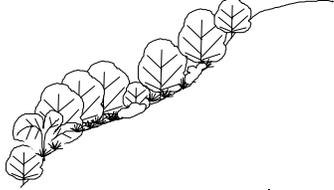


## G. NON-RIPARIAN TALL SHRUBLANDS (SA)

SA1. **UTAH SERVICEBERRY/SEDGE-DARK CLAY SOILS-LEEWARD** (AMUT/CAGE-CAPEH). Utah serviceberry/dryland sedge-sun sedge-Deep Argiborolls-Leeward upper backslopes and shoulders, < 9,100 ft



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 <sup>1</sup>	Taf most often [45%], or Km-Jm-Kj dj [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.

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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**

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Description of Community Types

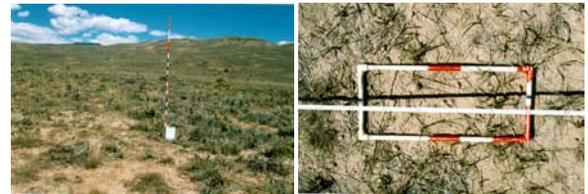
- A** *Utah serviceberry-snowberry-sun sedge* is characterized by total graminoid cover >80%, >30% cover of tall Utah serviceberry, snowberry cover >40%, and sun sedge cover 30%. Big sagebrush cover is <15%, usually less. One of the two plots had >20% cover of dryland sedge (CAGE).
- B** *Utah serviceberry-sparse* 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.
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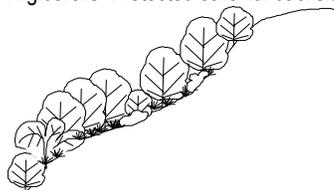
Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Utah serviceberry-snowberry-sun sedge	8,615 (8,550-8,680) 46.2 (28-64)	61 (54-69) 53 (45-60) 45 (30-60)	4 (1-8) 2 (1-3) LS	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
B. Utah serviceberry-sparse	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	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
C. Big sagebrush-snowberry-dryland sedge-sparse Utah serviceberry	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	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
D. Big sagebrush-sparse Utah serviceberry-pine needlegrass-sparse snowberry	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	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
E. Big sagebrush-muttongrass-sparse snowberry	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	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
F. Big sagebrush-sparse Utah serviceberry-rabbitbrush-sparse snowberry-Indian ricegrass	8,354 (8,100-8,700) 17.4 (9-28)	45 28 28	36 (16-50) 22 (8-55) ES-EM	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
G. Big sagebrush-sparse Utah serviceberry-rabbitbrush-sparse snowberry	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	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

	SHRUBS	
AMUT	<i>Amelanchier utahensis</i>	Utah serviceberry
ARNO4	<i>Artemisia nova</i>	black sagebrush
ARTR2	<i>Artemisia tridentata</i>	big sagebrush
PUTR2	<i>Purshia tridentata</i>	antelope bitterbrush
	GRAMINOIDS	
ACLE9	<i>Achnatherum lettermanii</i>	Letterman needlegrass
ACNE9	<i>Achnatherum nelsonii</i>	Nelson's needlegrass
ACPI2	<i>Achnatherum pinetorum</i>	pine needlegrass
AGCR	<i>Agropyron cristatum</i>	crested wheatgrass
BRCA10	<i>Bromopsis canadensis</i>	fringed brome
CAREX	<i>Carex</i>	sedge
CAGE	<i>Carex geophila</i>	dryland sedge
CAPEH	<i>Carex pensylvanica</i> ssp. <i>heliophila</i>	sun sedge
CASTE3	<i>Carex stenophylla</i> ssp. <i>eleocharis</i>	needleleaf sedge
CHGR15	<i>Chondrosium gracile</i>	blue grama
ELEL5	<i>Elymus elymoides</i>	bottlebrush squirreltail
FEAR2	<i>Festuca arizonica</i>	Arizona fescue
HECO26	<i>Hesperostipa comata</i>	needle-and-thread
KOMA	<i>Koeleria macrantha</i>	prairie junegrass
MUFI	<i>Muhlenbergia filiculmis</i>	slimstem muhly
PASM	<i>Pascopyrum smithii</i>	western wheatgrass
POFE	<i>Poa fendleriana</i>	muttongrass
PONEI2	<i>Poa nemoralis</i> ssp. <i>interior</i>	interior bluegrass
POSE	<i>Poa secunda</i>	Sandberg bluegrass
	FORBS	
ALLIU	<i>Allium</i>	onion
AMLA6	<i>Amerosedum lanceolatum</i>	yellow stonecrop
BASA3	<i>Balsamorhiza sagittata</i>	arrowleaf balsam-root
ERSU11	<i>Eriogonum subalpinum</i>	sulfurflower
GASE6	<i>Galium septentrionale</i>	northern bedstraw
LUAR3	<i>Lupinus argenteus</i>	silvery lupine
LUSE4	<i>Lupinus sericeus</i>	silky lupine
VIAM	<i>Vicia americana</i>	American vetch



