

H. DRY SAGEBRUSH SHRUBLANDS (SB)

SB1. **WYOMING SAGEBRUSH/INDIAN RICEGRASS-ARIDIC SOILS** (ARTRW8/ACHY). Wyoming big sagebrush/Indian ricegrass-Aridic soils-Colluvial and old-alluvial benches and slopes, < 9,000 ft



NUMBER OF SAMPLES	31, soil descriptions from 11; 4 not assigned to a CT (total 35)
ELEVATION	8,078 ft (7,660-8,900 ft); 2,462 m (2,330-2,710 m)
ASPECT	Usually southerly
LITHOLOGY	Breccia, granite, gneiss, felsite, schist, tuff [59%]; sandstone, mudstone, and shale [41%]
FORMATIONS ¹	Tpl-Tbb-Taf-Tos [44%], Km-Jmj-Jj [38%], Xg-Xfh [19%]
LANDFORMS	Mostly soil creep slopes [50%] or slump-earthflows [25%]
SLOPE POSITIONS	Mostly from upper toeslope to lower backslope [88%]
SLOPE SHAPES	Linear [58%] to convex [42%] horizontally, Mostly linear [83%] vertically.
SLOPE ANGLE	17% (1-100%)
SOIL PARENT MATERIAL	Mostly colluvium [73%], some old-alluvium or colluvium over residuum
COARSE FRAGMENTS	23% (4 - 43%) cover on surface, mostly gravelly [64%] Coarse fragments 34% (3 - 70%) by volume in soil
SOIL DEPTH	87 cm (14 - 175 cm); 34 in (6 - 69 in)
MOLLIC THICKNESS	21 cm (0 - 143 cm); 8 in (0 - 57 in)
TEXTURE	On the surface, a tendency to be sandy: sandy loam-loamy sand-sandy clay loam-sand [63%]; In the subsurface, a wide variety of textures, with sandy clay loam [23%], clay loam [23%], loamy sand [15%], and clay [15%] leading the list
SOIL CLASSIFICATION	Argiborolls [44%], Haploborolls [33%], Haplargids [22%]. Most either an Aridic moisture regime, or a tendency toward one
TOTAL LIVE COVER	77.2% (30-134%)
NUMBER OF SPECIES	28 (20-51)
TOTAL LIVE COVER/NO. SPECIES	2.8% (1.3-5.3%)
CLIMATE	Usually outside deep rainshadow. Montane climate, warm, dry, exposed to sun, moderately exposed to wind
WATER	No permanent water on or near sites

Key to Community Types

1. Total graminoid cover >60%. Needle-and-thread (HECO26) usually >15% cover (2)
1. Total graminoid cover <60%. Needle-and-thread absent to <15% cover (3)

2. Total shrub cover >40% **B**
2. Total shrub cover <40% **A**

3. Total graminoid cover 40-60%. Wyoming sagebrush 10-30% cover..... **C**
3. Total graminoid cover <40%. Wyoming sagebrush 0-40% cover..... (4)

