in)
MOLLIC THICKNESS	27 cm (0-85 cm); 11 in (0-34 in)
TEXTURE	<i>surface</i> : Mostly loam or sandy loam [71%]; <i>subsurface</i> : Mostly clay, clay loam, or sandy clay [79%]
SOIL CLASSIFICATION	Argiborolls [81%] or Haploborolls [13%]; [25%] Pachic and [19%] Lithic.
TOTAL LIVE COVER	155.8% (88 - 219)
NUMBER OF SPECIES	32 (23 - 46)
TOTAL LIVE COVER/NO. SPECIES	5.0% (2.6 - 8.0%)
CLIMATE	In moderate rainshadow or outside rainshadow. Warm, moderately exposed to sun, somewhat protected from wind. Sites with >60% cover of tall shrubs create a microclimate significantly moister and cooler than sites where sagebrush is dominant.
WATER	Sites with >60% cover of tall shrubs trap some snow in the winter. No permanent water on or near sites.

Key to Community Types

1. Total tall shrub cover (serviceberry, mountain-mahogany, and chokecherry) >70%. Utah serviceberry cover >30%. Total sedge (CAREX) cover > 20%.....**A**
1. Total tall shrub cover <70%. Serviceberry cover <40%. If total tall shrub cover rarely >80%, then serviceberry cover always <30%. Total sedge cover usually <20%, sometimes more.....(2)
2. Total graminoid cover >55%. Total tall shrub cover >45%, usually >50%. Total sedge cover usually >5%.....**B**
2. Total graminoid cover <55%. Total tall shrub cover <55%, usually <45%. Total sedge cover <15%, often <10%.....(3)
3. Either total tall shrub cover >40% or serviceberry cover >10%. Total sedge cover <5%.....**C**
3. Total tall shrub cover always <40%. Serviceberry cover usually <5%. Total sedge cover 0-15%.....**D**

Description of Community Types

- A** *Utah serviceberry-mountain-mahogany-snowberry-dryland sedge* is close to Potential Natural Community stage, with tall shrub cover (AMUT-CEMO2-PAVI11) >75%, Utah serviceberry cover >30%, and sedge cover >20%. Graminoid production is moderate because of dense cover by tall deciduous shrubs. Shrub production is high. Horizontal obstruction is complete to very high, ranging from 1.5 to 2.0 m.
- B** *Mountain-mahogany-Utah serviceberry-big sagebrush-snowberry-muttongrass* has a reduced tall shrub layer, usually 45-60% cover, and big sagebrush has invaded into the site, along with other sun-loving species such as muttongrass. Utah serviceberry cover is 10-40%. Graminoid production is moderate to high; shrub production is moderate to moderately high. Horizontal obstruction is very high above 1 m, but moderately low to moderate below 1 m.
- C** *Mountain-mahogany-Utah serviceberry-big sagebrush-snowberry* The tall shrub layer is even more reduced, usually 40-55% cover. Utah serviceberry cover ranges from Trace to 35%. Graminoid production is low to moderate; shrub production is high, mostly by invaders such as sagebrush and rabbitbrush. Horizontal obstruction is high above 1 m, but moderately low to moderate below 1 m.
- D** *Mountain-mahogany-sagebrush-muttongrass-sparse Utah serviceberry* has a very reduced tall shrub layer with <40% cover. Serviceberry cover is usually <5%. Graminoid production can be high. Horizontal obstruction is moderate to high above 1.5 m, but typically very low to low below.

Communities Not Assigned to a Community Type

- One community has abundant tall shrub cover and good cover of tall Utah serviceberry, but dryland sedge is sparse, as are graminoids in general. Except for the sedge and graminoid cover, this plot would fit well in community type A.

Table 25-8. Community types within *Utah serviceberry-mountain-mahogany/sedge-Dark clay soils-Protected*.

Community Type	No. samples	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Lr	Layer Height, m	Avg Layr Cvr %	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
A. Utah serviceberry-mountain-mahogany-snowberry-dryland sedge	2	8,540 (8,480-8,600) 27.0 (27-27)	48 (45-51) 39 (34-43) 18 (15-20)	5 (5-6) 1 (1-1) LS	S1 S2 GF S3 LM	1.5 (1.0-3.0) 1.0 (0.4-1.5) 0.3 (0.0-1.2) 0.2 (0.0-0.5) 0.0	50.9 25.8 85.3 46.7 1.3	0 (0-0) 142 (138-147) 59 (57-61) 7 (0-13)	30 (25-34) 208 (199-217) 7.2 (6.4-8.0)	2779-2809 501-562 1-198	83 (75-90) 100(100-100) 100(100-100) 100(100-100) 96 (94-98)
B. Mountain-mahogany-Utah serviceberry-big sagebrush-snowberry-muttongrass	5	8,282 (7,600-8,640) 36.9 (31-47)	57 (51-66) 56 (38-68) 31 (23-39)	23 (11-36) 2 (0-5) LM-MS	S1 S2 GF S3 LM	1.9 (0.8-3.0) 0.7 (0.2-1.5) 0.2 (0.0-1.2) 0.2 (0.0-0.4) 0.0	14.4 48.5 73.3 30.2 0.9	0 (0-0) 89 (70-97) 76 (66-96) 19 (2-25)	31 (25-34) 185 (155-219) 6.0 (5.0-6.6)	1443-2264 633-948 31-384	25 (10-50) 47 (40-55) 80 (65-95) 95 (85-100) 62 (53-68)
C. Mountain-mahogany-Utah serviceberry-big sagebrush-snowberry	4	8,208 (7,700-8,520) 47.6 (43-53)	58 (23-79) 55 (15-78) 24 (0-43)	32 (16-66) 8 (0-20) LM-MS	S1 S2 GF S3 LM	1.4 (0.9-2.0) 0.6 (0.3-0.9) 0.2 (0.0-0.6) 0.3 (0.0-0.6) 0.0	42.0 18.6 28.9 43.6 4.4	0 (0-0) 82 (76-90) 27 (11-55) 7 (0-22)	28 (23-35) 117 (89-153) 4.2 (3.5-4.5)	1665-2071 32-467 0-327	33 (0-75) 54 (25-75) 74 (55-90) 98 (90-100) 64 (43-81)
D. Mountain-mahogany-big sagebrush-muttongrass-sparse Utah serviceberry	5	8,305 (7,920-8,566) 24.6 (12-38)	47 (20-60) 38 (13-85) 30 (3-85)	24 (12-39) 8 (1-24) EM-MS	S1 S2 GF S3 LM	1.3 (0.8-1.2) 0.5 (0.3-0.7) 0.2 (0.0-0.5) 0.1 (0.0-0.3) 0.0	27 25 76 17 4	0 (0-2) 78 (57-117) 42 (19-73) 15 (3-27)	39 (34-46) 135 (100-183) 3.5 (2.6-4.7)	978-2606 58-731 48-406	3 (0-15) 11 (0-20) 42 (0-90) 86 (45-100) 36 (11-51)

Table 25-9. Resource Values for <i>Utah serviceberry-mountain-mahogany/sedge-Dark clay soils-Protected</i> . Resource values were calculated from the numbers in Table 25-8, 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.				
Community Type				
Resource Value	A	B	C	D
Potential Cattle Forage Production	3	3-4	0-2	1-3
Grazing Suitability	1 ¹	1 ¹	1 ¹	2
Wetland	No	No	No	No
Riparian Area	No	No	No	No
Developed Recreation	ns ²	ns ²	ns ²	ns ²
Dispersed Recreation	0-1	0-1	0-1	1-2
Scenic	2	2	2	2
Road & Trail Stability	2-3	2-3	2-3	3-4
Construction Suitability	ns ²	ns ²	ns ²	0-1
Deer & Elk Hiding Cover	6	4-5	3-6	1-3
Deer & Elk Forage & Browse	5-6	4-5	3-4	3
Need for Watershed Protection	3-4	3-4	3	3
Soil Stability	2-3	2-3	2-3	3
Risk of Soil Loss-Natural	3	3	3	3
Risk of Soil Loss-Management	3-4	3-4	3-4	2-3
Risk of Permanent Depletion-Range	3-4	3-4	2-3	2-3
Risk of Permanent Depletion-Wildlife	3-4	2-3	2	2
Resource Cost of Management	3-4	3-4	3-4	2-3
Cost of Rehabilitation	4	4	4	3

1. Steep, far from water. 2. Too steep, slumpy. ns = Not suitable.



A mountain-mahogany-Utah serviceberry/mat sedges stand (not classified as a community type), on a very well-drained site: a few inches of soil stabilizing an old rock pile. Mountain-mahogany 56% cover, Utah serviceberry 35%, pityophila sedge 15%, snowberry 8%, big sagebrush 3%. Coarse Fragments Cover = 12%, Total Live Cover = 128%, Coarse Fragments in Soil = 39. Soil sampled as a Typic Argiboroll, Clayey-Skeletal over Fragmental, Smectitic. Signal Peak Quadrangle, elevation 9,040 ft, 2% 284° (WNW) slope. July 21, 1994.

Table 25-10. Common Species in *Utah serviceberry-mountain-mahogany/sedge-Dark clay soils-Protected*, 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	Common Name
Code	Species	Ccv (Con) N = 2	Ccv (Con) 5	Ccv (Con) 4	Ccv (Con) 5	
SHRUBS						
AMUT	<i>Amelanchier utahensis</i>	47 (100)	24 (100)	16 (100)	6 (100)	Utah serviceberry
ARNO4	<i>Artemisia nova</i>	-	-	T (25)	5 (60)	black sagebrush
ARTR2	<i>Artemisia tridentata</i>	11 (100)	15 (100)	14 (100)	15 (100)	big sagebrush
CEMO2	<i>Cercocarpus montanus</i>	42 (100)	32 (100)	22 (100)	33 (100)	true mountain-mahogany
CHDE2	<i>Chrysothamnus depressus</i>	-	-	T (25)	1 (60)	dwarf rabbitbrush
CHV18	<i>Chrysothamnus viscidiflorus</i>	1 (100)	4 (100)	6 (100)	11 (100)	Douglas rabbitbrush
PUTR2	<i>Purshia tridentata</i>	3 (100)	5 (40)	15 (50)	3 (40)	antelope bitterbrush
SYRO	<i>Symphoricarpos rotundifolius</i>	36 (100)	10 (100)	13 (100)	2 (100)	mountain snowberry
GRAMINOIDS						
ACHY	<i>Achnatherum hymenoides</i>	-	-	8 (50)	6 (60)	Indian ricegrass
ACPI2	<i>Achnatherum pinetorum</i>	4 (50)	5 (80)	-	1 (40)	pine needlegrass
CAFO3	<i>Carex foenea</i>	16 (50)	30 (20)	-	-	silvertop sedge
CAGE	<i>Carex geophila</i>	13 (100)	13 (60)	1 (75)	15 (40)	dryland sedge
CAHO5	<i>Carex hoodii</i>	16 (50)	-	-	-	Hood sedge
ELEL5	<i>Elymus elymoides</i>	6 (50)	4 (100)	1 (100)	3 (100)	bottlebrush squirreltail
HECO26	<i>Hesperostipa comata</i>	-	1 (20)	-	3 (60)	needle-and-thread
KOMA	<i>Koeleria macrantha</i>	4 (100)	7 (80)	7 (25)	5 (80)	prairie junegrass
POFE	<i>Poa fendleriana</i>	8 (100)	41 (100)	24 (75)	26 (80)	muttongrass
POSE	<i>Poa secunda</i>	-	13 (20)	-	-	Sandberg bluegrass
FORBS						
AMLA6	<i>Amerosedum lanceolatum</i>	-	1 (40)	4 (25)	3 (60)	yellow stonecrop
ANSE4	<i>Androsace septentrionalis</i>	4 (50)	-	-	2 (60)	northern rock-jasmine
ARFR4	<i>Artemisia frigida</i>	T (50)	-	T (25)	1 (40)	fringed sagewort
CALI4	<i>Castilleja linariifolia</i>	-	3 (60)	5 (25)	1 (40)	Wyoming paintbrush
COUM	<i>Comandra umbellata</i>	-	1 (60)	-	T (20)	bastard toadflax
EREA	<i>Erigeron eatonii</i>	1 (50)	2 (100)	4 (25)	1 (80)	Eaton fleabane
ERUM	<i>Eriogonum umbellatum</i>	T (100)	7 (60)	3 (50)	7 (20)	sulfur buckwheat
HEPA11	<i>Heuchera parvifolia</i>	-	1 (20)	1 (50)	1 (20)	littleleaf alumroot
PECA4	<i>Penstemon caespitosus</i>	-	1 (60)	1 (25)	T (60)	beardtongue
PEST2	<i>Penstemon strictus</i>	T (50)	T (60)	-	-	Mancos penstemon
PHHO	<i>Phlox hoodii</i>	-	T (20)	T (25)	3 (80)	Hood's phlox
FORB	forb unknown	-	-	T (25)	1 (60)	unknown forb
GROUND COVER						
.BARESO	bare soil	1 (50)	2 (100)	8 (100)	8 (100)	
.LITTER	litter and duff	91 (100)	73 (100)	59 (100)	65 (100)	
GRAVEL	gravel 0.2-10 cm	1	4	12	7	
.COBBLE	cobble 10-25 cm	2 (100)	7 (80)	9 (100)	6 (80)	
.STONES	stone > 25 cm	2 (50)	9 (100)	2 (75)	8 (80)	
.MOSSON	moss on soil	3 (50)	-	4 (50)	3 (20)	
LICHENS	lichens on soil	-	4	4	1	

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

SERVICEBERRY-OAK-DARK CLAY SOILS-PROTECTED

Serviceberry-Gambel oak/Sedge-
Deep Argiborolls, little coarse on surface-Lees or other protected slopes, 7,600 - 8,600 ft

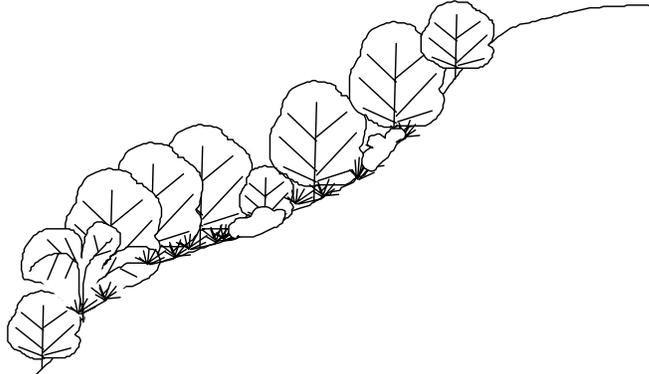


Figure 25-7. Cross-section of vegetation structure of *Serviceberry-oak-Dark clay soils-Protected*. Aspects are various, and slope angles average 26%.