**SA2. UTAH SERVICEBERRY-MOUNTAIN-MAHOGANY/SEDGE-DARK CLAY SOILS-PROTECTED**

(AMUT-CEMO2/CAGE-CAPEH). Utah serviceberry-mountain-mahogany/dryland sedge-sun sedge-Argiborolls-Protected colluvial backslopes and shoulders, < 8,700 ft



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 <sup>1</sup>	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.

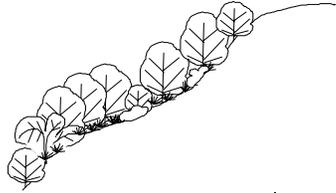
Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Utah serviceberry-mountain-mahogany-snowberry-dryland sedge	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	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
B. Mountain-mahogany-Utah serviceberry-big sagebrush-snowberry-muttongrass	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	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
C. Mountain-mahogany-Utah serviceberry-big sagebrush-snowberry	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	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
D. Mountain-mahogany-big sagebrush-muttongrass-sparse Utah serviceberry	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	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

SHRUBS		
AMUT	<i>Amelanchier utahensis</i>	Utah serviceberry
ARTR2	<i>Artemisia tridentata</i>	big sagebrush
CEFE	<i>Ceanothus fendleri</i>	buckbrush
CEMO2	<i>Cercocarpus montanus</i>	true mountain-mahogany
PIR16	<i>Picradenia richardsonii</i>	pingue
QUGA	<i>Quercus gambelii</i>	scrub oak
GRAMINOIDS		
ACHY	<i>Achnatherum hymenoides</i>	Indian ricegrass
BRPO5	<i>Bromopsis porteri</i>	nodding brome
CAFO3	<i>Carex foenea</i>	silvertop sedge
CAGE	<i>Carex geophila</i>	dryland sedge
CAHO5	<i>Carex hoodii</i>	Hood sedge
CASTE3	<i>Carex stenophylla</i> ssp. <i>eleocharis</i>	needleleaf sedge
CAXE	<i>Carex xerantica</i>	dryland sedge
DAPA2	<i>Danthonia parryi</i>	Parry oatgrass
ELEL5	<i>Elymus elymoides</i>	bottlebrush squirreltail
KOMA	<i>Koeleria macrantha</i>	prairie junegrass
MUMO	<i>Muhlenbergia montana</i>	mountain muhly
PIMI7	<i>Piptatherum micranthum</i>	littleseed ricegrass
POFE	<i>Poa fendleriana</i>	muttongrass
POSE	<i>Poa secunda</i>	Sandberg bluegrass
FORBS		
ASSP16	<i>Aster spathulatus</i>	western aster
ASCO12	<i>Astragalus convallarius</i>	lesser rushy milkvetch
ERCO24	<i>Eremogone congesta</i>	desert sandwort
ERUM	<i>Eriogonum umbellatum</i>	sulfur buckwheat
HYFI	<i>Hymenopappus filifolius</i>	white ragweed
SOSI3	<i>Solidago simplex</i>	Mt. Albert goldenrod





SA3. **SERVICEBERRY-OAK-DARK CLAY SOILS-PROTECTED** (AMUT-AMAL2-QUGA/CAGE-CAGE2).  
 Serviceberry-Gambel oak/Sedge-Deep Argiborolls, little coarse on surface-Lees or other protected slopes,  
 7,600 - 8,600 ft



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 <sup>1</sup>	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.

