Trend Study 22-1-08

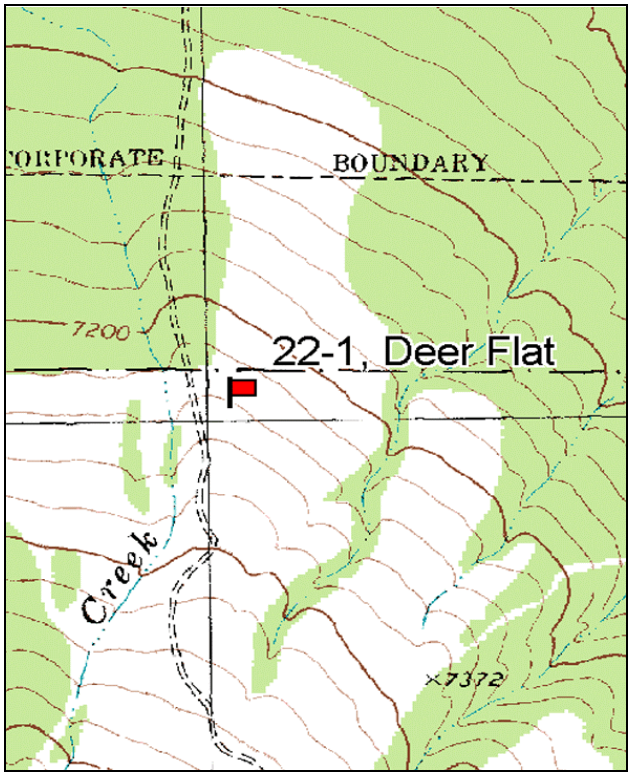
Study site name: Deer Flat . Vegetation type: Chained, Seeded P-J .

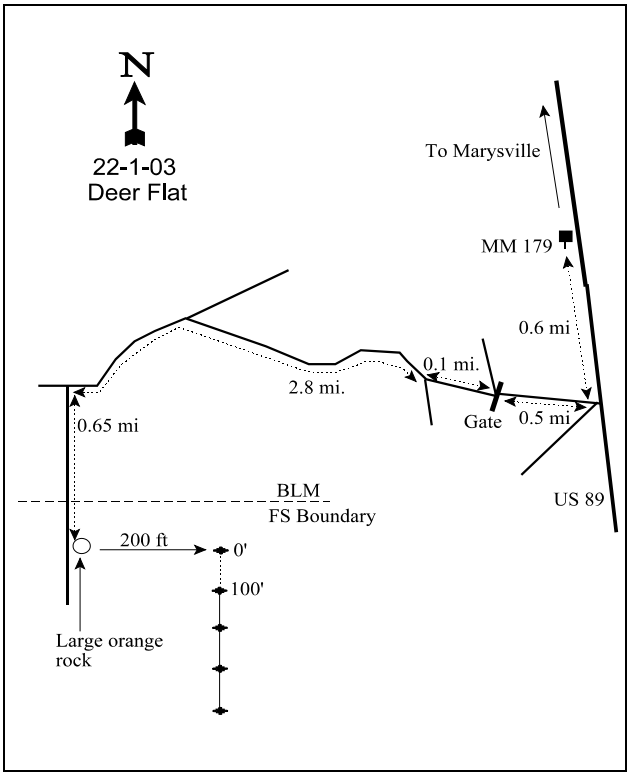
Compass bearing: frequency baseline 170 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 1 on 1ft, belt 2 on 2ft, belt 3 on 1ft, belt 4 on 5ft, belt 5 on 4ft.

LOCATION DESCRIPTION

From mile marker 179 south of Marysvale, proceed 0.6 miles and turn right on a dirt road. The road forks immediately beyond a fence, stay to the right. Proceed 0.5 miles to another fork in the road at a fence corner. Go straight through the gate, passing a road on each side. Continue 0.1 miles and turn right. Proceed 2.8 miles up this road, following a ditch, passing 2 ponds and passing through a DWR fence to another fork. Turn left. Go 0.65 miles (through a gate) to a large painted rock on the left side of the road. The rock has an orange arrow with a white circle painted around it. The site number is also painted on the rock in white. The 0-foot baseline stake is 200 feet east of the rock. It is a rebar with a browse tag #7106 attached.