Serviceberry-oak-Dark clay soils-Protected is an uncommon type in small areas in the bottom of the western portion of the UGB, where hard springtime freezes do not damage the leaf buds of Gambel oak. These areas generally occur in moderate rainshadow climates, in warmer pockets in the western part of the Gunnison Basin. This type is also known from far south-central Wyoming, many places in western Colorado, northwestern New Mexico, and northeastern Utah. *Serviceberry-oak-Dark clay soils-Protected* is characterized by either Utah or Saskatoon serviceberry (AMUT-AMAL2), Gambel oak (QUGA), mountain snowberry (SYRO), and one of several sedges, usually dryland sedge (CAGE), elk sedge (CAGE2), or silvertop sedge (CAFO3). Early seral stages also support big sagebrush (ARTR2) and sun-loving species such as muttongrass (POFE). See Table 25-15 for common species names and codes. Other distinguishing features include oak mixed with serviceberry, deep Argiborolls, and no coarse fragments on the soil surface.

Serviceberry-oak-Dark clay soils-Protected is related to *Utah serviceberry/sedge-Dark clay soils-Leeward*, which has more surface coarse fragments, occurs in microclimates where hard spring frosts do not occur, and lacks oak. The similarities between these types support the hypothesis that serviceberry is the potential community on much, if not all, of the oak-dominated lands of western Colorado.

Serviceberry-oak-Dark clay soils-Protected is also related to *Utah serviceberry-mountain-mahogany/sedge-Dark clay soils-Protected*, which occurs on slightly steeper slopes with more surface coarse fragments, and lacks oak. These types are also very similar (mountain-mahogany may occur in both, for example), lending support to the serviceberry-potential hypothesis. *Serviceberry-oak-Dark clay soils-Protected* is

also related to *Saskatoon serviceberry/elk sedge-Deep dark soils-Lees*, which occurs at higher elevations, has slightly more surface coarse fragments, and lacks oak.

The plant association *Amelanchier utahensis-A. alnifolia-Quercus gambelii/Carex geophila-Carex geyeri* is described as new here and is based on parts of several descriptions:

- *Q. gambelii/Symphoricarpos/Lathyrus* (Boyce 1977)
- *Q. gambelii/C. geyeri* (Henderson and others 1977)
- Oak-serviceberry (Steinhoff 1978)
- *Q. gambelii/Symphoricarpos/C. geyeri* (Hess and Wasser 1982)
- *Q. gambelii-A. utahensis/C. geyeri* (Baker 1982)

Wyoming big sagebrush or big sagebrush (not mountain) communities occur on adjacent, more exposed slopes with shallower soil. Aspen or Douglas-fir forests border this type on better-drained northerly slopes. *Serviceberry-oak-Dark clay soils-Protected* is never adjacent to riparian areas.

Serviceberry is one of the most palatable browse plants in the UGB. Heavy browsing reduces serviceberry cover, especially if animals are concentrated or if browsing continues over a decade or more. Serviceberry will eventually be eliminated because browsing induces longer, more succulent leaders the next season, so the animals become more dedicated each year to searching out every serviceberry plant. Browsing also reduces other palatable tall shrubs such as chokecherry and mountain-mahogany, leaving stands of pure oak. Oak is somewhat palatable to animals, and in critical locations it may be eaten, but it is much more tolerant of browsing and is rarely eliminated from a site by browsing alone. As the canopy of oak becomes sparser, sun-loving plants such as big

sagebrush, rabbitbrush, and dry-site grasses invade.

Deer and elk are the primary browsers of serviceberry, but it is palatable to cattle and domestic sheep as well. Many serviceberry stands are far from water, but those near water are heavily browsed by livestock. Serviceberry was more intensely used by livestock before the turn of the 20th century, when there were few fences and large herds of cattle over-wintered in the valley bottoms. In those days, cattle moved up to whatever they could reach as the snow receded. Moderately-heavy to heavy grazing by cattle, sheep, deer, or elk decreases shrub cover, especially of serviceberry and mountain-mahogany, decreases sedge cover (because of reduced shade), increases invader shrubs such as sagebrush and rabbitbrush, and increases dry-site grasses and forbs. Heavy grazing and browsing by deer and elk also reduces oak cover.

Horizontal obstruction varies from moderately low to very high. Hiding cover is very high in

community type A, moderately low to moderate in community type B, and moderate to moderately high in Community types C and D. In good condition, these stands provide cover and browse for deer and elk. Deer use these stands year-round, but elk use most of the sites only in winter.

Stands in good condition, with >40% cover of tall serviceberry, are important mule deer habitat in the UGB. Deterioration of many of these stands by long-term cattle grazing (especially before World War II) and sharp increases in elk populations in recent decades has caused a significant decline in the quality of mule deer habitat in the last 30-40 years.

Midserral sites such as community type C or community type D meet the criteria for sage grouse nesting and brood-rearing sites, which they may once have been, but they occur in the western end of the bottom of the UGB, where few sage grouse remain.



Looking south down an east-west ridge, northeast of Tomichi Creek (visible in background). Normal wind direction is from west to east, that is from right to left across the picture. In the winter, the wind deposits the snow in the lee on the left, leading to deeper soils, more tall shrubs, and moister conditions even in late season. On the windward (right) side of the photo, dry windswept Arizona fescue grassland. On the leeward (left) side of the photo, bitterbrush and big sagebrush, formerly much taller serviceberry shrubland leeward of ridge. July 21, 1992.

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	16, soil descriptions from 4; 1 not assigned to a community type (total 17)
ELEVATION	8,176 ft (7,600-8,600); 2,492 m (2,310 - 2,620 m)
ASPECT	All, sometimes northerly
LITHOLOGY	Mostly Tuff and Welded Tuff [52%], some Breccia [38%] or Sandstone-Mudstone [10%]
FORMATIONS ¹	Mostly igneous, with Taf [48%] and Tpl [35%]. Some metamorphic, Xb-Xfh [9%] or sedimentary, Jm [9%]
LANDFORMS	Mostly soil creep slopes [61%], with some mesas and ridges [39%]
SLOPE POSITIONS	Mostly backslopes, shoulders, and upper backslopes [80%]
SLOPE SHAPES	Mostly linear [82%] horizontally, Mostly linear [65%] vertically.
SLOPE ANGLE	26% (10-40%)
SOIL PARENT MATERIAL	Mostly colluvium [76%], a few of residuum [24%]
COARSE FRAGMENTS	4% (2-7%) cover on surface, 48% (16-84%) by volume in soil
SOIL DEPTH	50 cm (35-69 cm); 20 in (13-27 in)
MOLLIC THICKNESS	31 cm (20-37 cm); 12 in (8-15 in)
TEXTURE	Silt loam, sandy loam, or loam surface; Clay, sandy clay loam subsurface
SOIL CLASSIFICATION	Argiborolls or less commonly Haploborolls
TOTAL LIVE COVER	139.6% (70-370%)
NUMBER OF SPECIES	23 (13-41)
TOTAL LIVE COVER/NO. SPECIES	6.4% (1.7-12.2%)
CLIMATE	In moderate rainshadow or outside rainshadow. Warm, moderately exposed to sun, protected from wind, in microclimates where hard spring frosts do not damage the leaf buds of oak. Sites with >60% cover of tall shrubs create a microclimate significantly moister and cooler than sites where sagebrush is dominant.
WATER	Sites with >60% cover of tall shrubs trap much snow from wind blowing over ridges to the west. When sagebrush is dominant, snow is scattered, melts and runs off faster. The effect of such depleted sites on watersheds is that less water is held upslope now than 150-200 years ago. No permanent water on or near sites.



A serviceberry-oak/elk sedge stand (Community Type A) on a leeward slope. Gambel oak 90% cover, Saskatoon serviceberry 20%, snowberry 8%, elk sedge 87%. Soil sampled as a Lithic Haploboroll, Loamy-Skeletal. West Elk Peak SW Quadrangle, elevation 8,600 ft, 29° 065° (ENE) slope. September 11, 1995.

Key to Community Types

1. Tall shrub cover nearly complete, oak cover >75%, serviceberry cover >20%. Sagebrush missing or <10% cover. Total graminoid cover >80%. Total sedge cover >40%.....**A**
1. Tall shrub cover patchy, oak cover <75%, serviceberry missing or <20%. Sagebrush cover conspicuous, usually >20%. Total graminoid cover usually <80%, uncommonly more. Total sedge cover <40%(2)
2. Total graminoid cover >40%. Oak cover >30%; serviceberry present, but very inconspicuous (need to search for it under sagebrush). Total sedge cover usually >10%**B**
2. Total graminoid cover <40%. Oak cover 5-50%; serviceberry present, usually <5% cover. Total sedge cover usually <10%.....(3)
3. Serviceberry missing or very inconspicuous, <0.1% cover; oak cover 10-50%; sagebrush cover 20-50%.....**D**
3. Serviceberry present but sparse, 0.5-5% cover; oak cover 5-50%; sagebrush cover 20-40%**C**

Descriptions of Community Types

- A** *Oak-serviceberry-snowberry-bedstraw* is characterized by nearly complete tall shrub cover, with oak (>75% cover) mixed with serviceberry (>20%). Sedge cover is >40%, sometimes >70%. These stands have several tall shrub layers. Sagebrush is missing or in any case <10%.
- B** *Oak-big sagebrush-snowberry-muttongrass* has patchy tall shrub cover, with oak (25-40% cover), but serviceberry is very inconspicuous (<0.1% cover). Sedge cover is sometimes >15%. Sagebrush is conspicuous between patches of oak, 15-35% cover.
- C** *Big sagebrush-oak-snowberry-sparse serviceberry* has patchy tall shrub cover, with smaller patches of oak (5-50% cover); serviceberry is inconspicuous but clearly present, 0.5-5% cover. Sedge cover is <10%. The site appears as a sagebrush stand with widely spaced patches of oak; sagebrush cover is 10-50%.
- D** *Big sagebrush-oak-sparse grasses* is like the last, but with even less serviceberry and fewer graminoids. Oak cover is 10-45%; serviceberry is very inconspicuous (<0.1% cover). Sedge cover is usually <5%. The site appears as a sagebrush stand with widely spaced patches of oak; sagebrush cover is 20-45%.

Communities Not Assigned to a Community Type

- A community with almost complete cover of oak and very inconspicuous serviceberry. Elk sedge or other sedges and dry grasses are usually conspicuous. This is a community that apparently has been subject to very heavy browsing pressure, probably in the wintertime only, to judge by the vigorous graminoid cover.

Table 25-12. Community types within *Serviceberry-oak-Dark clay soils-Protected*.

Community Type	No. samples	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Lr	Layer Height, m	Avg Layr Cvr %	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
A. Oak-serviceberry-snowberry-bedstraw	3	8,480 (8,280-8,600) 31.6 (26-40)	59 (33-84) 47 (35-69) 31 (20-37)	4 (2-7) * LM	S1 S2 S3 GF S4 ML	3.5 (2.5-5.0) 2.2 (1.0-3.2) 1.1 (0.2-2.0) 0.3 (0.0-0.8) 0.1 (0.0-0.1) 0.0	8.1 35.1 59.7 86.1 6.6 1.5	0 (0-0) 154 (123-203) 86 (82-90) 47 (6-81)	28 (22-32) 287 (219-370) 10.3 (9.4-11.6)	2672-2921 824-904 73-1221	85 (60-100) 100(100-100) 100(100-100) 100(100-100) 96 (90-100)
B. Oak-big sagebrush-snowberry-muttongrass	3	8,140 (7,940-8,360) 19.7 (15-22)	16 59 33	3 1 MS		*		4 (0-12) 71 (62-76) 62 (42-95) 2 (0-4)	21 (13-28) 139 (125-159) 7.6 (4.5-12.2)	1144-1660 266-940 4-51	50 30 50 30 40
C. Big sagebrush-oak-snowberry-sparse serviceberry	4	8,168 (7,960-8,410) 22.5 (10-30)	* * *	* * EM		*		1 (1-2) 63 (38-94) 16 (12-23) 6 (3-9)	27 (17-41) 86 (70-114) 3.9 (1.7-6.7)	296-2184 34-67 32-114	*
D. Big sagebrush-oak-sparse grasses	6	8,048 (7,600-8,300) 28.3 (20-40)	* * *	* * ES-EM		*		4 (1-10) 74 (58-92) 17 (4-36) 7 (1-28)	19 (13-22) 102 (80-126) 5.6 (3.8-9.0)	1013-2121 12-174 6-404	*

