

Trend Study 25C-25-08

Study site name: Center Creek.

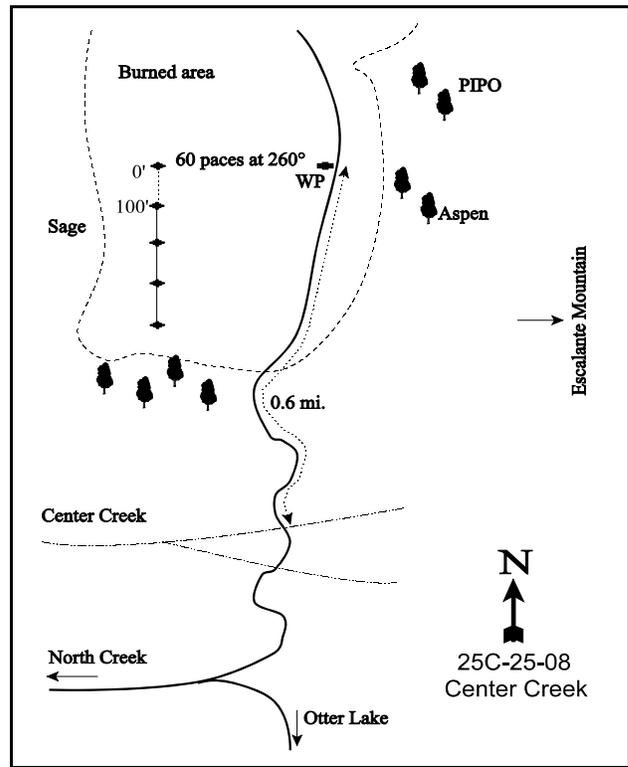
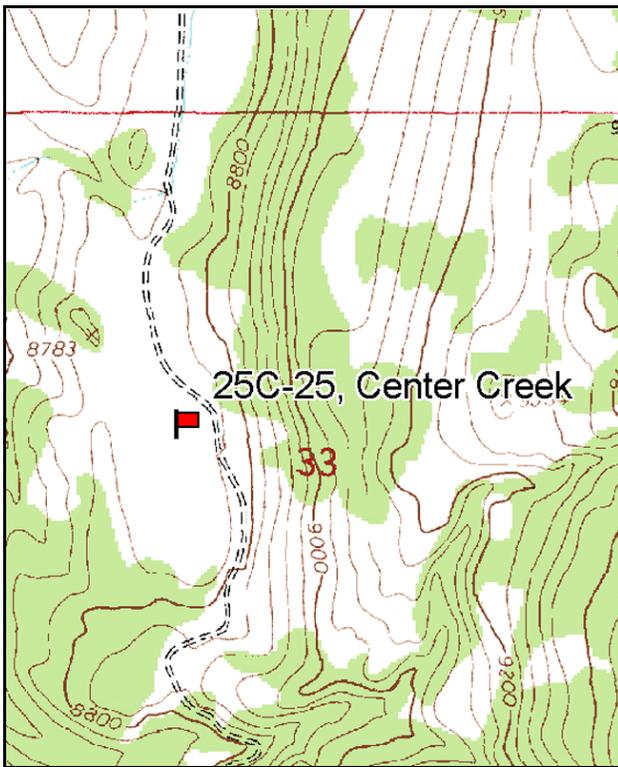
Vegetation type: Burn.

Compass bearing: frequency baseline 183 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line4 (71ft).

LOCATION DESCRIPTION

From the intersection of SR12 and Rt. 1660 (to 22) turn left onto Johns Flat Road. Go 17.2 miles to the Grass Lake Road (USFS sign) and turn east. Travel 1.2 miles on this road to a fork by some fields. Turn right and continue 0.4 miles to the Horse Creek Fork. Turn left and go 1.15 miles to a fork with a sign. Stay left and continue 0.25 miles on the main road. Past the buildings, at Birch Creek, take the right fork and go 0.6 miles. Stay left at the fork and go 0.75 miles to a cattleguard. Continue 0.75 miles to a fork. Stay left and go 1.65 miles to a USFS enclosure. Continue 2.55 miles to a cattleguard. Continue 0.5 miles to North Creek. Go 2.6 miles, past the North Creek transect, to the Center Creek-Otter Lake intersection. Bear left and go 1.25 miles to a witness post on the left side of the road. Walk 60 paces west at 265 degrees to the 0-foot baseline stake, a short fencepost marked with a red browse tag.