4. Total graminoid cover 30-40% **D**
4. Total graminoid cover <30%..... (5)

5. Total graminoid cover 20-30%..... **E**
5. Total graminoid cover <20%..... **F**

Description of Community Types

- A** *Needle-and-thread-blue grama-Wyoming sagebrush* is dominated by Wyoming sagebrush with 15 to 25% cover. Needle-and-thread is prominent, 10-50% cover. Blue grama (CHGR15) is always present, 5-40% cover. Total graminoid cover ranges from 60 to 90%. Graminoid production ranges from 500 to 700 lb/ac/yr.
- B** *Wyoming sagebrush-rabbitbrush-muttongrass-pine needlegrass* is dominated by Wyoming sagebrush, 1-45% cover, or by Douglas rabbitbrush (CHVI8), T-40% cover. Pine needlegrass (ACPI2), junegrass (KOMA), and muttongrass (POFE) are usually prominent. Total graminoid cover ranges from 60 to 80%, and graminoid production ranges from 500 to 700 lb/ac/yr.
- C** *Wyoming sagebrush-muttongrass-needle-and-thread* is dominated by Wyoming sagebrush with 20-30% cover. Needle-and-thread and muttongrass are usually prominent. Total graminoid cover ranges from 40-60%. Graminoid production ranges from 300 to 450 lb/ac/yr.
- D** *Wyoming sagebrush-sparse Indian ricegrass* is dominated by Wyoming sagebrush at 30-50% cover. Needle-and-thread, muttongrass, and pine needlegrass are sometimes prominent. Indian ricegrass (ACHY) is always present in small amounts, T-15% cover. Total graminoid cover ranges from 30 to 40%, and graminoid production ranges from 200 to 350 lb/ac/yr.
- E** *Wyoming sagebrush-Hood's phlox* is dominated by Wyoming sagebrush, with 25-40% cover. Pine needlegrass or western wheatgrass (PASM) are sometimes prominent. Hood's phlox is always present, 2-10% cover. Total graminoid cover is 20-30%, and graminoid production is 100-150 lb/ac/yr.
- F** *Wyoming sagebrush-sparse* is dominated by Wyoming sagebrush at 10-30% cover. The understory is sparse; plant species rarely achieve >10% cover (except sagebrush). Total graminoid cover is <20%, and graminoid production is <100 lb/ac/yr.

Communities Not Assigned to a Community Type

- One community was dominated by rabbitbrush mixed with a little Wyoming sagebrush; the understory was dominated by a thick stand of crested wheatgrass (AGCR), with some smooth brome (BRIN7). This community was seeded to crested wheatgrass in the 1930's and 1940's. The smooth brome was seeded on a nearby roadway more recently, and invaded the site.
- One community supported more Wyoming sagebrush than normal (>60% cover), with a sparse understory. This much Wyoming sagebrush is unusual, and the circumstances that precipitated it are not clear.
- One community was codominated by Wyoming sagebrush, black sagebrush (ARNO4), and cheatgrass (ANTE6). Cheatgrass is invading the warmest parts of the Gunnison Basin, and seems to be covering more territory each year.
- One community was dominated by snakeweed (GUSA2) and Wyoming sagebrush, with a sparse understory. Snakeweed is a semi-native invader shrub that is very persistent.

	SHRUBS	
ARTRW8	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming big sagebrush
GUSA2	<i>Gutierrezia sarothrae</i>	broom snakeweed
	GRAMINOIDS	
ACPI2	<i>Achnatherum pinetorum</i>	pine needlegrass
AGCR	<i>Agropyron cristatum</i>	crested wheatgrass
ANTE6	<i>Anisantha tectorum</i>	cheatgrass
CAOB4	<i>Carex obtusata</i>	blunt sedge
CHGR15	<i>Chondrosium gracile</i>	blue grama
ELEL5	<i>Elymus elymoides</i>	bottlebrush squirreltail
HECO26	<i>Hesperostipa comata</i>	needle-and-thread
KOMA	<i>Koeleria macrantha</i>	prairie junegrass
PASM	<i>Pascopyrum smithii</i>	western wheatgrass
POFE	<i>Poa fendleriana</i>	muttongrass
	FORBS	
PHHO	<i>Phlox hoodii</i>	Hood's phlox