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

CT	Sage Grouse	Mule Deer	Elk
	Season-Preference	Season-Preference	Season-Preference
A, B	Spring-Low (Lek) Nesting- Low Summer- Moderate	Winter, Mild- Mod. High (Cover, Browse) Winter, Severe- Low Spring/Fall- High to Very High (Cover, Browse, Overnight)	Winter, Mild- Mod. High (Cover, Browse) Winter, Severe- Low Spring/Fall- Low (Cover, Browse, Overnight)
C	Spring-Low (Lek) Nesting- Mod. High Summer- Moderate	Winter, Mild- Mod. Low (Browse) Winter, Severe- Low Spring/Fall- Moderate (Browse)	Winter, Mild- Mod. High (Browse) Winter, Severe- Low Spring/Fall- Very Low (Browse)
D	Spring-Low (Lek) Nesting- Moderate Summer- Moderate	I	I

Resource Value	Community Type			
	A	B	C	D
Potential Cattle Forage Production	3	2-3	0	0-1
Grazing Suitability	2	2	0	0
Wetland	No	No	No	No
Riparian Area	No	No	No	No
Developed Recreation	ns ¹	ns ¹	ns ¹	ns ¹
Dispersed Recreation	2	2	1	1
Scenic	3-4	3-4	2	2
Road & Trail Stability	2	2	2	2
Construction Suitability	ns ¹	ns ¹	ns ¹	ns ¹
Deer & Elk Hiding Cover	6	2-3	3-4	3-4
Deer & Elk Forage & Browse	5-6	4-5	3	3
Need for Watershed Protection	3	3	3	3
Soil Stability	3-4	3-4	3	2-3
Risk of Soil Loss-Natural	2	2-3	3-4	3-4
Risk of Soil Loss-Management	3	3-4	4-5	4-5
Risk of Permanent Depletion-Range	4-5	4-5	5	5
Risk of Permanent Depletion-Wildlife	4-5	4-5	5	5
Resource Cost of Management	5	5	5	5
Cost of Rehabilitation	2	2	2	2

1. Steep, far from water. ns = Not suitable.

Table 25-15. Common Species in *Serviceberry-oak-Dark clay soils-Protected*, 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		C		D		Common Name
		Ccv (Con) N = 3		Ccv (Con) 3		Ccv (Con) 4		Ccv (Con) 6		
TREES										
JUSC2	Juniperus scopulorum	T (33)		1 (67)		1 (100)		4 (100)		Rocky Mountain juniper
POTR5	Populus tremuloides	-	-	10 (33)		-	-	-	-	quaking aspen
PSME	Pseudotsuga menziesii	T (33)		1 (33)		1 (25)		1 (33)		Douglas-fir
SHRUBS										
AMAL2	Amelanchier alnifolia	23 (67)		-	-	-	-	-	-	Saskatoon serviceberry
AMUT	Amelanchier utahensis	31 (33)		-	-	1 (100)		-	-	Utah serviceberry
ARTR2	Artemisia tridentata	6 (67)		27 (100)		30 (100)		31 (100)		big sagebrush
CHV18	Chrysothamnus viscidiflorus	-	-	7 (33)		2 (75)		2 (50)		Douglas rabbitbrush
MARE11	Mahonia repens	4 (67)		1 (67)		1 (50)		1 (17)		Oregon-grape
PAV111	Padus virginiana	7 (33)		-	-	1 (75)		9 (50)		common chokecherry
PUTR2	Purshia tridentata	3 (33)		5 (67)		1 (100)		8 (67)		antelope bitterbrush
QUGA	Quercus gambelii	86 (100)		31 (100)		25 (100)		26 (100)		scrub oak
RICE	Ribes cereum	-	-	1 (33)		1 (50)		1 (83)		wax currant
ROWO	Rosa woodsii	2 (67)		3 (33)		1 (50)		1 (33)		Woods rose
SYRO	Symphoricarpos rotundifolius	30 (100)		5 (100)		3 (100)		6 (83)		mountain snowberry
GRAMINOIDS										
ACHY	Achnatherum hymenoides	-	-	16 (33)		3 (50)		2 (67)		Indian ricegrass
ACPI2	Achnatherum pinetorum	-	-	T (33)		2 (75)		1 (50)		pine needlegrass
CABR11	Carex brevipes	12 (33)		-	-	-	-	-	-	sedge
CAF03	Carex foenea	47 (33)		-	-	-	-	-	-	silvertop sedge
CAGE	Carex geophila	1 (33)		5 (67)		3 (100)		4 (100)		dryland sedge
CAGE2	Carex geyeri	82 (67)		10 (67)		-	-	5 (17)		elk sedge
ELEL5	Elymus elymoides	-	-	3 (33)		1 (25)		1 (33)		bottlebrush squirreltail
FEAR2	Festuca arizonica	-	-	15 (67)		8 (50)		10 (33)		Arizona fescue
POA	Poa	-	-	40 (33)		-	-	1 (17)		bluegrass
POFE	Poa fendleriana	3 (67)		19 (100)		5 (100)		9 (67)		muttongrass
FORBS										
ACLA5	Achillea lanulosa	1 (67)		-	-	1 (25)		1 (33)		western yarrow
ANSE4	Androsace septentrionalis	-	-	-	-	1 (50)		1 (33)		northern rock-jasmine
ANPA4	Antennaria parvifolia	-	-	1 (33)		1 (25)		1 (33)		smallleaf pussytoes
BOCR3	Boechera crandallii	-	-	1 (33)		1 (25)		1 (50)		Crandall rock cress
EREA	Erigeron eatonii	-	-	1 (33)		1 (100)		-	-	Eaton fleabane
GASE6	Galium septentrionale	11 (100)		-	-	1 (25)		-	-	northern bedstraw
HEPA11	Heuchera parvifolia	T (33)		-	-	1 (50)		1 (17)		littleleaf alumroot
LALE2	Lathyrus leucanthus	24 (67)		-	-	-	-	-	-	aspen peavine
LUAR3	Lupinus argenteus	30 (33)		1 (67)		1 (75)		9 (50)		silvery lupine
PECA4	Penstemon caespitosus	1 (33)		1 (33)		1 (100)		1 (33)		beardtongue
POTEN	Potentilla	-	-	-	-	1 (100)		1 (17)		cinquefoil
TAOF	Taraxacum officinale	-	-	1 (33)		1 (50)		1 (17)		common dandelion
TRGY	Trifolium gymnocarpum	1 (33)		1 (33)		1 (50)		1 (50)		holly-leaf clover
GROUND COVER										
.BARESO	bare soil	-	-	1 (33)		-	-	-	-	
.LITTER	litter and duff	93 (100)		94 (33)		-	-	-	-	
GRAVEL	gravel 0.2-10 cm	-		2		-	-	-	-	
.COBBLE	cobble 10-25 cm	2 (100)		T (33)		-	-	-	-	
.STONES	stone > 25 cm	4 (67)		1 (33)		-	-	-	-	
.MOSSON	moss on soil	1 (33)		-	-	-	-	-	-	
LICHENS	lichens on soil	1		-		-	-	-	-	

SERVICEBERRY/GREEN NEEDLEGRASS-DEEP CLAY SOILS-LEES

Serviceberry/green needlegrass-spike-fescue-
Deep Argiborolls, sometimes Pachic-Lee sides of ridges and mesas, 8,000-9,300 ft

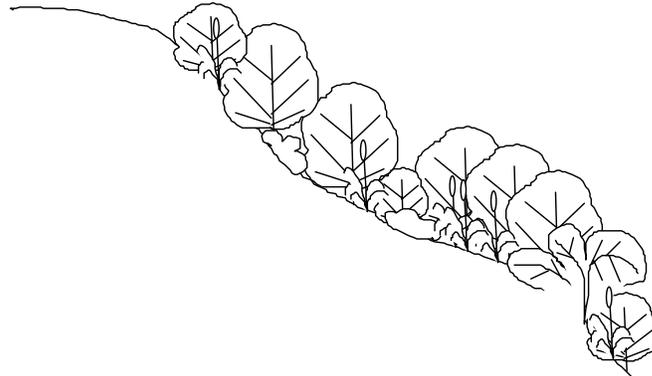


Figure 25-8. Cross-section of vegetation structure of *Serviceberry/green needlegrass-Deep clay soils-Lees*. Aspects are east to northeast, and slope angles average 27%.

Serviceberry/green needlegrass-Deep clay soils-Lees is an uncommon type in the lees of ridges and mesas, in areas outside the deep rainshadows. It occurs on protected, leeward slopes in the lower part of the Gunnison Basin. This type probably also occurs on the lower mountain slopes of western Colorado and eastern Utah, and has been noted in northwestern Colorado (Piceance Basin), northern New Mexico, and northern Arizona. *Serviceberry/green needlegrass-Deep clay soils-Lees* is characterized by serviceberry (AMAL2 or AMUT), green needlegrass (NAVI4) or spike-fescue (LEKI2), mountain snowberry (SYRO), and big sagebrush (ARTR2). See Table 25-19 for common species names and codes. Other distinguishing features include location on upper, leeward slopes on sites protected from wind and deep, loamy soils.

Serviceberry/green needlegrass-Deep clay soils-Lees is related to *Utah serviceberry/sedge-Dark clay soils-Leeward*, which occurs at somewhat lower elevations on shallower soils with more surface coarse fragments, and lacks green needlegrass and spike-fescue. *Serviceberry/green needlegrass-Deep clay soils-Lees* is also related to *Utah serviceberry-mountain-mahogany/sedge-Dark clay soils-Protected*, which occurs at lower elevations on shallower soils with more surface coarse fragments, has prominent mountain-mahogany (CEMO2), and lacks green needlegrass and spike-fescue.

Serviceberry/green needlegrass-Deep clay soils-Lees is also related to *Serviceberry-oak-Dark clay soils-Protected*, which occurs at lower elevations in pockets where springtime frost does not occur, on shallower soils, and has prominent Gambel oak (QUGA), but lacks green needlegrass and spike-fescue. *Serviceberry/green needlegrass-Deep clay soils-Lees* is also related to *Saskatoon serviceberry/elk sedge-Deep dark*

soils-Lees, which occurs at higher elevations on somewhat shallower soils, and lacks needlegrass and spike-fescue. *Serviceberry/green needlegrass-Deep clay soils-Lees* is also related to *Douglas-fir/serviceberry-Steep northerly*, a forested type dominated by Douglas-fir (PSME), which occurs on steeper, consistently northerly slopes with a thinner dark (Mollic) layer.

The plant associations *Amelanchier alnifolia-A. utahensis/Nassella viridula* and *Amelanchier alnifolia-A. utahensis/Leucopoa kingii* are both described as new here; neither has been described previously.

Serviceberry is one of the most palatable browse plants in the UGB. Browsing reduces serviceberry cover and palatable grasses, especially if animals are concentrated or if browsing continues over a decade or more. Serviceberry will eventually be eliminated because browsing induces longer, more succulent leaders the next season, so animals become more dedicated each year to searching out every serviceberry plant. As the serviceberry disappears, so do the shade-tolerant species like the mat sedges and green needlegrass, and sagebrush and rabbitbrush invade the site. Browsing decreases other palatable tall shrubs that occur with serviceberry, such as chokecherry and mountain-mahogany. Green needlegrass is very palatable to cattle, elk, and deer, and may once have been more abundant in the UGB than at present.

Deer and elk are the primary browsers on serviceberry, but it is also palatable to cattle and domestic sheep. Many serviceberry stands are far from water, but those that are near receive considerable use livestock. Browsing on serviceberry was more intense before the turn of the 20th century, when there were few fences and large herds of cattle over-wintered in the valley bottoms. In those days, cattle moved up to

whatever they could reach as the snow receded. Moderately-heavy to heavy grazing by cattle, sheep, deer, or elk decreases shrub cover, especially of serviceberry, decreases cover of palatable grasses such as green needlegrass and spike-fescue, decreases sedge cover (because of reduced shade), and increases invader shrubs such as sagebrush and rabbitbrush, and dry-site grasses and forbs.

Wyoming big sagebrush or big sagebrush (not mountain) communities occur on adjacent more exposed slopes with shallower soils. Aspen or Douglas-fir forests adjoin this type on better-drained northerly slopes. *Serviceberry/green needlegrass-Deep clay soils-Lees* is never adjacent to riparian areas. Horizontal obstruction varies from low to very high. Hiding cover is very high in Community types A and B, moderate to moderately high in Community types C and D, and moderate to very high in community type E. In good condition, these stands provide much cover, browse, and forage for deer and elk. Deer use these

stands year-round, but elk use most sites only in the winter.

Stands in good condition, with >40% cover of tall serviceberry, are important mule deer habitat in the UGB. Long-term cattle grazing caused deterioration of many of these stands (especially before World War II), and sharp increases in elk populations in recent decades has resulted in a significant decline in the quality of mule deer habitat in the last 30-40 years.

Perhaps less than 50% of this type is in good enough condition to be considered good mule deer habitat. Recovery of deteriorated stands to a condition sufficient to be effective mule deer habitat should be a management priority.

Midserral sites such as community type C or community type D may be important sage grouse nesting and brood rearing sites because they support sagebrush and other shrubs like snowberry that hide nests. Deep loamy soils produce forbs that are good nestling food.



Utah serviceberry/green needlegrass type with mountain-mahogany. Here is a relatively lateral stand (Community Type A), providing some hiding cover and still moderately heavily browsed. Utah serviceberry 44% cover, green needlegrass 30%, mountain-mahogany 24%, pityophila sedge 9%, bitterbrush 3%. Coarse Fragments Cover 4%, Total Live Cover = 125%, Coarse Fragments in Soil = 45. Soil sampled as a Lithic or Typic Argiboroll, Clayey-Skeletal, Mixed. Signal Peak Quadrangle, elevation 8,480 ft, 21° 006° (N) slope. June 27, 1995.

Another serviceberry-snowberry-sagebrush stand (Community Type B). Serviceberry 89% cover, big sagebrush 22%, chokecherry 17%, green needlegrass 41%, snowberry 17%, rose 12%, Oregon-grape 11%. Soil sampled as a Pachic Argiboroll, Fine-Loamy, Mixed. Parlin Quadrangle, elevation 8,610 ft, 40° 048° (NE) slope. July 7, 1995.