Map Name: Grass Lakes

Diagrammatic Sketch

Township 32S, Range 1W, Section 33

GPS: NAD 83, UTM 12S 420275 E, 4204060 N

DISCUSSION

Center Creek - Trend Study No. 25C-25

Study Information

This study is located on a sagebrush flat north and east of Center Creek that was burned as part of a 1984 treatment [elevation: 8,750 feet (2,667 m), slope: 1%-5%, aspect: southwest]. Initially after the treatment, the site was occupied by rabbitbrush (*Chrysothamnus* spp.) and herbaceous vegetation, but in recent years mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has become a large component. The old sagebrush flat is on a high bench on the west side of the Escalante Mountains (Aquarius Plateau). Deer often utilize high elevation winter ranges on the west side of herd unit between Widtsoe and Antimony during light to moderate winters. There was fairly abundant deer and elk use at 15 deer and elk days use/acre (37 days use/ha) on the site in 1991, with apparently more use made of the surrounding sagebrush hillsides and aspen stands. Deer use on the site was estimated to be moderate in 1998 and 2003 (36 ddu/acre:89 ddu/ha and 25 ddu/acre:61 ddu/ha, respectively), and slightly decreasing to moderately light in 2008 (19 ddu/acre:48 ddu/ha). Elk use was estimated to be light in 1998 and 2003 (12 edu/acre:30 edu/ha), and moderate in 2008 (32 edu/acre:79 edu/ha). Cattle use was estimated to be moderate in 1998 and 2003 (33 cdu/acre:82 cdu/ha and 27 cdu/acre:66 cdu/ha, respectively), and decreased slightly to lightly moderate in 2008 (17 cdu/acre:41 cdu/ha). There are a considerable amount of ant hills on the site.

Soil

Soil on the site is moderately deep with an effective rooting depth of almost 18 inches. Texture is a loam which is slightly acidic in reaction (pH 6.1). Pavement is common on the surface, and there is excellent protective ground cover and little exposed bare ground. Relative combined vegetation and litter cover was 72% in 1998, 56% in 2003, and 68% in 2008. Relative combined rock and pavement cover was 25% in 1998, 40% in 2003, and 28% in 2008. Relative bare ground cover has been low at 3%-4% since 1998. Current erosion is minimal due to good soil protection and gentle terrain. The erosion condition class was rated as stable in 2003 and 2008.

Browse

Mountain big sagebrush has begun to reestablish itself since the 1984 burn. It had a density of 200 plants/acre in 1987, 1,380 plants/acre in 1991, 2,620 plants/acre by 2003, and 5,980 plants/acre in 2008. The population exhibits good vigor and low decadence. Sagebrush reproduction and recruitment were excellent in 2008 with around 4,000 seedlings/acre, and young plants comprising 62% of the population.

The dominant shrub is mountain low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *lanceolatus*) which provided 83% of the browse cover in 1998, 63% in 2003, and 65% in 2008. Density was estimated at almost 4,000 plants/acre in 1987. Ninety-eight percent of those medium-sized shrubs encountered were mature vigorously prolific plants. This population exploded in 1991, increasing its density nearly 9 times to 35,066 plants/acre, 84% of which were classified as young. Competition and drought have since thinned the high density to 25,360 plants/acre in 1994 and 12,360 plants/acre in 1998. Density increased 32% in 2003 to 18,080 plants/acre, and a further 19% to 22,300 plants/acre in 2008. Twenty percent of the population consists of young plants. Mature plants are smaller than those sampled in 1998 with an average height of 11 inches compared to 20 inches in 1998. The population appears relatively stable but overly abundant. Utilization of these shrubs is mostly light. There is also some horsebrush (*Tetradymia canescens*), rubber rabbitbrush (*Chrysothamnus nauseosus*), and snowberry plants (*Symphoricarpos oreophilus*) on the site, however at this elevation, it is really the herbaceous vegetation that is important and the woody plants appear to be unutilized.