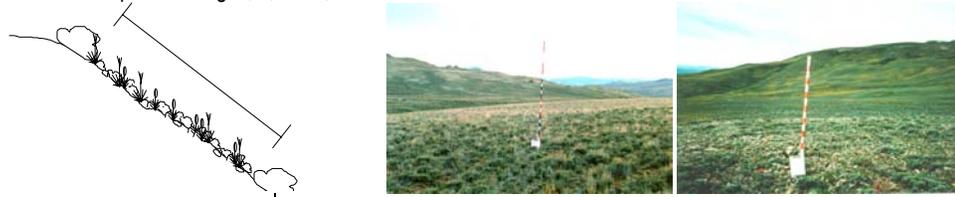
Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. ¹ , lb/ac/yr Shrubs Gramin. Forbs
A. Needle-and-thread-blue grama-Wyoming sagebrush	8,148 (8,070-8,200) 7.2 (4-11)	37 (18-55) 162 (155-175) 36 (0-143)	19 (4-41) 24 (20-31) LS	0 (0-0) 23 (19-26) 75 (62-86) 8 (5-12)	27 (22-31) 106 (98-116) 4.0 (3.4-5.3)	75-103 520-674 31-73
B. Wyoming sagebrush-rabbitbrush-muttongrass-pine needlegrass	8,780 (8,660-8,900) 9.0 (4-14)	37 (25-49) 102 (43-161) 93 (43-143)	12 (4-20) 13 (7-19) LM	0 (0-0) 45 (43-46) 69 (65-73) 19 (15-23)	28 (27-28) 132 (131-134) 4.8 (4.7-5.0)	314-360 540-602 87-135
C. Wyoming sagebrush-muttongrass-needle-and-thread	8,418 (8,215-8,620) 4.0 (3-5)	44 (21-67) 40 (33-46) 10 (0-20)	19 (12-25) 23 (15-32) LM	0 (0-0) 37 (35-39) 46 (43-49) 9 (9-10)	38 (34-41) 93 (92-94) 2.5 (2.2-2.8)	193-259 312-380 54-57
D. Wyoming sagebrush-sparse Indian ricegrass	8,001 (7,690-8,489) 8.6 (2-35)	35 (15-69) 69 (33-105) 5 (0-17)	15 (1-43) 34 (12-55) MS-EM	0 (0-1) 35 (26-73) 37 (35-40) 10 (2-26)	28 (22-36) 83 (69-113) 3.0 (2.2-4.2)	102-686 216-273 9-154
E. Wyoming sagebrush-Hood's phlox	7,950 (7,675-8,170) 4.6 (1-9)	17 (3-46) 108 (79-146) 19 (0-30)	18 (0-40) 39 (25-53) EM	0 (0-0) 35 (27-40) 25 (24-26) 10 (5-14)	27 (21-34) 71 (66-76) 2.7 (2.1-3.1)	108-273 126-135 27-79
F. Wyoming sagebrush-sparse	8,011 (7,660-8,390) 33.3 (3-100)	42 (20-70) 22 (14-38) 2 (0-5)	34 (6-60) 28 (12-46) EM-ES	1 (0-2) 30 (10-56) 15 (10-19) 9 (2-38)	28 (20-51) 55 (31-95) 2.0 (1.3-3.2)	41-499 49-99 12-258

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



SB2. BLACK SAGEBRUSH/MUTTONGRASS–COARSE HEAVY-CLAY SOILS–WINDWARD

(ARNO4/POFE-ACPI2). Black sagebrush/muttongrass-pine needlegrass–Coarse Eutroboralfs–Westerly windward slopes and ridges, 8,000-9,200 ft



NUMBER OF SAMPLES	31, soil descriptions from 14; 1 not assigned to a CT (total 32)
ELEVATION	8,380 ft (8,040-9,180 ft); 2,554 m (2,450-2,800 m)
ASPECT	Usually westerly, windward
LITHOLOGY	Mostly sedimentary: sandstone [35%] or shale [30%] predominate. Also represented are fine-textured gneiss, granite, and breccia [35%]
FORMATIONS'	Km-Kdb-KJdm-Kd [67%] or Tpl-Tos-Taf [28%] or Xfh [6%]
LANDFORMS	Mostly soil creep slopes [53%], with some ridges and mesas [40%]
SLOPE POSITIONS	Mostly backslopes, shoulders, and summits [93%] highly exposed to wind
SLOPE SHAPES	Mostly convex [64%] or linear [29%] horizontally, Convex [57%] to linear [43%] vertically.
SLOPE ANGLE	18% (0-50%)
SOIL PARENT MATERIAL	Mostly colluvium [50%] or colluvium over residuum [29%]
COARSE FRAGMENTS	38% (26-64%) cover on surface, mostly gravelly [81%]; Coarse fragments 46% (15-68%) by volume in soil
SOIL DEPTH	62 cm (18-200 cm); 24 in (7-79 in)
MOLLIC THICKNESS	11 cm (2-25 cm); 4 in (0.5-9 in)
TEXTURE	surface: Mostly clay loam, clay, or sandy clay loam [92%]. subsurface: Mostly clay, sandy clay, or sandy clay loam [92%]
SOIL CLASSIFICATION	Eutroboralfs [86%] or less commonly Haploborolls [14%]. Clay is mostly Smectitic (Montmorillonitic)
TOTAL LIVE COVER	76.4% (39-132%)
NUMBER OF SPECIES	26 (12-41)
TOTAL LIVE COVER/NO. SPECIES	3.1% (1.7-5.7%)
CLIMATE	Usually in partial rainshadow. Submontane (foothills) or semidesert climate, warm, very dry, exposed to sun, very exposed to wind
WATER	No permanent water on or near sites