A serviceberry-sagebrush stand (Community Type C). Serviceberry 11% cover, big sagebrush 25%, bitterbrush 23%, pine needlegrass 32%, needleleaf sedge 23%, green needlegrass 21%, spike-fescue 15%. Soil sampled as a Typic Argiboroll, Fine-Loamy, Mixed. McIntosh Mountain Quadrangle, elevation 8,620 ft, 14° 078° (ENE) slope. July 26, 1995.

Summary of Ecological Type Characteristics

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

NUMBER OF SAMPLES	16, soil descriptions from 16; 1 not assigned to a community type (total 17)
ELEVATION	8,558 ft (8,000-9,250 ft); 2,608 m (2,435-2,820 m)
ASPECT	East to northeast-facing, usually in the lee of ridges
LITHOLOGY	Usually Tuff or welded Tuff [71%] or Breccia [18%]; others are minor
FORMATIONS ¹	Usually Taf [63%] or Tpl [19%]; others are minor
LANDFORMS	Ridges [43%], soil creep slopes [38%], or mesas [19%]
SLOPE POSITIONS	Mostly upper backslopes and shoulders [70%]; some summits [20%]. No footslopes or toeslopes
SLOPE SHAPES	Linear [50%] to convex [44%] horizontally, Linear [50%] to concave [38%] vertically.
SLOPE ANGLE	27% (13-54%)
SOIL PARENT MATERIAL	Colluvium [47%] or residuum [27%]; some colluvium over residuum [20%]
COARSE FRAGMENTS	10% (0-65%) cover on surface, 50% (17-84%) by volume in soil
SOIL DEPTH	82 cm (31-183 cm); 32 in (12-72 in)
MOLLIC THICKNESS	31 cm (4-64 cm); 12 in (2-25 in)
TEXTURE	A wide variety of surface textures, usually loam-silt loam-clay loam-silty clay loam [78%]. A wide variety of subsurface textures, often sandy (sandy clay loam-loamy sand-sandy loam-sandy clay [53%])
SOIL CLASSIFICATION	Argiborolls [81%], often Pachic
TOTAL LIVE COVER	159.4% (57-243%)
NUMBER OF SPECIES	32 (19-45)
TOTAL LIVE COVER/NO. SPECIES	5.2% (1.5-9.3%)
CLIMATE	In moderate rainshadow or outside rainshadow. Warm, moderately exposed to sun, protected from wind. Sites in good condition with >60% cover of tall shrubs create microclimates significantly moister and cooler than depleted sites dominated by sagebrush.
WATER	Sites in good condition with >60% cover of tall shrubs trap large amounts of wind-blown snow from the west. On depleted condition dominated by sagebrush, snow scatters, melts faster and runs off faster. Since many sites are depleted, much less water is held upslope now than 150-200 yr ago. No permanent water on or near sites.

Table 25-16. Wildlife values (relative to the whole UGB) for the principal wildlife species using *Serviceberry/green needlegrass-Deep clay soils-Lees*.

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

A sagebrush-bitterbrush stand, seral to serviceberry (Community Type D). Big sagebrush 17% cover, bitterbrush 16%, serviceberry 3%, muttongrass 31%, peavine 21%, elk sedge 17%, spike-fescue 9%. Soil sampled as a Pachic Haploboroll, Sandy-Skeletal, Mixed. West Elk Peak SW Quadrangle, elevation 9,160 ft, 46° 06'2" (ENE) slope. June 23, 1994.



Key to Community Types

1. Serviceberry cover >40%. Green needlegrass always present and >20%; spike-fescue absent(2)
 1. Serviceberry cover <40%. Green needlegrass sometimes absent, 1-25% cover; spike-fescue sometimes present, 1-25% cover.....(3)

 2. Mountain-mahogany present and >15% cover. Total graminoid cover >60%.....**A**
 2. Mountain-mahogany absent or <5% cover. Total graminoid cover <60%.....**B**

 3. Green needlegrass always present, 1-25% cover. Spike-fescue absent or if rarely present then less cover than green needlegrass(4)
 3. Green needlegrass absent. Spike-fescue always present, 1-25% cover **D**

 4. Total graminoid cover >90%. Green needlegrass cover >20%; spike-fescue sometimes prominent but less cover than green needlegrass **C**
 4. Total graminoid cover <90%. Green needlegrass cover <20%; spike-fescue absent**E**
-

Community Type Descriptions

- A** *Serviceberry-snowberry-mountain-mahogany-green needlegrass* has conspicuous tall shrub layers with serviceberry cover >40% and mountain-mahogany >15%. Sagebrush cover is <5%. Total graminoid cover ranges from 65 to 115%, with green needlegrass cover >25%. Spike-fescue is absent.
- B** *Serviceberry-snowberry-big sagebrush-green needlegrass* has conspicuous tall shrub layers, with serviceberry cover ranging from 60 to 80%. Mountain-mahogany is absent. One plot had chokecherry (PAVI11) at >15% cover. Sagebrush is noticeable with 5-30% cover. Total graminoid cover ranges from 40 to 60%, with green needlegrass 20-45% cover. spike-fescue is absent.
- C** *Big sagebrush-serviceberry-bitterbrush-green needlegrass-pine needlegrass* has somewhat depleted tall shrub layers, with serviceberry cover between 10 and 20%. Mountain-mahogany is absent. Sagebrush is prominent, 25-40% cover; one plot had bitterbrush (PUTR2). Total graminoid cover is >90%, with green needlegrass cover 20-30%. Only one plot had spike-fescue (15% cover) and green needlegrass.
- D** *Big sagebrush-sparse serviceberry-muttongrass-spike-fescue* lacks the tallest shrub layer (>2 m). The lesser tall shrub layer varies from none to modest, with serviceberry cover from 0 to 35%. Mountain-mahogany is absent. Sagebrush is usually prominent with 10-50% cover; two plots also had bitterbrush. Total graminoid cover is highly variable; spike-fescue is always present but sometimes inconspicuous, ranging from 1 to 25% cover; green needlegrass is absent. Muttongrass is usually prominent with 3 to 50% cover.
- E** *Snowberry-big sagebrush-muttongrass-green needlegrass* has sparse to moderate tall shrub layers, with serviceberry cover from 0 to 40%. Two plots had mountain-mahogany cover of >15%. Sagebrush is usually noticeable at 10 to 50% cover. Two plots also had bitterbrush. Total graminoid cover ranges from 40 to 80%. Green needlegrass is always present but usually inconspicuous at 1 to 10% cover; spike-fescue is absent. Muttongrass is sometimes prominent with 1-60% cover.

Communities Not Assigned to a Community Type

- One community had sparse to moderate savanna-like Gambel oak, inconspicuous serviceberry, and sagebrush dominant in patches between oak microsites. Spike-fescue was prominent in and around the oak patches. This was the only community in this ecological type in which oak was present. Apparently it has been browsed heavily enough to remove most of the serviceberry, and to reduce oak cover, but it seems to have been browsed only in the winter, judging from the good cover of palatable graminoids.
-

Table 25-17. Community types within *Serviceberry/green needlegrass-Deep clay soils-Lees*.

Community Type	No. samples	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Layer Height, m	Avg Layr Cvr %	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
A. Serviceberry-snowberry-mountain-mahogany-green needlegrass-dryland sedge	2	8,430 (8,380-8,480) 37.4 (21-54)	65 (65-66) 48 (34-62) 30 (15-45)	2 (1-4) 3 (3-4) LS-LM	S1 2.3 (1.4-5.0) S2 1.7 (0.5-2.0) S3 0.4 (0.2-0.7) GF 0.4 (0.0-1.2) S4 0.1 (0.0-0.2) ML 0.0	35.5 60.2 42.5 68.0 5.1 1.1	0 (0-0) 155 (121-189) 88 (67-109) 19 (3-35)	30 (25-35) 262 (191-332) 8.6 (7.6-9.5)	2657-2868 652-1018 38-548	60 (20-100) 90 (80-100) 100(100-100) 100(100-100) 88 (75-100)
B. Serviceberry-snowberry-big sagebrush-green needlegrass	2	8,475 (8,340-8,610) 26.5 (13-40)	18 (17-18) 118 (72-163) 28 (25-31)	1 (1-1) 2 (2-2) MS-LM	S1 3.2 (2.1-4.0) S2 1.5 (0.9-3.0) S3 0.7 (0.3-1.2) GF 0.4 (0.0-0.8) S4 0.2 (0.0-0.3) ML Missing	14.5 62.5 68.4 55.7 16.1 M	0 (0-0) 152 (144-160) 50 (46-54) 20 (5-36)	29 (25-32) 222 (194-250) 7.8 (7.8-7.8)	2800-2828 332-458 71-582	95 85 100 100 95
C. Big sagebrush-serviceberry-snowberry-green needlegrass-pine needlegrass-muttongrass	3	8,493 (8,209-8,650) 18.3 (14-21)	58 (39-77) 144 (105-183) 45 (25-64)	4 (3-6) 12 (4-22) EM-MS	S1 3.3 (1.0-4.5) S2 1.5 (1.0-2.5) S3 0.6 (0.2-1.0) GF 0.3 (0.0-1.2) S4 0.3 (0.0-0.5) ML Missing	1.3 10.0 46.4 86.9 16.2 M	0 (0-0) 77 (69-86) 89 (65-104) 29 (26-33)	37 (30-42) 195 (177-213) 5.4 (4.6-5.9)	1404-1966 628-993 391-519	8 (0-15) 17 (5-25) 42 (30-60) 98 (95-100) 41 (39-44)
D. Big sagebrush-sparse serviceberry-muttongrass-spike-fescue	2	8,840 (8,520-9,160) 47.8 (46-50)	73 (63-84) 79 (78-79) 49 (43-55)	37 (10-65) 1 (0-2) EM	*		0 (0-0) 49 (45-52) 48 (5-92) 31 (1-62)	42 (39-45) 128 (58-199) 3.0 (1.5-4.4)	527-795 14-919 10-1028	15 (0-30) 28 (0-55) 53 (30-75) 95 (90-100) 48 (33-63)
E. Big sagebrush-muttongrass-spike-fescue	3	8,710 (8,120-9,250) 15.0 (13-17)	35 (18-52) 67 (58-76) 27 (23-30)	19 (13-25) 16 (9-24) EM	S1 Missing S2 1.5 (0.9-2.0) S3 0.6 (0.2-1.2) GF 0.2 (0.0-0.9) S4 0.2 (0.0-0.3) ML 0.0	M 25.8 38.3 56.0 16.8 0.7	0 (0-0) 64 (32-91) 62 (39-81) 16 (4-39)	30 (19-39) 143 (111-176) 5.6 (2.8-9.3)	128-2108 227-819 61-636	0 (0-0) 0 (0-0) 18 (0-35) 75 (50-100) 23 (13-34)
F. Big sagebrush-rabbitbrush-snowberry-dry grasses	3	8,846 (8,771-8,895) 22.7 (10-30)	* * *	6 (6-6) 11 (7-15) EM-ES	S1 Missing S2 1.5 (0.9-2.0) S3 0.6 (0.2-1.2) GF 0.2 (0.0-0.9) S4 0.2 (0.0-0.3) ML 0.0	M 25.8 38.3 56.0 16.8 0.7	0 (0-0) 80 (42-134) 67 (48-88) 24 (14-36)	33 (20-40) 171 (130-195) 6.0 (3.2-9.8)	439-2757 360-882 208-577	0 (0-0) 0 (0-0) 15 (10-25) 85 (80-90) 25 (23-29)
G. Serviceberry-snowberry-big sagebrush-muttongrass-green needlegrass	4	8,508 (8,320-8,740) 27.7 (16-39)	56 (25-70) 54 (31-70) 17 (4-32)	5 (2-8) 6 (1-9) LM-MS	S1 2.4 (1.0-3.6) S2 1.5 (0.7-2.6) S3 0.6 (0.2-1.2) GF 0.2 (0.0-1.0) S4 Missing ML Missing	15.3 33.7 45.7 59.0 M M	0 (0-0) 90 (74-120) 61 (41-79) 12 (0-38)	29 (26-34) 164 (115-191) 5.6 (4.4-6.6)	1595-2642 250-798 0-617	40 (35-45) 48 (40-55) 90 (85-95) 100(100-100) 69 (68-71)
H. Big sagebrush-snowberry-muttongrass	4	8,311 (8,000-8,482) 10.5 (8-15)	21 113 38	1 (0-2) 12 (1-21) ES	*		0 (0-0) 83 (62-110) 48 (31-64) 9 (1-20)	30 (24-40) 140 (108-161) 4.8 (3.6-6.7)	1161-2501 105-608 8-305	0 (0-0) 1 (0-5) 24 (15-40) 95 (90-100) 30 (28-34)

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

Table 25-18. Resource Values for *Serviceberry/green needlegrass-Deep clay soils-Lees*. Resource values were calculated from the numbers in Table 25-17, 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				
	A	B, C	D, E	F, G	H
Potential Cattle Forage Production	3-4	2	3-4	1-3	2-3
Grazing Suitability	3	1-2	4	2	2
Wetland	No	No	No	No	No
Riparian Area	No	No	No	No	No
Developed Recreation	ns ¹				
Dispersed Recreation	1-2	1-2	2-3	1-2	1-2
Scenic	3	3	2-3	2	2
Road & Trail Stability	3	3	2-3	2-3	2-3
Construction Suitability	ns ¹	ns ¹	0-1	ns ¹	ns ¹
Deer & Elk Hiding Cover	6	6	3-4	2-4	3-6
Deer & Elk Forage & Browse	5-6	4-5	3-4	3	3
Need for Watershed Protection	5	5	4	3	3
Soil Stability	2	2	3	2	2
Risk of Soil Loss-Natural	1-2	1-2	2	3	3
Risk of Soil Loss-Management	4-5	4-5	3	4	4
Risk of Permanent Depletion-Range	4	4	4	4	4
Risk of Permanent Depletion-Wildlife	5	5	3	3	3
Resource Cost of Management	5	5	4	4	4
Cost of Rehabilitation	2	2	2	2	2