Herbaceous Understory

There is a good mix and diversity of grasses and forbs, but grasses dominate the understory. Average cover of perennial grasses was estimated at 19% in 1994, increasing to 24% in 1998, and decreasing again to 15% in 2008. The most common grasses are the native pinewoods needlegrass (*Stipa pinetorum*) and mutton bluegrass (*Poa fendleriana*), and the seeded grasses, crested wheatgrass (*Agropyron cristatum*) and smooth

brome (*Bromus inermis*). Forbs are diverse, but only a few species are abundant. The large silky lupine (*Lupinus sericeus*) is the dominant forb along with redroot eriogonum (*Eriogonum racemosum*) and Utah deervetch (*Lotus utahensis*) which combined to produce 81% of the forb cover in 1998, 68% in 2003, and 60% in 2008. Utilization of these plants appears light.

1991 TREND ASSESSMENT

Trend for browse is slightly up, but still poor because of the overwhelming numbers of the increaser shrub, mountain low rabbitbrush, which has increased since the burn. The most common browse, low rabbitbrush, has increased dramatically while the key species, mountain big sagebrush, has also increased from 200 to 733 plants/acre. Seedlings and young are moderately abundant and the population should continue to expand. The most important aspect of this site is the herbaceous understory. There are 40 species of grasses and forbs sampled on this site. The sum of nested frequencies for perennial grasses increased, with a significant increase in the frequencies of smooth brome, bottlebrush squirreltail (*Sitanion hystrix*), and pinewoods needlegrass. The trend for grasses is up. Sum of nested frequency for perennial forbs declined slightly. The trend for forbs is slightly down.

browse - slightly up (+1)

grass - up (+2)

forb - slightly down (-1)

1994 TREND ASSESSMENT

The browse component is still dominated by mountain low rabbitbrush. However, it's density has declined considerably since 1991, while the population density of the preferred mountain big sagebrush increased by 47%. The browse composition is still poor, but the trend is up. The trend for grasses is slightly down. Sum of nested frequency of perennial grasses decreased, but production remained good on the site. The trend for forbs is down. Sum of nested frequency of perennial forbs declined dramatically and production fell to 3% cover for perennial forbs. Some of the decline in herbaceous species may be the result of the natural thinning process after a fire. The extremely dry spring and summer of 1994 may also be an additional cause for these declines.

browse - up (+2)

grass - slightly down (-1)

forb - down (-2)

1998 TREND ASSESSMENT

Trend for browse is up. Density of mountain big sagebrush increased slightly, while the number of mountain low rabbitbrush declined 51%. Sagebrush remains good, and decadence low at only 1%. Dead plants counted in 1998 were burned stems from the 1984 fire. Mountain low rabbitbrush declined in density, but there are still an estimated 12,360 plants/acre, 48% of which are young plants. Seedlings are also abundant. The decline in density came from the young age class which numbered 19,620 plants/acre in 1994. Mature plant density actually rose from 4,500 to 6,060 plants/acre since 1994. The population will likely become more mature in the future, although density will probably not drop significantly any time soon. The trend for the grasses is up. Sum of nested frequency of perennial grasses increased and production of perennial grasses has increased. Cover of grasses has increased from 20% to 24%. Trend for forbs is slightly up. Sum of nested frequency of perennial forbs increased slightly, but cover increased dramatically since 1994. Forb cover has gone from 3% in 1994 to 12% in 1998.

browse - up (+2)

grass - up (+2)

forb - slightly up (+1)