Key to Community Types

- 1. Cheatgrass prominent, >40% cover. Total graminoid cover >60% **D**
- 1. Cheatgrass usually absent, sometimes <10%. Total graminoid cover <60% (2)

- 2. Total graminoid cover 45-60% **A**
- 2. Total graminoid cover <45% (3)

- 3. Total graminoid cover 30-45% **B**
- 3. Total graminoid cover <30% (4)

- 4. Total graminoid cover 10-20% **E**
- 4. Total graminoid cover <10% **F**

Description of Community Types

- A** *Black sagebrush-pine needlegrass* is dominated by black sagebrush, 10-40% cover. Total graminoid cover is 45-60%, and graminoid production is 300-400 lb/ac/yr.
- B** *Black sagebrush-bottlebrush-pine needlegrass* is dominated by black sagebrush, 10-35% cover. Total graminoid cover is 30-40%, and graminoid production is 200-320 lb/ac/yr.

- C *Black sagebrush-sparse* is dominated by black sagebrush, 20-30% cover. Total graminoid cover is 20-30%, and graminoid production is 150-200 lb/ac/yr.
- D *Cheatgrass-black sagebrush* is dominated by cheatgrass, >40% cover, with black sagebrush subdominant, 10-35% cover. Total graminoid cover is 60-110%, most of that cheatgrass. Graminoid production is >350 lb/ac/yr.
- E *Black sagebrush-big sagebrush-bottlebrush* has big sagebrush (ARTR2 or ARTRW8) evident, 1-15% cover, with black sagebrush codominant, 10-35% cover. Total graminoid cover is 10-20%, and graminoid production is 75-150 lb/ac/yr.
- F *Black sagebrush-rabbitbrush-sparse* is dominated by black sagebrush, 15-45% cover. Total graminoid cover is <10%, and graminoid production is <75 lb/ac/yr.

Communities Not Assigned to a Community Type

- A community dominated by black sagebrush with the exotic species crested wheatgrass (AGCR) and smooth brome (BRIN7). Crested wheatgrass was seeded on the sites in the 1930's and 1940's; smooth brome was used to revegetate some nearby sites (perhaps a roadway), and invaded into these sites.

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. ¹ , lb/ac/yr Shrubs Gramin. Forbs
A. Black sagebrush-pine needlegrass	8,504 (8,180-8,760) 9.8 (5-13)	56 (29-68) 69 (37-132) 7 (2-10)	34 (26-42) 17 (13-22) LS-LM	0 (0-0) 34 (25-46) 50 (46-54) 20 (12-27)	36 (30-41) 104 (83-111) 2.9 (2.7-3.2)	100-290 346-383 71-167
B. Black sagebrush-bottlebrush squirreltail-pine needlegrass	8,732 (8,040-9,180) 12.3 (5-22)	41 (15-58) 45 (26-91) 15 (2-25)	38 (22-64) 13 (6-28) LM	0 (0-0) 34 (26-40) 35 (31-39) 17 (6-49)	32 (22-41) 86 (73-118) 2.8 (2.0-3.6)	105-230 214-298 39-201
C. Black sagebrush-pine needlegrass	8,372 (8,080-8,840) 14.3 (0-30)	37 (25-49) 40 (18-62) 14 (10-18)	30 (5-48) 26 (18-31) MS	0 (0-1) 36 (30-45) 26 (23-29) 8 (3-17)	27 (17-34) 70 (61-89) 2.7 (2.1-3.6)	121-284 155-200 15-103
D. Cheatgrass-black sagebrush	8,248 (8,140-8,320) 30.3 (6-50)	* * *	* * ES-EM	1 (1-1) 26 (22-33) 77 (69-100) 4 (4-5)	21 (19-23) 108 (96-132) 5.2 (4.8-5.7)	87-153 399-418 21-31
E. Black sagebrush-big sagebrush-bottlebrush squirreltail	8,284 (8,080-8,549) 19.4 (2-35)	42 (38-47) 109 (18-200) 10 (2-18)	38 (31-49) 21 (16-29) MS	0 (0-1) 29 (21-50) 17 (13-20) 12 (4-25)	28 (16-41) 58 (40-71) 2.3 (1.5-4.4)	84-328 86-134 24-152
F. Black sagebrush-rabbitbrush- sparse	8,178 (8,120-8,240) 19.4 (7-25)	* * *	* * EM-ES	0 (0-1) 36 (31-43) 6 (4-8) 4 (3-4)	17 (12-20) 46 (39-54) 2.9 (2.2-4.2)	127-261 31-52 18-24