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.

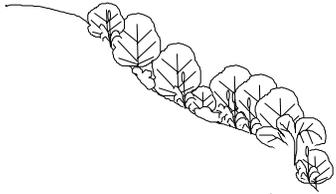
Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Oak-serviceberry-snowberry-bedstraw	8,480 (8,280-8,600) 31.6 (26-40)	59 (33-84) 47 (35-69) 31 (20-37)	4 (2-7) * LM	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
B. Oak-big sagebrush-snowberry-muttongrass	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
C. Big sagebrush-oak-snowberry-sparse serviceberry	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	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.

	TREES	
POTR5	Populus tremuloides	quaking aspen
	SHRUBS	
AMAL2	Amelanchier alnifolia	Saskatoon serviceberry
AMUT	Amelanchier utahensis	Utah serviceberry
PAV111	Padus virginiana	common chokecherry
QUGA	Quercus gambelii	scrub oak
SYRO	Symphoricarpos rotundifolius	mountain snowberry
	GRAMINOIDS	
ACHY	Achnatherum hymenoides	Indian ricegrass
BRCA10	Bromopsis canadensis	fringed brome
CABR11	Carex brevipes	sedge
CAFO3	Carex foenea	silvertop sedge
CAGE	Carex geophila	dryland sedge
CAGE2	Carex geyeri	elk sedge
CAOB4	Carex obtusata	blunt sedge
FEAR2	Festuca arizonica	Arizona fescue
KOMA	Koeleria macrantha	prairie junegrass

	GRAMINOIDS (Cont.)	
LECI4	Leymus cinereus	giant wildrye
POA	Poa	bluegrass
POFE	Poa fendleriana	muttongrass
GRAM1	graminoid unknown	unknown graminoid
	FORBS	
ERSP4	Erigeron speciosus	Oregon fleabane
GASE6	Galium septentrionale	northern bedstraw
LALE2	Lathyrus leucanthus	aspen peavine
LUAR3	Lupinus argenteus	silvery lupine
THFE	Thalictrum fendleri	Fendler meadow-rue

SA4. **SERVICEBERRY/GREEN NEEDLEGRASS–DEEP CLAY SOILS–LEES** (AMAL2-AMUT/NAVI4-LEK12). Serviceberry/green needlegrass-spike-fescue–Deep Argiborolls, sometimes Pachic–Lee sides of ridges and mesas, 8,000-9,300 ft



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'	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.

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.



Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod., lb/ac/yr Shrubs Gramin. Forbs
A. Serviceberry-snowberry-mountain-mahogany-green needlegrass-dryland sedge	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	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
B. Serviceberry-snowberry-big sagebrush-green needlegrass	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	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
C. Big sagebrush-serviceberry-snowberry-green needlegrass-pine needlegrass-muttongrass	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	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
D. Big sagebrush-sparse serviceberry-muttongrass-spike-fescue	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
E. Big sagebrush-muttongrass-spike-fescue	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	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
F. Big sagebrush-rabbitbrush-snowberry-dry grasses	8,846 (8,771-8,895) 22.7 (10-30)	* * *	6 (6-6) 11 (7-15) EM-ES	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
G. Serviceberry-snowberry-big sagebrush-muttongrass-green needlegrass	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	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
H. Big sagebrush-snowberry-muttongrass	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