2003 TREND ASSESSMENT

Trend for the key browse species, mountain big sagebrush is up. Density has increased 46% and average cover rose from 1.5% in 1998 to 7.4% in 2003. Vigor remains good, and decadence low. No seedlings were encountered in 2003, but young plants account for 16% of the population. The site is still dominated by mountain low rabbitbrush which provided 63% of the total browse cover in 2003. Density of rabbitbrush increased 32% to 18,080 plants/acre and 21% of the population was classified as young. Trend for the grasses is slightly down. Sum of nested frequency for grasses declined 13% with a significant drop in the nested frequency of intermediate wheatgrass (*Agropyron intermedium*), bluebunch wheatgrass (*Agropyron spicatum*), and bottlebrush squirreltail. Dominant grasses, pinewoods needlegrass, crested wheatgrass, smooth brome,

and mutton bluegrass remained relatively stable. Trend for the forbs is down. Perennial forb sum of nested frequency declined 38% with significant declines in dominant forbs, Utah deervetch, silky lupine, and dandelion (*Taraxacum officinale*). Production declined from 12% cover of perennial forbs in 1998 to 6% cover in 2003.

browse - up (+2)

grass - slightly down (-1)

forb - down (-2)

2008 TREND ASSESSMENT

Trend for the primary browse species, mountain big sagebrush, continues to be up. Density of sagebrush increased by 56% to 5,980 plants/acre. Vigor is good and decadence low. Sagebrush recruitment was excellent with many seedlings encountered and young plants comprising 62% of the population. The increaser species, mountain low rabbitbrush, also increased in density to 22,300 plants/acre. Recruitment remains high for this species, but decadence increased to 30% in 2008. Shrubs are not considered to be important forage at this elevation. Trend for grasses is stable. Sum of nested frequency of perennial grasses increased slightly, but cover decreased slightly. There was a significant increase in the frequency and cover Kentucky bluegrass (*Poa pratensis*). The trend for forbs is slightly up. Sum of nested frequency of perennial forbs increased by 63%, though cover was similar to 2003.

browse - up (+2)

grass - stable (0)

forb - slightly up (+1)

HERBACEOUS TRENDS --

Management unit 25C, Study no: 25

Type	Species	Nested Frequency						Average Cover %			
		'87	'91	'94	'98	'03	'08	'94	'98	'03	'08
G	Agropyron cristatum	a 110	ab 148	ab 131	b 165	ab 126	ab 145	3.22	5.21	2.17	2.30
G	Agropyron intermedium	ab 19	ab 11	a 5	b 25	ab 5	ab 9	.03	.29	.06	.09
G	Agropyron spicatum	ab 4	ab 3	ab 4	b 12	a -	a -	.03	.24	-	-
G	Bouteloua gracilis	ab 26	ab 27	ab 26	a 15	b 44	ab 20	1.58	.48	1.41	.63
G	Bromus inermis	a 58	b 124	b 124	c 176	cd 211	d 227	2.25	6.44	5.12	4.29
G	Bromus japonicus (a)	6	-	-	1	-	-	-	.03	-	-
G	Carex sp.	8	3	2	4	2	8	.03	.03	.00	.04
G	Festuca ovina	-	1	5	7	-	-	.03	.09	-	-
G	Koeleria cristata	-	-	-	-	-	-	-	.03	-	-
G	Poa fendleriana	a 49	a 62	a 18	bc 127	b 103	c 147	.43	3.45	3.48	2.93
G	Poa pratensis	a -	a -	a 3	a 3	a 6	b 81	.15	.38	.30	1.44
G	Poa secunda	-	-	-	1	8	8	-	.03	.06	.04
G	Sitanion hystrix	b 126	c 200	a 83	b 136	a 68	a 40	.56	3.11	1.02	.51
G	Stipa columbiana	-	-	-	-	-	3	-	-	-	.03
G	Stipa comata	a -	c 54	a -	bc 27	b 24	bc 20	-	.38	.37	.22
G	Stipa pinetorum	a 171	c 198	d 272	bc 166	b 152	bc 164	11.32	4.17	2.74	2.80
Total for Annual Grasses		6	0	0	1	0	0	0	0.03	0	0
Total for Perennial Grasses		571	831	673	864	749	872	19.66	24.35	16.77	15.36
Total for Grasses		577	831	673	865	749	872	19.66	24.38	16.77	15.36
F	Agoseris glauca	-	4	-	3	1	-	-	.01	.03	-