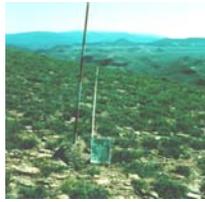
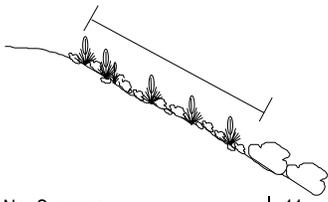
*. Unknown: measurements were not taken in this CT.

	SHRUBS	
ARNO4	Artemisia nova	black sagebrush
QUGA	Quercus gambelii	scrub oak
	GRAMINOIDS	
ACPI2	Achnatherum pinetorum	pine needlegrass
ANTE6	Anisantha tectorum	cheatgrass
CASTE3	Carex stenophylla ssp. eleocharis	needleleaf sedge
CHGR15	Chondrosium gracile	blue grama
HECO26	Hesperostipa comata	needle-and-thread
KOMA	Koeleria macrantha	prairie junegrass
PASM	Pascopyrum smithii	western wheatgrass
POFE	Poa fendleriana	muttongrass
POSE	Poa secunda	Sandberg bluegrass

	FORBS	
COUM	Comandra umbellata	bastard toadflax
PHHO	Phlox hoodii	Hood's phlox
PHMU3	Phlox multiflora	flowery phlox

SB3. BLACK SAGEBRUSH/ARIZONA FESCUE–COARSE HEAVY-CLAY SOILS–WINDWARD

(ARNO4/FEAR2). Black sagebrush/Arizona fescue–Coarse Smectitic Eutroboralfs–Southwesterly windward low-angle slopes and mesas, 8,000–9,400 ft



No. SAMPLES	11, soil descriptions from 7 (total 11)
ELEVATION	8,824 ft (8,080-9,340 ft); 2,689 m (2,460-2,845 m)
ASPECT	Typically southwesterly, from south to west
LITHOLOGY	Mostly tuff [64%], some shale [18%] or breccia [18%]
FORMATIONS ¹	Mostly Taf [56%], some Tpl [22%] or Km [22%]
LANDFORMS	Mostly soil creep slopes and mesas [78%]
SLOPE POSITIONS	Predominantly shoulders, backslopes, and summits [90%]. These sites are highly exposed to wind
SLOPE SHAPES	Mostly convex [78%] horizontally, Convex [67%] to linear [33%] vertically.
SLOPE ANGLE	15% (2-25%)
SOIL PARENT MATERIAL	Mostly colluvium, some residuum or alluvium
COARSE FRAGMENTS	56% (35-78%) cover on surface, all gravelly; Coarse fragments are 67% (48-87%) by volume in soil
SOIL DEPTH	50 cm (25-85 cm); 20 in (9-33 in)
MOLLIC THICKNESS	14 cm (8-19 cm); 5 in (2-7 in)
TEXTURE	Predominantly sandy: sandy loam or sandy clay loam [71%] surface; Clay, sandy loam, sandy clay, or clay loam [86%] subsurface
SOIL CLASSIFICATION	Eutroboralfs, usually moderately deep
TOTAL LIVE COVER	68.6% (41-92%)
NUMBER OF SPECIES	30 (18-41)
TOTAL LIVE COVER/NO. SPECIES	2.4% (1.7-3.5%)
CLIMATE	Within partial rainshadow. Montane climate, warm, dry, exposed to sun, very exposed to wind
WATER	No permanent water on or near sites