1. Steep, far from water. ns = Not suitable.

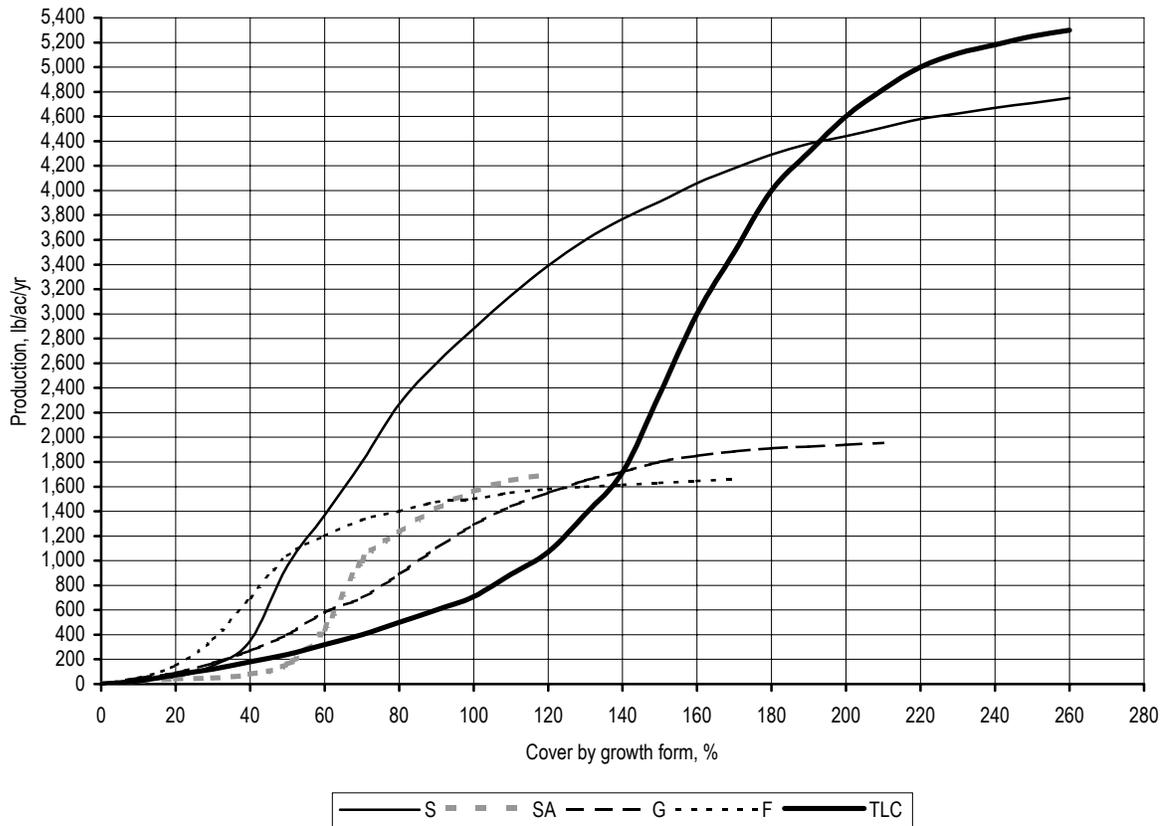


Figure 25-9. Relationship of cover by growth form and production. This is the AMALCAGE (AMAL2-CAGE2) model. S = shrubs, G = graminoids, F = forbs, and TLC = Total live cover. SA = Sagebrush only.

Table 25-19. Common Species in *Serviceberry/green needlegrass-Deep clay soils-Lees*, 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 Avg = Average Cover, then these are related using the formula $Avg = Ccv \cdot 100\% / Con$.

Community Type		A	B	C	D	E	F	G	H	Common Name
Code	Species	Ccv(Con)								
		N = 2	2	3	2	3	3	4	4	
SHRUBS										
AMELA	Amelanchier	67(100)	69(100)	15(100)	9(100)	T (67)	T (67)	31(100)	T (75)	serviceberry
ARTR2	Artemisia tridentata	1(100)	17(100)	33(100)	13(100)	31(100)	39(100)	10(100)	56(100)	big sagebrush
CEMO2	Cercocarpus montanus	21(100)	-	-	-	-	-	30 (50)	-	true mountain-mahogany
CHNA2	Chrysothamnus nauseosus	-	8 (50)	-	1 (50)	-	3 (67)	-	8 (25)	rubber rabbitbrush
CHV18	Chrysothamnus viscidiflorus	-	4(100)	3(100)	4(100)	24 (67)	18(100)	2(100)	8 (75)	Douglas rabbitbrush
PUTR2	Purshia tridentata	3 (50)	-	16 (67)	16 (50)	36 (33)	-	8 (75)	-	antelope bitterbrush
ROWO	Rosa woodsii	2 (50)	8(100)	3 (67)	T (50)	1 (33)	13 (67)	1 (50)	T (50)	Woods rose
SYRO	Symphoricarpos rotundifolius	58(100)	37(100)	12(100)	11 (50)	5 (67)	12(100)	26(100)	17(100)	mountain snowberry
GRAMINOIDS										
ACNE9	Achnatherum nelsonii	-	-	-	11 (50)	10 (33)	-	-	-	Nelson's needlegrass
ACPI2	Achnatherum pinetorum	5(100)	1 (50)	22(100)	3(100)	1 (33)	4 (67)	1 (75)	3 (50)	pine needlegrass
AGCR	Agropyron cristatum	-	-	-	-	-	-	-	12 (25)	crested wheatgrass
BRCA10	Bromopsis canadensis	3(100)	-	5 (67)	5 (50)	20 (33)	-	-	5 (25)	fringed brome
BRPO5	Bromopsis porteri	-	12 (50)	-	-	-	-	-	-	nodding brome
CAGE	Carex geophila	10(100)	15 (50)	5 (67)	T(100)	7 (33)	2 (33)	25 (75)	T (50)	dryland sedge
CAGE2	Carex geyeri	-	-	-	17 (50)	-	33 (33)	-	-	elk sedge
CARO5	Carex rossii	-	-	-	-	-	-	14 (25)	-	Ross sedge
CASTE3	Carex stenophylla ssp. eleocharis	-	-	14 (67)	-	-	8 (33)	-	4 (75)	needleleaf sedge
CAXE	Carex xerantica	20 (50)	-	-	-	-	-	-	-	dryland sedge
ELEL5	Elymus elymoides	4(100)	1(100)	7(100)	1 (50)	1 (67)	1(100)	2(100)	9 (75)	bottlebrush squirreltail
KOMA	Koeleria macrantha	7 (50)	-	1 (67)	1 (50)	9 (67)	6 (67)	T (75)	T (50)	prairie junegrass
LEKI2	Leucopoa kingii	-	-	15 (33)	4(100)	11(100)	-	1 (25)	-	spike-fescue
NAV14	Nassella viridula	28(100)	32(100)	23 (67)	-	-	19(100)	4 (75)	5 (50)	green needlegrass
PASM	Pascopyrum smithii	-	6 (50)	-	-	-	1 (33)	-	2 (75)	western wheatgrass
PIMI7	Piptatherum micranthum	-	-	24 (33)	T (50)	-	35 (33)	-	1 (75)	littelseed ricegrass
POA	Poa	-	-	-	-	30 (33)	-	-	-	bluegrass
POFE	Poa fendleriana	18(100)	1 (50)	11(100)	17(100)	18(100)	21 (67)	28(100)	25(100)	muttongrass
FORBS										
ACLA5	Achillea lanulosa	-	T (50)	7 (33)	-	1 (33)	-	3 (50)	1 (25)	western yarrow
ASSP16	Aster spathulatus	13 (50)	-	-	-	-	-	-	-	western aster
CALI4	Castilleja linariifolia	1 (50)	T (50)	4 (67)	2 (50)	T (33)	1 (67)	8 (25)	1 (50)	Wyoming paintbrush
ERSU2	Erigeron subtrinervis	-	-	1 (33)	-	-	3 (33)	7 (25)	1 (50)	threenerve fleabane
ERUM	Eriogonum umbellatum	-	T (50)	3(100)	17 (50)	2 (67)	T (67)	1(100)	1 (25)	sulfur buckwheat
LUAR3	Lupinus argenteus	-	4(100)	12(100)	5 (50)	T(100)	6(100)	4 (50)	9 (50)	silvery lupine
LUSE4	Lupinus sericeus	10 (50)	-	-	-	-	-	-	-	silky lupine
PECA4	Penstemon caespitosus	-	T (50)	-	T (50)	1 (67)	1 (33)	T (25)	T (25)	beardtongue
PHMU3	Phlox multiflora	-	-	T (33)	-	6 (67)	8 (33)	4 (50)	-	flowery phlox
TAOF	Taraxacum officinale	-	3 (50)	1 (33)	-	1 (67)	1 (33)	-	T (25)	common dandelion
TRGY	Trifolium gymnocarpum	-	T(100)	-	-	11 (67)	3 (67)	-	T (25)	holly-leaf clover
GROUND COVER										
.BARESO	bare soil	3(100)	2 (50)	12(100)	1(100)	16 (67)	11(100)	6(100)	12(100)	
.LITTER	litter and duff	94(100)	93(100)	81(100)	61(100)	61 (67)	82(100)	88(100)	83(100)	
GRAVEL	gravel 0.2-10 cm	1	1	1	7	13	2	2	T	
.COBBLE	cobble 10-25 cm	1 (50)	-	1 (67)	12(100)	T (33)	3 (33)	2 (75)	1 (25)	
.STONES	stone > 25 cm	-	-	1 (33)	11(100)	-	-	1 (25)	-	
.MOSSON	moss on soil	1 (50)	-	1 (33)	-	1 (33)	3(100)	1 (25)	3(100)	
LICHENS	lichens on soil	-	-	-	-	-	T	T	-	

SASKATOON SERVICEBERRY/ELK SEDGE–DEEP DARK SOILS–LEES

Saskatoon serviceberry/elm sedge–
Deep Argiborolls and Argic Cryoborolls, often Pachic–
Lee slopes on ridges and mesas, 8,500-9,900 ft

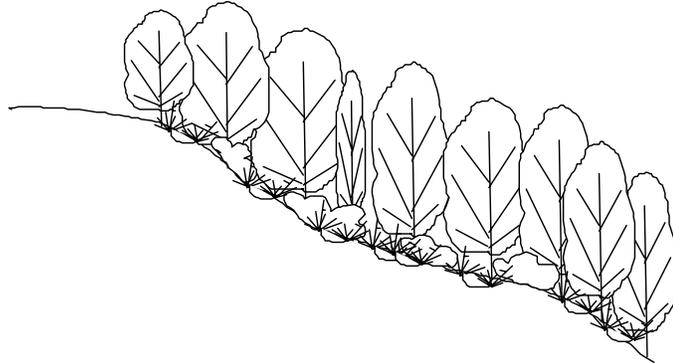


Figure 25-10. Cross-section of vegetation structure of *Saskatoon serviceberry/elm sedge–Deep dark soils–Lees*. The tallest shrub layer typically averages about 8 ft tall. Aspects are easterly, and slope angles average 25%.

Saskatoon serviceberry/elm sedge–Deep dark soils–Lees is a common type outside deep rainshadows, usually within the zone of continuous forest. It occurs on upper leeward slopes and protected middle to lower slopes in the Montane and lower Subalpine zones in the Gunnison Basin. This type also occurs throughout western Colorado, southern Wyoming, and eastern Utah, and has been recorded from northern New Mexico and northern Arizona. *Saskatoon serviceberry/elm sedge–Deep dark soils–Lees* is characterized by *Saskatoon serviceberry* (AMAL2), *mountain snowberry* (SYRO), and *elm sedge* (CAGE2). Most sites also support some big sagebrush (ARTR2). See Table 25-23 for common species names and codes. Other distinguishing features include location on upper, leeward and protected middle to lower slopes, locations protected from wind and where snow accumulates, and deep, loamy soils.

Saskatoon serviceberry/elm sedge–Deep dark soils–Lees is related to *Serviceberry-oak–Dark clay soils–Protected*, which occurs at lower elevations on soils with fewer surface coarse fragments, and is dominated by Gambel oak (QUGA). *Saskatoon serviceberry/elm sedge–Deep dark soils–Lees* is also related to *Serviceberry/green needlegrass–Deep clay soils–Lees*, which occurs at somewhat lower elevations on deeper soils, and supports green needlegrass (NAVI4) or spike-fescue (LEKI2). *Saskatoon serviceberry/elm sedge–Deep dark soils–Lees* is also related to *Serviceberry/Thurber fescue–Deep dark cold loamy soils–Subalpine*, which occurs at somewhat higher elevations and always on cold (Cryic) soils, and has prominent Thurber fescue (FETH). *Elm sedge* often occurs in large quantities in both types.

Saskatoon serviceberry/elm sedge–Deep dark soils–Lees is also related to *Douglas-fir/serviceberry–Steep northerly*, a forested type dominated by Douglas-fir (PSME), which occurs at somewhat lower elevations on steeper, more consistently northerly slopes and on deeper soils. *Saskatoon serviceberry/elm sedge–Deep dark soils–Lees* is also related to *Aspen/serviceberry–Deep dark soils*, a forested type dominated by aspen (POTR5), which occurs at somewhat lower elevations and on less-coarse soils.