Type	Species	Nested Frequency						Average Cover %			
		'87	'91	'94	'98	'03	'08	'94	'98	'03	'08
F	<i>Alyssum alyssoides</i> (a)	-	-	-	1	-	-	-	.00	-	-
F	<i>Antennaria parvifolia</i>	-	1	4	7	4	5	.03	.33	.07	.04
F	<i>Androsace septentrionalis</i> (a)	14	5	_a 20	_b 73	_a 4	_a 4	.07	.35	.01	.01
F	<i>Arabis</i> sp.	-	-	-	3	2	2	-	.00	.00	.00
F	<i>Astragalus convallarius</i>	-	4	6	15	-	10	.01	.22	-	.04
F	<i>Astragalus</i> sp.	-	-	-	1	-	-	-	.03	-	-
F	<i>Castilleja linariaefolia</i>	-	-	2	12	7	7	.00	.10	.33	.07
F	<i>Calochortus nuttallii</i>	-	-	3	-	3	-	.00	-	.00	-
F	<i>Chenopodium album</i> (a)	-	-	5	3	3	3	.01	.03	.15	.00
F	<i>Chaenactis douglasii</i>	_b 37	_c 46	_b 22	_b 19	_a -	_a -	.05	.09	-	-
F	<i>Chenopodium leptophyllum</i> (a)	-	-	-	-	4	3	-	-	.01	.00
F	<i>Collomia linearis</i> (a)	-	-	-	2	-	2	-	.00	-	.03
F	<i>Crepis acuminata</i>	-	-	-	4	-	-	-	.01	-	-
F	Cruciferae	4	6	-	-	-	-	-	-	-	-
F	<i>Descurainia pinnata</i> (a)	_b 17	_b 22	_a -	_a 3	_a 3	_a -	-	.00	.00	-
F	<i>Dracocephalum parviflorum</i>	2	-	-	-	2	-	-	-	.00	-
F	<i>Eriogonum cernuum</i> (a)	-	2	-	2	-	3	-	.01	-	.03
F	<i>Erodium cicutarium</i> (a)	-	-	1	-	-	-	.00	-	-	-
F	<i>Erigeron eatonii</i>	_a -	_b 16	_a -	_b 27	_b 15	_c 47	-	.15	.08	.31
F	<i>Erigeron flagellaris</i>	_a -	_{ab} 8	_a -	_{ab} 9	_a -	_b 8	-	.05	-	.05
F	<i>Eriogonum hookeri</i> (a)	_b 12	_b 9	_b 20	_a -	_a -	_a -	.09	-	-	-
F	<i>Erigeron pumilus</i>	_a 13	_a 33	_{ab} 36	_a 8	_a 29	_b 58	.26	.09	.39	.37
F	<i>Eriogonum racemosum</i>	_a 63	_{ab} 79	_{ab} 87	_b 109	_b 106	_b 115	.77	2.04	1.76	1.20
F	<i>Eriogonum umbellatum</i>	-	-	-	-	6	3	-	-	.01	.00
F	<i>Holosteum umbellatum</i> (a)	-	-	-	1	-	-	-	.00	-	-
F	<i>Hymenoxys richardsonii</i>	-	3	-	-	-	-	-	-	-	-
F	<i>Ipomopsis aggregata</i>	-	4	6	5	-	1	.01	.18	-	.00
F	<i>Lappula occidentalis</i> (a)	3	5	-	2	5	1	-	.00	.01	.00
F	<i>Lotus utahensis</i>	_d 188	_c 136	_{bc} 98	_{bc} 108	_a 41	_b 87	.40	2.66	.36	.79
F	<i>Lupinus sericeus</i>	_d 132	_c 59	_{abc} 32	_{bc} 54	_a 18	_{ab} 26	1.29	5.44	2.32	1.36
F	<i>Lychnis drummondii</i>	_a 1	_b 22	_a -	_a -	_a 1	_a -	-	-	.00	-
F	<i>Machaeranthera canescens</i>	-	3	4	2	13	4	.03	.03	.19	.00
F	<i>Microsteris gracilis</i> (a)	-	-	-	-	2	-	-	-	.01	-
F	<i>Orthocarpus</i> sp. (a)	-	-	-	-	-	3	-	-	-	.03
F	<i>Penstemon comarrhenus</i>	_{ab} 12	_{ab} 9	_{abc} 17	_a 5	_{bc} 28	_c 29	.09	.01	.48	.49
F	<i>Phlox longifolia</i>	_d 198	_c 79	_b 34	_a 5	_a 2	_b 39	.08	.03	.01	.18
F	<i>Potentilla biennis</i>	1	-	-	-	-	-	-	.00	-	-