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

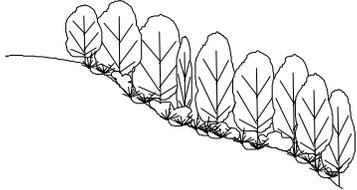
	SHRUBS	
AMELA	Amelanchier	serviceberry
ARTR2	Artemisia tridentata	big sagebrush
MARE11	Mahonia repens	Oregon-grape
PAV11	Padus virginiana	common chokecherry
PUTR2	Purshia tridentata	antelope bitterbrush
RICE	Ribes cereum	wax currant
ROWO	Rosa woodsii	Woods rose
	GRAMINOIDS	
ACLE9	Achnatherum lettermanii	Letterman needlegrass
ACNE9	Achnatherum nelsonii	Nelson's needlegrass
ACPI2	Achnatherum pinetorum	pine needlegrass
BRCA10	Bromopsis canadensis	fringed brome
CAGE	Carex geophila	dryland sedge
CAGE2	Carex geyeri	elk sedge
CAIN11	Carex interior	inland sedge
CASTE3	Carex stenophylla ssp. eleocharis	needleleaf sedge
ELEL5	Elymus elymoides	bottlebrush squirreltail
KOMA	Koeleria macrantha	prairie junegrass
LEKI2	Leucopoa kingii	spike-fescue
MUF1	Muhlenbergia filiculmis	slimstem muhly
NAVI4	Nassella viridula	green needlegrass
PIMI7	Piptatherum micranthum	littleseed ricegrass
POFE	Poa fendleriana	muttongrass

	FORBS	
ERSU11	Eriogonum subalpinum	sulfurflower
LALE2	Lathyrus leucanthus	aspen peavine
LUAR3	Lupinus argenteus	silvery lupine
LUSE4	Lupinus sericeus	silky lupine
PHMU3	Phlox multiflora	flowery phlox
TRGY	Trifolium gymnocarpum	holly-leaf clover



**SA5. SASKATOON SERVICEBERRY/ELK SEDGE--DEEP DARK SOILS--LEES (AMAL2/CAGE2).**

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



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 <sup>1</sup>	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.

**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.

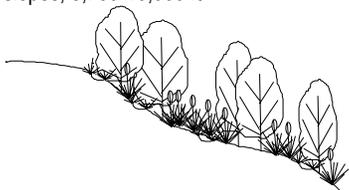
Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod., lb/ac/yr Shrubs Gramin. Forbs
A. Saskatoon serviceberry-snowberry-elk sedge-moist forbs	8,898 (8,820-9,080) 22.8 (6-36)	61 (36-78) 51 (35-64) 34 (12-63)	11 (4-19) 2 (0-5) LS	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
B. Saskatoon serviceberry-chokecherry-big sagebrush-snowberry-elk sedge	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	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
C. Saskatoon serviceberry-big sagebrush-snowberry-muttongrass-elk sedge	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	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
D. Snowberry-big sagebrush-dry grasses	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	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
E. Big sagebrush-prairie junegrass	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	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

	TREES	
POTR5	Populus tremuloides	quaking aspen
	SHRUBS	
AMAL2	Amelanchier alnifolia	Saskatoon serviceberry
ARTR2	Artemisia tridentata	big sagebrush
CEMO2	Cercocarpus montanus	true mountain-mahogany
JUCO6	Juniperus communis	common juniper
PAVI11	Padus virginiana	common chokecherry
PUTR2	Purshia tridentata	antelope bitterbrush
	GRAMINOIDS	
ACLE9	Achnatherum lettermanii	Letterman needlegrass
ACNE9	Achnatherum nelsonii	Nelson's needlegrass
ACPI2	Achnatherum pinetorum	pine needlegrass
CADI6	Carex disperma	soft leaved sedge
CAGE2	Carex geyeri	elk sedge
CAOB4	Carex obtusata	blunt sedge
CASTE3	Carex stenophylla ssp. eleocharis	needleleaf sedge
ELEL5	Elymus elymoides	bottlebrush squirreltail
ELTR7	Elymus trachycaulus	slender wheatgrass
HECO26	Hesperostipa comata	needle-and-thread
KOMA	Koeleria macrantha	prairie junegrass
POFE	Poa fendleriana	muttongrass