The plant association *Amelanchier alnifolia/Carex geyeri* is described as new here, based on *Amelanchier* spp./*Carex geyeri* (Johnston 1987) which is in turn based on *Amelanchier alnifolia/Carex* spp. of Terwilliger and Tiedeman (1978), and on “Mixed mountain shrub/dark brown loams” of Tiedeman (1978). *Amelanchier alnifolia/Carex geyeri* phase *Purshia tridentata* is described as new here. *Amelanchier alnifolia/Carex geyeri* phase *Padus virginiana* is also described as new here, based on *Amelanchier alnifolia-Padus virginiana/Vicia americana* (Johnston 1987), which is in turn based on *Amelanchier alnifolia/Prunus virginiana-Thalictrum fendleri* of Bunin (1975).

Saskatoon serviceberry is the most palatable browse plant in the UGB. Browsing reduces serviceberry cover and palatable grasses, especially if animals are concentrated or if browsing continues over a decade or more. Serviceberry is eventually eliminated because browsing induces longer, more succulent leaders the next season, encouraging the animals to seek out every serviceberry plant each year. As the serviceberry disappears, so do shade-tolerant species like sedges and spike-fescue, and sagebrush and rabbitbrush invade the site. Other palatable tall shrubs such as chokecherry and mountain-mahogany occur with serviceberry and are often browsed as well.

Deer and elk are the primary browsers of serviceberry, but it is also palatable to cattle and domestic sheep. Many of the serviceberry stands are far from water, but those that are closer are heavily browsed by livestock. Livestock browsing was more intense before the turn of the 20th century, when there were few fences and large herds of cattle over-wintered in the valley bottoms. In those days, cattle moved up to whatever they could reach as the snow receded. Moderately-heavy to heavy grazing by cattle, sheep, deer, or elk decreases shrub cover, especially of serviceberry, and cover of palatable graminoids and sedges. Shrubs such as sagebrush and rabbitbrush invade, and dry-site grasses and forbs increase. Big sagebrush (not Wyoming) communities occur on adjacent more exposed slopes with shallower soil. Aspen, Douglas-fir,

lodgepole pine, or spruce-fir forests adjoin this type on better-drained northerly slopes. *Saskatoon serviceberry/elk sedge-Deep dark soils-Lees* is sometimes adjacent to riparian areas.

Horizontal obstruction varies from low to very high. Hiding cover is very high in Community types A and B, moderate to moderately high in Community types C and D, and moderate to very high in community type E. Stands in good condition provide much cover, browse, and forage for deer and elk. Most stands receive considerable snow deposition, and are usable by deer and elk only in the summer and during mild winters.

Stands in good condition, with >40% cover of tall serviceberry, are important mule deer habitat in the UGB. Deterioration of many stands because of long-term cattle grazing (especially before World War II) and sharp increases in elk population in recent decades have caused significant declines in the quality of mule deer habitat in the last 30-40 years. Most of the sites in this type are in good enough condition now to provide some provide some mule deer habitat. However, these sites cannot serve as critical winter range.

Midserral sites, such as community type E, can be important sage grouse nesting and brood-rearing sites, because of their sagebrush cover and other shrubs like snowberry help hide nests. Deep, loamy soil produces forbs that are good nestling food.



A serviceberry/elk sedge site (Community Type A), somewhat transitional to rocky shrubland (SA7). Saskatoon serviceberry 42% cover, snowberry 38%, chokecherry 34%, ocean-spray 3%, elk sedge 49%, muttongrass 38%, aspen peavine 29%. Soil sampled as a Lithic Argiboroll, Fragmental. Almont Quadrangle, elevation 8,850 ft, 31% 066° (ENE) slope. July 22, 1994.

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	26, soil descriptions from 17; (total 26)
ELEVATION	9,113 ft (8,580-9,840 ft); 2,778 m (2,615-3,000 m)
ASPECT	Usually easterly, usually not northerly, usually on the lee side of ridges
LITHOLOGY	A wide variety of lithologies, but sedimentaries predominate: sandstone [33%], shale [15%], and mudstone [12%]. Igneous lithologies are somewhat less noticeable: gneiss [15%], granite [15%], tuff [12%], and schist-breccia [6%]
FORMATIONS ¹	A wide variety, led by Kd [17%], Taf [17%], Kdb [13%], Xfh [13%], Xg [13%], Jm [9%], KJdm [9%], and Tos [9%]
LANDFORMS	Mostly ridges and mesas [62%], with some soil creep slopes [38%]
SLOPE POSITIONS	Mostly upper backslopes, summits, and shoulders [88%]
SLOPE SHAPES	Mostly linear [74%] horizontally, Linear [62%] to concave [35%] vertically.
SLOPE ANGLE	25% (6-75%)
SOIL PARENT MATERIAL	Mostly colluvium [56%], some colluvium over residuum [20%] or residuum [16%]
COARSE FRAGMENTS	11% (0-37%) cover on surface, 46% (11-82%) by volume in soil
SOIL DEPTH	58 cm (14 - 99 cm); 23 in (5-39 in)
MOLLIC THICKNESS	28 cm (12-63 cm); 11 in (5-25 in)
TEXTURE	Various kinds of loam: loam-sandy loam-clay loam-silt loam [95%] on the surface; a wide variety of subsurface textures
SOIL CLASSIFICATION	Argiborolls [57%], Haploborolls [22%], or Argic Cryoborolls [17%]; about half of these are Pachic
TOTAL LIVE COVER	169.2% (83-307%)
NUMBER OF SPECIES	36 (14-48)
TOTAL LIVE COVER/NO. SPECIES	5.2% (2.1-15.3%)
CLIMATE	Usually outside rainshadow; sometimes in moderate rainshadow. Cool to cold, moderately exposed to sun, protected from wind. Stands in good condition, with >60% cover of tall shrubs, create a microclimate significantly moister and cooler than depleted sites, where sagebrush is dominant.
WATER	Stands in good condition, with >60% cover of tall shrubs, trap windblown snow from the west. In depleted condition, where sagebrush is dominant, the snow scatters, melts faster and runs off faster. Many sites are in depleted condition, so they retain much less water upslope now than 150-200 yr ago. No permanent water on or near sites.

Table 25-20. Wildlife values (relative to the whole UGB) for the principal wildlife species using *Saskatoon serviceberry/elm sedge-Deep dark soils-Lees*.

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

Table 25-21. Resource Values for *Saskatoon serviceberry/elk sedge-Deep dark soils-Lees*. Resource values were calculated from the numbers in Table 25-22, 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				
	A	B	C	D	E
Potential Cattle Forage Production	3-4	3	2-4	3-4	0-2
Grazing Suitability	3	2-3	3-4	3	1
Wetland	No	No	No	No	No
Riparian Area	No	No	No	No	No
Developed Recreation	ns ¹	ns ¹	1	ns ¹	ns ¹
Dispersed Recreation	2	2	3	2	2
Scenic	3-4	3-4	3-4	2-3	2-3
Road & Trail Stability	2-3	2-3	3-4	2-3	2-3
Construction Suitability	ns ¹	ns ¹	1	ns ¹	ns ¹
Deer & Elk Hiding Cover	2-4	5-6	2-3	1-2	1-3
Deer & Elk Forage & Browse	3-4	5-6	2-3	1-2	1-2
Need for Watershed Protection	4	4	4	3	3
Soil Stability	2-3	2-3	2-3	2-3	2-3
Risk of Soil Loss-Natural	3	3	3	3	3
Risk of Soil Loss-Management	4	4	4	4	4
Risk of Permanent Depletion-Range	3	3	3	3	2
Risk of Permanent Depletion-Wildlife	3-4	3-4	3-4	3	3
Resource Cost of Management	4	4	4	4	4
Cost of Rehabilitation	2-3	2-3	3	3	3

1. Steep, far from water. ns = Not suitable.

Key to Community Types

1. Total graminoid cover >75%. Elk sedge cover >25%..... **A**
 1. Total graminoid cover <75%. Elk sedge cover usually <25% (2)
2. Total graminoid cover >60%. Serviceberry cover 0-85% (3)
 2. Total graminoid cover <60%. Serviceberry cover 0-15% **E**
3. Saskatoon serviceberry cover >35%. Total graminoid cover 60-70%..... **B**
 3. Saskatoon serviceberry cover <35%. Total graminoid cover 40-140%..... (4)
4. Serviceberry cover 20-35%. Total graminoid cover 40-70%. Total sedge cover 20-30%..... **C**
 4. Serviceberry cover 0-10%. Total graminoid cover >70%..... **D**

Description of Community Types

- A** *Saskatoon serviceberry-snowberry-elk sedge-moist forbs* is characterized by tall serviceberry cover >30% and total graminoid cover >75%. Total sedge cover is >30%, and elk sedge is >25% cover. Four out of five plots had chokecherry (PAVI11), and all plots had muttongrass >15%. Moist forbs such as aspen peavine (LALE2) or star Solomon-plume (MAST4) are evident.
- B** *Saskatoon serviceberry-chokecherry-big sagebrush-snowberry-elk sedge* has tall serviceberry cover ranging from 55 to 90% and total graminoid cover 60-75%. Total sedge cover is 10-30%; elk sedge is always present, but of variable quantity. Both plots had chokecherry and muttongrass.
- C** *Saskatoon serviceberry-big sagebrush-snowberry-muttongrass-elk sedge* has tall serviceberry cover 20-30% and total graminoid cover 40-100%. Total sedge cover is 15-30%, and with elk sedge cover >5%. All plots had conspicuous muttongrass (5-35% cover). Chokecherry was absent.
- D** *Snowberry-big sagebrush-dry grasses* has serviceberry sparse or absent at 0-10% cover, and total graminoid cover ranged from 65 to 140%. Total sedge cover is variable, 0-40%. Three out of five plots had muttongrass >30% cover. Chokecherry is absent.
- E** *Big sagebrush-prairie junegrass* serviceberry is absent to sparse, 0-15% cover, and total graminoid cover <60%. Total sedge cover usually ranges 0-20%. Two of nine plots had prominent muttongrass. Chokecherry was absent.

Table 25-22. Community types within *Saskatoon serviceberry/elk sedge*–*Deep dark soils*–*Lees*.

Community Type	No. samples	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Layer Height, m	Avg Layr Cvr %	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
A. Saskatoon serviceberry-snowberry-elk sedge-moist forbs	5	8,898 (8,820-9,080) 22.8 (6-36)	61 (36-78) 51 (35-64) 34 (12-63)	11 (4-19) 2 (0-5) LS	S1 2.9 (2.0-3.2) S2 1.8 (0.9-2.6) S3 1.0 (0.2-1.8) S4 0.4 (0.0-0.9) GF 0.3 (0.0-1.5) S5 Missing ML Missing	12.1 29.1 36.1 38.8 86.6 M M	1 (0-4) 101 (50-177) 95 (77-116) 40 (19-62)	37 (20-48) 237 (193-306) 7.4 (4.1-15.3)	938-4237 862-1497 185-1186	3 (0-10) 14 (0-55) 45 (20-70) 89 (75-100) 38 (24-59)
B. Saskatoon serviceberry-chokecherry-big sagebrush-snowberry-elk sedge	2	8,890 (8,880-8,900) 24.0 (24-24)	37 (36-38) 63 (36-90) 47 (36-57)	1 (1-19) 0 (0-5) LM	S1 Missing S2 1.6 (1.2-2.3) S3 Missing S4 0.5 (0.2-1.4) GF 0.5 (0.0-1.2) S5 Missing ML Missing	M 81 M 95 72 M M	5 (0-10) 159 (103-216) 67 (66-67) 25 (20-31)	33 (27-38) 256 (210-303) 8.4 (5.5-11.2)	2969-4550 663-688 196-458	60 (50-70) 73 (50-95) 85 (70-100) 95 (90-100) 78 (65-91)
C. Saskatoon serviceberry-big sagebrush-snowberry-muttongrass-elk sedge	3	8,867 (8,720-9,100) 17.0 (7-24)	70 (63-82) 76 (64-84) 27 (16-36)	15 (9-23) 4 (3-7) LM	S1 2.1 (1.8-3.2) S2 1.7 (1.1-2.1) S3 1.1 (0.8-2.1) S4 0.5 (0.2-1.1) GF 0.3 (0.0-1.1) S5 0.1 (0.0-0.4) ML 0.0	T 10.5 9.5 45.8 86.8 45.8 2.1	3 (0-8) 78 (59-106) 69 (43-98) 36 (15-69)	38 (28-45) 185 (180-195) 5.1 (4.0-6.5)	1324-3043 313-1227 149-1304	8 (0-15) 20 (10-30) 50 (40-60) 93 (90-95) 43 (36-49)
D. Snowberry-big sagebrush-dry grasses	7	9,091 (8,580-9,540) 26.6 (9-36)	43 (17-70) 66 (35-99) 26 (18-45)	8 (0-26) 7 (3-10) EM	S1 Missing S2 1.3 (0.7-3.5) S3 Missing S4 0.5 (0.2-1.0) GF 0.3 (0.0-1.3) S5 0.2 (0.0-0.6) ML 0.0	M T M 28.3 88.6 21.7 1.5	0 (0-0) 51 (10-105) 99 (68-135) 20 (4-35)	35 (14-48) 169 (148-201) 5.7 (3.1-12.9)	63-3029 708-1701 38-569	0 (0-0) 0 (0-0) 15 (5-30) 79 (65-90) 23 (19-29)
E. Big sagebrush-prairie junegrass	9	9,380 (8,960-9,840) 29.0 (9-75)	32 (11-63) 51 (14-95) 23 (14-36)	14 (3-37) 7 (3-15) EM-ES	S1 Missing S2 1.6 (0.3-2.1) S3 0.9 (0.2-1.2) S4 Missing GF 0.2 (0.0-0.6) S5 0.2 (0.0-0.4) ML 0.0	M 16.0 39.2 M 38.5 15.9 0.2	0 (0-0) 54 (29-84) 35 (9-60) 18 (4-47)	38 (25-45) 107 (84-122) 2.9 (2.1-4.0)	190-2338 49-559 35-876	6 (0-25) 6 (0-25) 19 (0-70) 74 (45-95) 26 (11-53)

Table 25-23. Common Species in *Saskatoon serviceberry/elk sedge-Deep dark soils-Lees*, 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 Avg = Average Cover, then these are related using the formula $Avg = Ccv \cdot 100\% / Con$.