Type	Species	Nested Frequency						Average Cover %			
		'87	'91	'94	'98	'03	'08	'94	'98	'03	'08
F	Potentilla concinna	-	-	-	-	1	2	-	-	.00	.00
F	Polygonum douglasii (a)	-	-	_a 6	_a -	_a 3	_b 31	.01	-	.00	.08
F	Senecio multilobatus	_a 8	_b 34	_{ab} 22	_a 2	_a 7	_{ab} 9	.05	.01	.04	.13
F	Taraxacum officinale	_c 209	_c 187	_a 38	_b 74	_a 3	_a 24	.07	.41	.15	.23
F	Tragopogon dubius	_{ab} 6	_{ab} 6	_a -	_{ab} 7	_b 8	_{ab} 7	-	.01	.02	.07
Total for Annual Forbs		46	43	52	87	24	50	0.19	0.41	0.20	0.19
Total for Perennial Forbs		874	739	411	479	297	483	3.20	11.98	6.33	5.38
Total for Forbs		920	782	463	566	321	533	3.39	12.39	6.53	5.57

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 25C, Study no: 25

Type	Species	Strip Frequency				Average Cover %			
		'94	'98	'03	'08	'94	'98	'03	'08
B	Artemisia tridentata vaseyana	34	37	56	81	1.42	1.50	7.36	6.05
B	Chrysothamnus nauseosus	17	7	14	13	.33	.00	.24	.09
B	Chrysothamnus viscidiflorus lanceolatus	96	100	97	98	14.60	14.51	13.74	12.07
B	Symphoricarpos oreophilus	2	3	2	2	.41	.76	.15	.18
B	Tetradymia canescens	22	15	13	11	1.01	.69	.18	.06
Total for Browse		171	162	182	205	17.79	17.47	21.68	18.46

CANOPY COVER, LINE INTERCEPT --

Management unit 25C, Study no: 25

Species	Percent Cover	
	'03	'08
Artemisia tridentata vaseyana	12.33	12.64
Chrysothamnus nauseosus	.81	.80
Chrysothamnus viscidiflorus lanceolatus	17.60	16.93
Symphoricarpos oreophilus	.15	-
Tetradymia canescens	.61	.55

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 25C, Study no: 25

Species	Average leader growth (in)	
	'03	'08
Artemisia tridentata vaseyana	2.2	1.0