Key to Community Types

- 1. Total graminoid cover >30%. Arizona fescue >10% cover. Muttongrass (POFE) always present, 3-20% cover **A**
- 1. Total graminoid cover <30%. Arizona fescue <10% cover. Muttongrass usually absent, rarely up to 5% cover..... (2)
- 2. Total graminoid cover 20-30%. Sandberg bluegrass present, 5-15% cover **B**
- 2. Total graminoid cover <20%. Sandberg bluegrass absent or <10% cover..... **C**

Description of Community Types

- A** *Black sagebrush-Arizona fescue-muttongrass* is dominated by black sagebrush with 10-40% cover. Arizona fescue is prominent, 10-30% cover. Total graminoid cover ranges from 30 to 50%. Graminoid production ranges from 200 to 400 lb/ac/yr.
- B** *Black sagebrush-Sandberg bluegrass-Arizona fescue* is dominated by black sagebrush, at 20-35% cover. Arizona fescue is always present, 4-10% cover. Total graminoid cover ranges from 20 to 30%. Graminoid production ranges from 150 to 225 lb/ac/yr
- C** *Black sagebrush-big sagebrush-sparse* is dominated by black sagebrush, with 5-40% cover, and big sagebrush (ARTR2), Trace-10% cover. Arizona fescue is always present, 1-10% cover. Total graminoid cover ranges from 10 to 20%. Graminoid production ranges from 50 to 150 lb/ac/yr.

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Gramin. Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. ¹ , lb/ac/yr Shrubs Gramin. Forbs
A. Black sagebrush-Arizona fescue-junegrass-pingue	9,037 (8,625-9,340) 25.6 (16-53)	60 (48-83) 60 (41-85) 16 (14-19)	58 (35-78) 8 (1-22) LS	0 (0-0) 31 (20-39) 8 (1-22) 35 (32-43) 5 (3-8)	34 (30-40) 72 (67-78) 2.1 (1.8-2.6)	79-223 227-331 20-46
B. Black sagebrush-Sandberg bluegrass-Arizona fescue- pingue	8,874 (8,610-9,150) 14.0 (7-20)	62 40 15	43 (31-56) 12 (1-25) LM	0 (0-0) 33 (28-44) 27 (22-30) 16 (8-30)	28 (24-33) 76 (65-92) 2.8 (2.4-3.5)	114-268 151-207 51-184
C. Black sagebrush-big sagebrush-sparse Arizona fescue	8,490 (8,080-9,120) 11.2 (2-20)	82 (77-87) 36 (25-46) 11 (8-14)	75 (58-90) 7 (5-9) MS	0 (0-1) 29 (11-38) 15 (14-18) 15 (5-24)	28 (18-41) 60 (42-78) 2.2 (1.7-2.6)	45-209 93-126 27-148

	SHRUBS	
ARNO4	Artemisia nova	black sagebrush
	GRAMINOIDS	
FEAR2	Festuca arizonica	Arizona fescue
FEM13	Festuca minutiflora	smallflower fescue
HECO26	Hesperostipa comata	needle-and-thread
KOMA	Koeleria macrantha	prairie junegrass
MUF1	Muhlenbergia filiculmis	slimstem muhly
POFE	Poa fendleriana	muttongrass
POSE	Poa secunda	Sandberg bluegrass
	FORBS	
EREA	Erigeron eatonii	Eaton fleabane
PHHO	Phlox hoodii	Hood's phlox
TEAC	Tetaneuris acaulis	stemless hymenoxys
TETO	Tetaneuris torreyana	Torrey's hymenoxys