Community Type	A	B	C	D	E		
Code	Species	Ccv(Con) N = 5	Ccv(Con) 2	Ccv(Con) 3	Ccv(Con) 7	Ccv(Con) 9	Common Name
SHRUBS							
AMAL2	<i>Amelanchier alnifolia</i>	45(100)	70(100)	25(100)	2 (86)	5 (33)	Saskatoon serviceberry
ARUV	<i>Arctostaphylos uva-ursi</i>	-	-	18 (33)	-	-	kinnikinnick
ARTR2	<i>Artemisia tridentata</i>	7 (80)	6(100)	19(100)	10(100)	31(100)	big sagebrush
CEMO2	<i>Cercocarpus montanus</i>	-	-	17 (33)	-	19 (11)	true mountain-mahogany
CHV18	<i>Chrysothamnus viscidiflorus</i>	3 (80)	1 (50)	1 (67)	4 (71)	4 (67)	Douglas rabbitbrush
MARE11	<i>Mahonia repens</i>	T (20)	2 (50)	1 (67)	1 (14)	3 (44)	Oregon-grape
PAV111	<i>Padus virginiana</i>	34 (80)	24(100)	-	-	8 (11)	common chokecherry
PAMY	<i>Paxistima myrsinites</i>	-	-	-	-	13 (11)	mountain-lover
PUTR2	<i>Purshia tridentata</i>	14 (20)	T (50)	9 (67)	21 (71)	12 (67)	antelope bitterbrush
ROWO	<i>Rosa woodsii</i>	2 (60)	4(100)	1 (33)	T (43)	1 (67)	Woods rose
SYRO	<i>Symphoricarpos rotundifolius</i>	15(100)	53(100)	11(100)	20(100)	3 (78)	mountain snowberry
GRAMINOIDS							
ACLE9	<i>Achnatherum lettermanii</i>	2 (60)	-	-	3 (29)	6 (22)	Letterman needlegrass
ACNE9	<i>Achnatherum nelsonii</i>	6 (60)	-	-	16 (57)	8 (22)	Nelson's needlegrass
ACPI2	<i>Achnatherum pinetorum</i>	-	-	2 (67)	17 (57)	5 (44)	pine needlegrass
BRCA10	<i>Bromopsis canadensis</i>	4 (80)	9 (50)	1 (33)	3 (29)	T (33)	fringed brome
CAFO3	<i>Carex foenea</i>	-	-	-	26 (14)	-	silvertop sedge
CAGE	<i>Carex geophila</i>	1 (60)	-	10 (33)	1 (43)	1 (11)	dryland sedge
CAGE2	<i>Carex geyeri</i>	42(100)	12(100)	11(100)	11 (57)	12 (89)	elk sedge
CAOB4	<i>Carex obtusata</i>	20 (40)	10 (50)	5 (33)	3 (14)	-	blunt sedge
ELEL5	<i>Elymus elymoides</i>	3 (80)	1(100)	3 (33)	8 (86)	3 (78)	bottlebrush squirreltail
ELTR7	<i>Elymus trachycaulus</i>	-	50 (50)	-	5 (14)	T (11)	slender wheatgrass
HECO26	<i>Hesperostipa comata</i>	10 (20)	-	9 (33)	43 (71)	8 (67)	needle-and-thread
KOMA	<i>Koeleria macrantha</i>	1 (80)	-	4(100)	8 (86)	5(100)	prairie junegrass
MUMO	<i>Muhlenbergia montana</i>	T (20)	-	-	4 (43)	1 (44)	mountain muhly
POCO	<i>Poa compressa</i>	17 (20)	-	-	-	-	Canada bluegrass
POFE	<i>Poa fendleriana</i>	32 (80)	15(100)	38(100)	29 (71)	5 (89)	muttongrass
FORBS							
ACLA5	<i>Achillea lanulosa</i>	3 (40)	1 (50)	1 (33)	2 (29)	3 (33)	western yarrow
AGGL	<i>Agoseris glauca</i>	-	1(100)	-	1 (29)	T (22)	false-dandelion
AMLA6	<i>Amerosedum lanceolatum</i>	T (20)	-	2 (67)	1 (29)	T (22)	yellow stonecrop
ANPA4	<i>Antennaria parvifolia</i>	-	T (50)	-	4 (14)	5 (44)	smalleaf pussytoes
CALI4	<i>Castilleja linariifolia</i>	3 (80)	T (50)	6 (67)	4 (57)	1 (56)	Wyoming paintbrush
ERCO24	<i>Eremogone congesta</i>	1 (60)	4 (50)	10 (67)	1 (71)	2 (56)	desert sandwort
ERCO27	<i>Erigeron concinnus</i>	1 (20)	-	T (33)	1 (14)	T (33)	Navajo fleabane
EREA	<i>Erigeron eatonii</i>	T (40)	-	4 (67)	6 (14)	1 (78)	Eaton fleabane
ERSP4	<i>Erigeron speciosus</i>	11 (40)	-	-	2 (29)	1 (22)	Oregon fleabane
ERSU2	<i>Erigeron subtrinervis</i>	1 (20)	7 (50)	2 (33)	1 (29)	2 (22)	threenerve fleabane
ERRA3	<i>Eriogonum racemosum</i>	1 (20)	-	T (33)	1(100)	1 (89)	redroot buckwheat
ERSU11	<i>Eriogonum subalpinum</i>	2 (60)	-	-	1 (43)	2 (11)	sulfurflower
ERUM	<i>Eriogonum umbellatum</i>	3 (20)	2 (50)	1 (33)	1 (14)	1 (67)	sulfur buckwheat
GADR3	<i>Gastrolychnis drummondii</i>	1 (40)	-	T (33)	1 (43)	T (22)	alpine campion
GARA2	<i>Gayophytum ramosissimum</i>	-	-	-	1 (14)	1 (56)	hairstem ground smoke
LALE2	<i>Lathyrus leucanthus</i>	22 (60)	-	-	2 (29)	4 (22)	aspen peavine
LUAR3	<i>Lupinus argenteus</i>	T (60)	10(100)	3 (67)	1 (14)	1 (22)	silvery lupine
MAST4	<i>Maianthemum stellatum</i>	32 (20)	-	-	-	1 (11)	star Solomon-plume
ORLU2	<i>Orthocarpus luteus</i>	T (40)	2 (50)	-	8 (14)	2 (44)	yellow owl-clover
PECA4	<i>Penstemon caespitosus</i>	T (20)	-	1 (33)	1 (29)	T (22)	beardtongue
PHMU3	<i>Phlox multiflora</i>	2 (60)	6 (50)	6 (67)	2 (57)	T (11)	flowery phlox
PODO4	<i>Polygonum douglasii</i>	1 (20)	-	T (33)	2 (29)	T (22)	Douglas knotweed
POPU9	<i>Potentilla pulcherrima</i>	-	-	-	T (43)	1 (44)	beauty cinquefoil
TAOF	<i>Taraxacum officinale</i>	-	T (50)	-	T (29)	T (44)	common dandelion
VIAM	<i>Vicia americana</i>	3 (60)	-	16 (33)	2 (29)	T (11)	American vetch
FORB	forb unknown	-	T (50)	T (33)	2 (57)	1 (22)	unknown forb
GROUND COVER							
.BARESO	bare soil	2(100)	T (50)	4(100)	7 (86)	7(100)	
.LITTER	litter and duff	88(100)	95(100)	80(100)	80 (86)	75(100)	
GRAVEL	gravel 0.2-10 cm	3	1	5	5	4	
.COBBLE	cobble 10-25 cm	5 (40)	-	3(100)	1 (29)	5 (78)	
.STONES	stone > 25 cm	3 (60)	-	3 (67)	2 (14)	7 (67)	
.MOSSON	moss on soil	-	-	3 (67)	1 (43)	T (22)	
LICHENS	lichens on soil	-	-	2	5	1	

SERVICEBERRY/THURBER FESCUE–DEEP DARK COLD LOAMY SOILS–SUBALPINE

Saskatoon serviceberry/Thurber fescue–Deep Argic Cryoborolls, loam surface–
Subalpine slopes, 8,700-10,000 ft

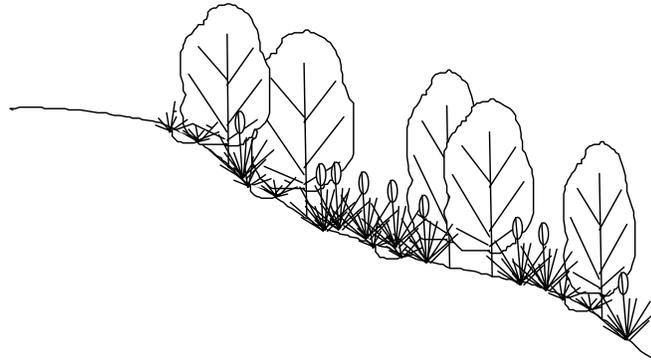


Figure 25-11. Cross-section of vegetation structure of *Serviceberry/Thurber fescue–Deep dark cold loamy soils–Subalpine*. Aspects are various, and slope angles average 34%.

Serviceberry/Thurber fescue–Deep dark cold loamy soils–Subalpine is an uncommon type found on deep loamy soils in the Subalpine zone, usually outside any rainshadows. In the Gunnison Basin, it occurs on upper, protected, leeward slopes and in Subalpine parks. This type probably also occurs on mountain slopes of western Colorado and eastern Utah. *Serviceberry/Thurber fescue–Deep dark cold loamy soils–Subalpine* is characterized by Saskatoon serviceberry (AMAL2) and Thurber fescue (FETH). Mountain snowberry (SYRO), elk sedge (CAGE2), and big sagebrush (ARTR2) are often present. See Table 25-27 for common species names and codes. Other distinguishing features include location on upper leeward slopes and in parks, locations protected from wind, and deep loamy Argic Cryoborolls.

Serviceberry/Thurber fescue–Deep dark cold loamy soils–Subalpine is related to *Saskatoon serviceberry/elk sedge–Deep dark soils–Lees*, which sometimes occurs on Frigid soils, and lacks Thurber fescue. *Serviceberry/Thurber fescue–Deep dark cold loamy soils–Subalpine* is also related to *Thurber-Idaho fescues–Deep cold dark soils*, which occurs at much higher elevations on more southerly slopes, and lacks serviceberry. *Serviceberry/Thurber fescue–Deep dark cold loamy soils–Subalpine* is also related to *Aspen/Thurber fescue–Deep dark soils*, a forested type dominated by aspen (POTR5), which occurs at higher elevations on more westerly slopes with less-coarse soils.

The plant association *Amelanchier alnifolia/Festuca thurberi* is described as new here.

Saskatoon serviceberry is the most palatable browse plant in the UGB. Browsing reduces serviceberry cover and palatable grasses, especially if animals are concentrated or if browsing

continues over a decade or more. Serviceberry will eventually be eliminated, because browsing induces longer, more succulent leaders the next season; so the animals become more dedicated to searching out every serviceberry plant. As the serviceberry disappears, so do the shade-tolerant species like sedges and spike-fescue, and sagebrush and rabbitbrush invade the site. Other palatable tall shrubs, such as chokecherry and mountain-mahogany, occur with serviceberry and are also browsed.

Deer and elk are the primary browsers on serviceberry, but it is also palatable to cattle and domestic sheep. These high-elevation serviceberry stands are protected from winter browsing by deep snow most years, and they are not browsed as much as those at lower elevations, especially those below the lower tree line. Mountain big sagebrush communities occur on adjacent, more exposed slopes with shallower soils. Thurber fescue grasslands adjoin this type on deeper soils on slumps. Aspen or spruce-fir forests occur on nearby better-drained northerly slopes. *Serviceberry/Thurber fescue–Deep dark cold loamy soils–Subalpine* is sometimes adjacent to riparian areas.

Horizontal obstruction varies from moderately low to very high. Hiding cover is moderately low to moderately high in community type A, very high in community type B, and moderate to very high in community type C. Stands in good condition provide cover, browse, and forage for deer and elk. Most stands accumulate considerable snow, so deer and elk use them only during the summer and mild winters.

Stands in good condition, with >40% cover of tall serviceberry, are important mule deer habitat in the UGB. Many stands have been degraded by long-term cattle grazing (especially before World

War II) and sharp increases in elk population in recent decades, causing a significant decline in the quality of mule deer habitat in the last 30-40 yr. Most sites in this type are in good enough condition

now to provide some mule deer habitat, but these sites cannot serve as critical winter range.

This ecological type is not much use to sage grouse.