BASIC COVER --

Management unit 25C, Study no: 25

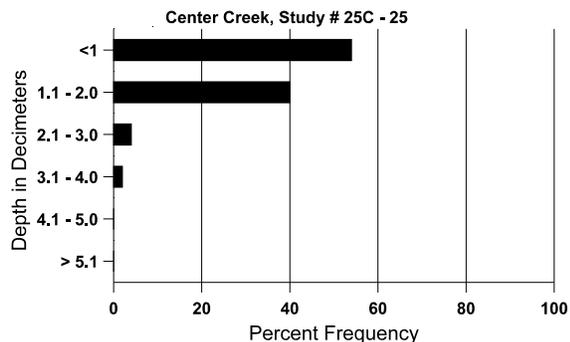
Cover Type	Average Cover %					
	'87	'91	'94	'98	'03	'08
Vegetation	18.25	11.25	36.82	54.06	43.32	48.18
Rock	.50	.75	1.92	.29	1.07	.45
Pavement	41.50	42.00	24.34	32.76	44.06	31.81
Litter	30.25	35.75	29.96	41.45	20.54	27.86
Cryptogams	0	0	0	.01	.04	.10
Bare Ground	9.50	10.25	8.61	4.53	3.86	4.83

SOIL ANALYSIS DATA --

Management unit 25C, Study no: 25, Study Name: Center Creek

Effective rooting depth (in)	Temp °F (depth)	pH	loam			%0M	PPM P	PPM K	ds/m
			% sand	% silt	% clay				
17.9	55.0 (13.5)	6.1	48.4	31.1	20.6	2.7	15.3	249.6	0.4

Stoniness Index



PELLET GROUP DATA --

Management unit 25C, Study no: 25

Type	Quadrat Frequency			
	'94	'98	'03	'08
Rabbit	12	14	12	50
Elk	12	5	6	31
Deer	29	25	8	33
Cattle	1	8	17	17

Days use per acre (ha)		
'98	'03	'08
-	-	-
6 (15)	12 (30)	32 (79)
36 (89)	25 (61)	19 (48)
33 (82)	27 (66)	17 (41)

BROWSE CHARACTERISTICS --
 Management unit 25C, Study no: 25

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
87	199	66	199	-	-	-	0	0	0	-	0	-/-
91	732	199	533	199	-	-	27	0	0	-	0	10/12
94	1380	540	240	1100	40	400	9	0	3	-	0	33/45
98	1420	240	460	940	20	640	13	0	1	-	0	19/29
03	2620	-	420	2100	100	-	11	0	4	.76	.76	18/27
08	5980	4160	3700	1820	460	80	19	2	8	1	1	19/34
Chrysothamnus nauseosus												
87	66	-	-	66	-	-	0	0	0	-	0	26/26
91	332	-	199	133	-	-	0	0	0	-	0	34/35
94	740	20	300	400	40	-	8	0	5	3	3	50/47
98	180	-	40	120	20	-	0	0	11	11	11	30/22
03	340	-	20	260	60	-	24	0	18	-	0	29/26
08	320	-	-	180	140	20	6	0	44	25	31	23/26
Chrysothamnus viscidiflorus lanceolatus												
87	3999	-	66	3933	-	-	0	0	0	-	0	19/23
91	35065	34866	29666	5399	-	-	.57	0	0	-	2	23/30
94	25460	480	19620	4500	1340	40	.23	1	5	.31	.31	49/55
98	12360	860	5980	6060	320	60	.32	.97	3	2	5	20/24
03	18080	20	3860	13620	600	-	1	0	3	.33	.33	12/15
08	22300	820	4380	11340	6580	40	13	0	30	2	4	11/15
Leptodactylon pungens												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
98	0	-	-	-	-	-	0	0	-	-	0	15/17
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
94	60	-	20	40	-	-	0	0	-	-	0	17/43
98	60	-	20	40	-	-	0	0	-	-	0	22/74
03	40	-	20	20	-	-	0	0	-	-	0	22/70
08	40	-	40	-	-	-	0	0	-	-	0	16/37

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Tetradymia canescens												
87	532	-	199	333	-	-	0	0	0	-	0	11/11
91	532	-	333	199	-	-	13	0	0	-	0	13/17
94	640	-	180	440	20	-	6	6	3	-	0	34/41
98	400	-	20	320	60	-	20	0	15	5	5	16/22
03	340	-	-	240	100	-	0	0	29	12	12	11/15
08	280	-	40	100	140	-	14	0	50	14	21	11/15