	FORBS	
ANPA4	Antennaria parvifolia	smallleaf pussytoes
CALI4	Castilleja linariifolia	Wyoming paintbrush
ERSP4	Erigeron speciosus	Oregon fleabane
GASE6	Galium septentrionale	northern bedstraw
LALE2	Galium leucanthus	aspen peavine
LUAR3	Lupinus argenteus	silvery lupine
MAST4	Maianthemum stellatum	star Solomon-plume
PHHO	Phlox hoodii	Hood's phlox
VIAM	Vicia americana	American vetch

**SA6. SERVICEBERRY/THURBER FESCUE–DEEP DARK COLD LOAMY SOILS–SUBALPINE**

(AMAL2/FETH). Saskatoon serviceberry/Thurber fescue–Deep Argic Cryoborolls, loam surface–Subalpine slopes, 8,700-10,000 ft



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 <sup>1</sup>	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.

**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

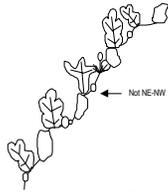
- One community was dominated by Rocky Mountain maple (ACGL) and red-osier dogwood (SWSE). This may be a different type; it is included here because the habitat is similar.
- One community was dominated by Rocky Mountain maple and snowberry (SYRO), with significant cover by elk sedge and Thurber fescue.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

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Serviceberry-snowberry-Thurber fescue-elk sedge	9,030 (8,780-9,280) 30.0 (30-30)	56 (35-78) 52 (48-55) 33 (28-37)	5 1 LS	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
B. Thurber fescue-serviceberry-rabbitbrush-yarrow	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	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
C. Big sagebrush-serviceberry-snowberry-elk sedge-Thurber fescue	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	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

	SHRUBS	
ACGL	Acer glabrum	Rocky Mountain maple
ARAR8	Artemisia arbuscula	low sagebrush
ARTR2	Artemisia tridentata	big sagebrush
ARTRV	Artemisia tridentata ssp. vaseyana	mountain big sagebrush
CHDE2	Chrysothamnus depressus	dwarf rabbitbrush
PAVI11	Padus virginiana	common chokecherry
RIWO	Ribes wolffii	Rothrock currant
RUID	Rubus idaeus	American red raspberry
SWSE	Swida sericea	red-osier
	GRAMINOIDS	
ACLE9	Achnatherum lettermanii	Letterman needlegrass
ACNE9	Achnatherum nelsonii	Nelson's needlegrass
CAFO3	Carex foenea	silvertop sedge
CAGE	Carex geophila	dryland sedge
CAGE2	Carex geyeri	elk sedge
CAOB4	Carex obtusata	blunt sedge
FETH	Festuca thurberi	Thurber fescue
KOMA	Koeleria macrantha	prairie junegrass
NAVI4	Nassella viridula	green needlegrass
POFE	Poa fendleriana	muttongrass
POPR	Poa pratensis	Kentucky bluegrass
TRSP2	Trisetum spicatum	spike trisetum
	FORBS	
ACLA5	Achillea lanulosa	western yarrow
ADLE	Adenolinum lewisii	blue flax

	FORBS (Continued)	
ANMA	Anaphalis margaritacea	pearly-everlasting
ATOC	Atragene occidentalis	blue clematis
CARO2	Campanula rotundifolia	common harebell
COHI5	Coriflora hirsutissima	leather flower
ERCO24	Eremogone congesta	desert sandwort
ERSP4	Erigeron speciosus	Oregon fleabane
ERSU2	Erigeron subtrinervis	threenerve fleabane
HEMU3	Helioeris multiflora	showy goldeneye
HEPA11	Heuchera parvifolia	littleleaf alumroot
LASE	Lactuca serriola	prickly lettuce
LAL2	Lathyrus leucanthus	aspen peavine
LIPU6	Ligularia pudica	groundsel
LUAR3	Lupinus argenteus	silvery lupine
MAAM6	Maianthemum amplexicaule	feather Solomon-plume
MEAR4	Mentha arvensis	field mint
OLDR	Oligosporus dracunculoides	wild tarragon
PHMU3	Phlox multiflora	flowery phlox
THFE	Thalictrum fendleri	Fendler meadow-rue
THSP	Thalictrum sparsiflorum	few-flowered meadow-rue
VIAM	Vicia americana	American vetch