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	8, soil descriptions from 8; 2 not assigned to a community type (total 10)
ELEVATION	9,084 ft (8,780-9,925 ft); 2,769 m (2,675-3,025 m)
ASPECT	A variety, often northeasterly
LITHOLOGY	Mostly sedimentaries: sandstone-mudstone-shale [67%], with some igneous: granite-breccia [33%]
FORMATIONS ¹	Km-KJdm-Jm [50%], Tpl-Taf-Tmi [30%], Xg [20%]
LANDFORMS	Mostly soil creep slopes [73%]
SLOPE POSITIONS	Mostly backslopes [75%]
SLOPE SHAPES	Mostly linear [80%] horizontally, concave [50%] to linear [50%] vertically.
SLOPE ANGLE	34% (17-50%)
SOIL PARENT MATERIAL	All ten samples were colluvium
COARSE FRAGMENTS	7% (0-20%) cover on surface, 52% (5-78%) by volume in soil
SOIL DEPTH	64 cm (48-78 cm); 25 in (19-31 in)
MOLLIC THICKNESS	42 cm (24-75 cm); 17 in (9-30 in)
TEXTURE	surface: Loamy (loam-sandy loam-clay loam-silt loam); subsurface: Mostly clayey (sandy clay loam-clay-sandy clay [73%])
SOIL CLASSIFICATION	Argic Cryoborolls [89%] and Cryoborolls [11%]. Of these, [33%] were Pachic
TOTAL LIVE COVER	203.7% (173-255%)
NUMBER OF SPECIES	37 (28-43)
TOTAL LIVE COVER/NO. SPECIES	5.6% (4.1-7.1%)
CLIMATE	Usually outside rainshadow or in moderate rainshadow. Cool to cold, moderately exposed to sun, protected from wind. Stands in good condition, with >60% cover of tall shrubs, create a microclimate significantly moister and cooler than depleted sites dominated by sagebrush.
WATER	Stands in good condition, with >60% cover of tall shrubs, trap some wind-blown snow from west. On depleted sites dominated by sagebrush, the snow scatters, melts faster and runs off faster. Many sites are now depleted so much less water is retained upslope now than 150-200 years ago. No permanent water on or near sites.



A serviceberry/Thurber fescue site (Community Type A). Saskatoon serviceberry 42% cover, snowberry 15%, elk sedge 48%, muttongrass 35%, Thurber fescue 6%. Soil sampled as an Argic Cryoboroll, Loamy-Skeletal, Mixed. Almont Quadrangle, elevation 8,780 ft, 30° 328° NNW slope. July 22, 1994.

Key to Community Types

1. Saskatoon serviceberry >30% cover(2)
1. Saskatoon serviceberry <30% cover. Thurber fescue 10-85% cover(3)

2. Big sagebrush (ARTR2) or mountain sagebrush (ARTRV) >25% cover. Snowberry (SYRO) <10% cover. Total graminoid cover <85%.....C
2. Big sagebrush and mountain sagebrush usually absent, sometimes <10% each. Snowberry >10% cover. Total graminoid cover >85%.....A

3. Big sagebrush or mountain sagebrush >25% cover. Serviceberry >5% cover, often >20%. Total graminoid cover <85%C
3. Big sagebrush and mountain sagebrush absent or <20% cover. Serviceberry <5% cover. Total graminoid cover >85%B

Description of Community Types

- A** *Serviceberry-snowberry-Thurber fescue-elk sedge* is dominated by Saskatoon serviceberry with >30% cover, and snowberry (SYRO) with >10% cover. Elk sedge and/or Thurber fescue are prominent, >45% cover. Total graminoid cover is 90-120%.
- B** *Thurber fescue-serviceberry-rabbitbrush-yarrow* is dominated by Thurber fescue, mountain sagebrush, or chokecherry. Thurber fescue is always present, ranging from 15 to 85% cover. Total graminoid cover ranges from 85 to 150%.
- C** *Big sagebrush-serviceberry-snowberry-elk sedge-Thurber fescue* is dominated by big sagebrush and Saskatoon serviceberry. The understory is dominated by Thurber fescue, 2-15%, and elk sedge, 8-35%. Total graminoid cover is 40-70%.

Communities Not Assigned to a Community Type

- One community was dominated by Rocky Mountain maple (ACGL) and red-osier dogwood (SWSE). This may be a different type; it is included here because the habitat is similar.
- One community was dominated by Rocky Mountain maple and snowberry (SYRO), with significant cover by elk sedge and Thurber fescue. This community occurs within the habitat of this ET, but maple established rather than chokecherry (PAVI11) or serviceberry.

Table 25-24. Community types within *Serviceberry/Thurber fescue-Deep dark cold loamy soils-Subalpine*.

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.!, 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. Serviceberry-snowberry-Thurber fescue-elk sedge	2	9,030 (8,780-9,280) 30.0 (30-30)	56 (35-78) 52 (48-55) 33 (28-37)	5 1 LS	S1	2.0 (1.5-2.5)	5.0	0 (0-0) 78 (74-81) 105 (102-108) 51 (23-78)	39 (36-42) 233 (213-254) 6.0 (5.9-6.1)	1961-2231 1289-1387 264-1411	10 (0-20) 25 (0-50) 28 (0-55) 78 (70-85) 35 (18-53)
					S2	1.5 (1.0-2.0)	5.8				
					S3	0.5 (0.7-1.5)	82.7				
					GF	0.3 (0.0-1.0)	95.9				
					S4	0.1 (0.0-0.3)	28.0				
					ML	Missing	M				
B. Thurber fescue-serviceberry-rabbitbrush-yarrow	3	8,917 (8,780-9,020) 40.6 (26-50)	40 (5-72) 75 (71-78) 55 (37-75)	5 (3-9) 5 (2-10) MS	S1	4.4 (1.4-4.1)	24.2	0 (0-0) 42 (22-74) 114 (93-140) 52 (14-74)	34 (28-41) 208 (176-235) 6.2 (5.2-7.1)	148-1930 1137-1746 136-1370	65 85 100 100 88
					S2	0.9 (0.5-1.4)	12.7				
					S3	0.4 (0.1-1.0)	9.5				
					GF	0.6 (0.0-1.3)	93.8				
					S4	0.1 (0.0-0.4)	2.7				
					ML	0.0	0.5				
C. Big sagebrush-serviceberry-snowberry-elk sedge-Thurber fescue	3	9,288 (8,840-9,925) 29.6 (17-38)	64 (53-75) 61 (57-65) 32 (24-39)	11 (4-20) 10 (6-14) EM	S1	Missing	M	0 (0-0) 86 (66-110) 58 (47-65) 35 (20-44)	39 (32-43) 179 (173-188) 4.7 (4.1-5.5)	1606-3166 359-654 192-804	25 (0-50) 35 (0-70) 53 (10-95) 100(100-100) 53 (28-79)
					S2	1.2 (0.3-2.8)	11.1				
					S3	0.5 (0.2-1.0)	50.1				
					GF	0.4 (0.0-1.0)	81.6				
					S4	0.2 (0.0-0.4)	10.0				
					ML	0.0	0.3				

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

Table 25-26. Resource Values for *Serviceberry/Thurber fescue-Deep dark cold loamy soils-Subalpine*. Resource values were calculated from the numbers in Table 25-24, 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		
	A	B	C
Potential Cattle Forage Production	4	4	2-3
Grazing Suitability	3	2	2
Wetland	No	No	No
Riparian Area	No	No	No
Developed Recreation	ns ¹	ns ¹	ns ¹
Dispersed Recreation	0-1 ¹	0-1 ¹	0-1 ¹
Scenic	4-5	4-5	2-3
Road & Trail Stability	1-2	1-2	1-2
Construction Suitability	ns ¹	ns ¹	ns ¹
Deer & Elk Hiding Cover	2-4	6	3-6
Deer & Elk Forage & Browse	4-5	4-5	2-3
Need for Watershed Protection	4-5	4-5	4-5
Soil Stability	2-3	2-3	2-3
Risk of Soil Loss-Natural	1-2	2-3	2-3
Risk of Soil Loss-Management	4-5	4	4-5
Risk of Permanent Depletion-Range	3-4	3-4	2
Risk of Permanent Depletion-Wildlife	3	3	2
Resource Cost of Management	5	4	5
Cost of Rehabilitation	2-3	3-4	4

1. Steep, far from water. ns = Not suitable.

Table 25-27. Common Species in *Serviceberry/Thurber fescue-Deep dark cold loamy soils-Subalpine*, 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	Community Type			Common Name
		A Ccv (Con) N = 2	B Ccv (Con) 3	C Ccv (Con) 3	
TREES					
POTR5	<i>Populus tremuloides</i>	-	-	T (67)	quaking aspen
SHRUBS					
AMAL2	<i>Amelanchier alnifolia</i>	38 (100)	1 (100)	24 (100)	Saskatoon serviceberry
ARAR8	<i>Artemisia arbuscula</i>	31 (50)	10 (33)	T (33)	low sagebrush
ARTR2	<i>Artemisia tridentata</i>	1 (50)	-	34 (67)	big sagebrush
ARTRV	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	-	8 (67)	-	mountain big sagebrush
CHDE2	<i>Chrysothamnus depressus</i>	-	-	24 (33)	dwarf rabbitbrush
CHNA2	<i>Chrysothamnus nauseosus</i>	-	2 (67)	3 (67)	rubber rabbitbrush
CHV18	<i>Chrysothamnus viscidiflorus</i>	4 (100)	4 (100)	1 (67)	Douglas rabbitbrush
MARE11	<i>Mahonia repens</i>	2 (50)	1 (33)	1 (67)	Oregon-grape
PAV111	<i>Padus virginiana</i>	T (50)	54 (33)	-	common chokecherry
ROWO	<i>Rosa woodsii</i>	1 (100)	2 (100)	2 (67)	Woods rose
SYRO	<i>Symphoricarpos rotundifolius</i>	14 (100)	9 (67)	14 (100)	mountain snowberry

Table 25-27. (Continued)

Code	Community Type Species	A	B	C	Common Name
		Ccv (Con) N = 2	Ccv (Con) 3	Ccv (Con) 3	
GRAMINOIDS					
ACLE9	Achnatherum lettermanii	4 (50)	3 (100)	2 (67)	Letterman needlegrass
ACPI2	Achnatherum pinetorum	- -	- -	2 (67)	pine needlegrass
BRCA10	Bromopsis canadensis	2 (100)	2 (67)	- -	fringed brome
CAGE2	Carex geyeri	26 (100)	33 (33)	16 (100)	elk sedge
CAOB4	Carex obtusata	2 (100)	- -	17 (67)	blunt sedge
ELEL5	Elymus elymoides	1 (50)	T (67)	5 (67)	bottlebrush squirreltail
ELTR7	Elymus trachycaulus	- -	1 (33)	7 (33)	slender wheatgrass
FEAR2	Festuca arizonica	- -	3 (33)	4 (33)	Arizona fescue
FETH	Festuca thurberi	46 (100)	50 (100)	5 (100)	Thurber fescue
KOMA	Koeleria macrantha	3 (100)	7 (67)	4 (100)	prairie junegrass
NAVI4	Nassella viridula	- -	10 (33)	- -	green needlegrass
POFE	Poa fendleriana	18 (100)	- -	29 (33)	muttongrass
POPA2	Poa palustris	T (100)	- -	- -	swamp bluegrass
POPR	Poa pratensis	- -	37 (67)	5 (33)	Kentucky bluegrass
TRSP2	Trisetum spicatum	- -	39 (33)	- -	spike trisetum
FORBS					
ACLA5	Achillea lanulosa	2 (100)	10 (100)	2 (33)	western yarrow
ADLE	Adenolinum lewisii	T (50)	6 (33)	- -	blue flax
ANPA4	Antennaria parvifolia	T (50)	- -	1 (33)	smallleaf pussytoes
CAGU	Calochortus gunnisonii	1 (50)	- -	1 (67)	Gunnison mariposa
CALI4	Castilleja linariifolia	T (100)	T (33)	4 (100)	Wyoming paintbrush
COHI5	Coriflora hirsutissima	5 (100)	- -	- -	leather flower
ERCO24	Eremogone congesta	4 (100)	7 (33)	8 (67)	desert sandwort
EREA	Erigeron eatonii	- -	- -	1 (67)	Eaton fleabane
ERSP4	Erigeron speciosus	6 (100)	6 (33)	- -	Oregon fleabane
ERSU2	Erigeron subtrineris	- -	6 (67)	2 (67)	threenerve fleabane
ERSU11	Eriogonum subalpinum	1 (100)	T (67)	5 (67)	sulfurflower
ERUM	Eriogonum umbellatum	- -	1 (33)	T (33)	sulfur buckwheat
GASE6	Galium septentrionale	4 (100)	2 (67)	1 (33)	northern bedstraw
HEVI4	Heterotheca villosa	- -	T (33)	T (33)	hairy golden aster
HEPA11	Heuchera parvifolia	3 (100)	7 (33)	2 (33)	littleleaf alumroot
IPAG	Ipomopsis aggregata	- -	- -	T (67)	trumpet gilia
LALE2	Lathyrus leucanthus	13 (50)	3 (100)	8 (67)	aspen peavine
LUAR3	Lupinus argenteus	4 (50)	17 (67)	T (33)	silvery lupine
OLDR	Oligosporus dracunculus	- -	4 (33)	T (33)	wild tarragon
PHMU3	Phlox multiflora	7 (100)	7 (33)	15 (33)	flowery phlox
PODO4	Polygonum douglasii	- -	T (33)	2 (33)	Douglas knotweed
POPU9	Potentilla pulcherrima	6 (50)	3 (33)	T (33)	beauty cinquefoil
TAOF	Taraxacum officinale	- -	3 (33)	1 (67)	common dandelion
VIAM	Vicia americana	T (50)	1 (67)	4 (67)	American vetch
FORB	forb unknown	- -	1 (33)	1 (33)	unknown forb
GROUND COVER					
.BARESO	bare soil	1 (100)	5 (100)	10 (100)	
.LITTER	litter and duff	95 (100)	89 (100)	77 (100)	
.GRAVEL	gravel 0.2-10 cm	4	1	4	
.COBBLE	cobble 10-25 cm	1 (50)	3 (67)	4 (100)	
.STONES	stone > 25 cm	T (50)	1 (67)	3 (33)	
.MOSSON	moss on soil	- -	1 (33)	1 (33)	
.LICHENS	lichens on soil	- -	- -	- -	