SA7. **TALL SHRUBLANDS—EXTREMELY ROCKY** (HODI-JUCO6-PEFL15-RHART-RICE-RUID). Ocean-spray-common juniper-shrubby cinquefoil-skunkbrush-wax currant-raspberry—Extremely rocky



NUMBER OF SAMPLES	9, soil descriptions from none (total 9)
ELEVATION	10,028 ft (9,280-11,800 ft); 3,056 m (2,825-3,600 m)
ASPECT	Usually southerly
LITHOLOGY	Usually hard rock, such as Granite, Welded Tuff, or Gneiss
FORMATIONS <sup>1</sup>	Xg, Tmi, Taf, Xfh
LANDFORMS	Mostly rockslides
SLOPE POSITIONS	Backslopes and lower backslopes
SLOPE SHAPES	Linear [56%] to convex [44%] horizontally, All linear vertically.
SLOPE ANGLE	72% (36-214%), always above the angle of repose for the particle sizes present
COARSE FRAGMENTS	61% (12-98%) cover on surface
TOTAL LIVE COVER	79.3% (17-132%)
NUMBER OF SPECIES	24 (16-41)
TOTAL LIVE COVER/NO. SPECIES	3.5 (0.9-7.0)
WATER	No permanent water on or near sites

Community Type Description

**A** *Mixed Rocky Tall Shrublands* is the mixed community including all nine plots in this type.

Two plots have conspicuous ocean-spray (HODI), one with wax currant (RICE), and the other with Thurber fescue (FETH).

Two plots have conspicuous common juniper (JUCO6).

One plot has conspicuous shrubby cinquefoil (PEFL15).

One plot has conspicuous skunkbrush (RHART).

One plot has conspicuous wax currant.

One plot has conspicuous red raspberry (RUID).

One plot has ocean spray-currant sparse to very sparse.

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Mixed; whole E. T.	10,028 (9,280-11,800) 72.0 (36-214)	* 28 0 (0-0)	61 (12-98) 5 (1-8)	0 (0-0) 46 (5-92) 19 (1-76) 14 (6-33)	24 (16-41) 79 (17-133) 3.5 (8-7.0)	47-838 4-672 11-149

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

	SHRUBS			GRAMINOIDS (Cont.)	
HODI	Holdiscus discolor	ocean-spray	FEAR2	Festuca arizonica	Arizona fescue
JUCO6	Juniperus communis	common juniper	FETH	Festuca thurberi	Thurber fescue
PEFL15	Pentaphragmoides floribunda	shrubby cinquefoil	MUMO	Muhlenbergia montana	mountain muhly
RHART	Rhus aromatica ssp. trilobata	skunkbrush		FORBS	
RICE	Ribes cereum	wax currant	AQCO	Aquilegia coerulea	Colorado columbine
RIMO2	Ribes montigenum	mountain gooseberry	ARAN7	Argentina anserina	silverweed
ROWO	Rosa woodsii	Woods rose	ARFR4	Artemisia frigida	fringed sagewort
RUID	Rubus idaeus	American red raspberry	ERSU11	Eriogonum subalpinum	sulfurflower
	GRAMINOIDS		ORAL	Oreoxis alpina	alpine-parsley
CAAR13	Carex arapahoensis	Arapaho sedge	TRDA2	Trifolium dasyphyllum	whiproot clover
CAGE2	Carex geyeri	elk sedge			
ELLA3	Elymus lanceolatus	Montana wheatgrass			