Map Name: Mount Brigham

Diagrammatic Sketch

Township 27S , Range 4W , Section 35

GPS: NAD 83, UTM 12S 387986 E, 4252230 N

DISCUSSION

Deer Flat - Trend Study No. 22-1

Study Information

This study is located on BLM administered land southwest of Marysvale [elevation: 7,200 feet, slope: 15%, aspect: north]. The area is considered an important deer wintering area. The area was chained and seeded to perennial grasses in 1968. Water is available in Pine Creek which is located about a half mile to the north. There is another chaining and seeding project that was completed in 1981 across the Forest Service-BLM boundary about 200 feet north of this study. Pellet group transect data collected in 1998 estimated 58 deer days use/acre (143 ddu/ha), 12 elk days use/acre (30 edu/ha), and 11 cow days use/acre (27 cdu/ha). In 2003, pellet group transect data indicated increased use of the site by deer and elk, at an estimated 149 deer days use/acre (369 ddu/ha) and 39 elk days use/acre (96 edu/ha). Cattle use remained low in at an estimated 8 days use/acre (20 cdu/ha). In 2008, pellet group transect data recorded a decrease for deer with 38 deer days use/acre (94 ddu/ha) and elk at 5 elk days use/acre (12 edu/ha), while cow use increased to 20 cow days use/acre (50 cdu/ha).

Soil

Soil analysis indicates a sandy clay loam texture which appears to have good permeability and water holding capacity. Parent material appears to be sandstone and limestone, and soils are slightly acidic (pH of 6.2). The soil profile is rocky throughout and soils are fairly shallow with an effective rooting depth of less than 9 inches. Soils directly on the site show minimal erosion, although the road to the site crosses a small creek and at times the water runs down the road causing severe cutting. Soils were rated stable from an erosion condition class assessment completed on site in 2003 and 2008.

Browse

The browse component at Deer Flat is diverse and abundant. Mountain big sagebrush (*Artemisia tridentata* ssp. v*aseyana*) is the key species, with black sagebrush (*Artemisia nova*) being of secondary importance. A portion of the sagebrush on this site is likely a hybrid between the two species. The project personnel classified sagebrush by color, growth form, leaf size, and seed-head formation in 2003. Mountain big sagebrush has had a fairly stable population with an estimated 3,640 plants/acre in 1998 and 3,480 in 2003, only a 4% decrease since 1998. In 2008, the population decreased to 2,920 plants/acre, a 16% decrease. Since 1998, on average percent young has only been 7%. This low recruitment leads to a continuing downward loss of sagebrush numbers. It should be noted that population estimates since 1998 are much lower compared to the 1985 and 1991 surveys, but this may be due to a larger sample size used after 1992. Use on mountain big sagebrush was moderate to heavy in 1991 and 2003, with mostly light to moderate use all other years. Vigor has been generally normal. Decadence was moderately low between 1985 and 1998; however, it increased to 45% in 2003 and 2008.

Black sagebrush density was estimated at 3,920 plants/acre in 1998 and 3,520 in 2003, a 10% drop in the population. In 2008, the population showed continued losses in numbers with density estimated at 3,100 plants/acre, a 12% decline. Black sagebrush on average is used less when compared to mountain big sagebrush in most years. Vigor has generally been good. As with mountain big sagebrush, decadence in black sagebrush increased in 2003 to 50% and stayed high at 48% in 2008. Recruitment by young black sagebrush plants mimics that of mountain big sagebrush at 13% in 1998, 1% in 2003, and 15% in 2008, giving it a mean recruitment of barely 10% since 1998. Black sagebrush numbers have decreased by 21% since 1998.

Other browse sampled on the site include both curlleaf (*Cercocarpus ledifolius*) and true mountain mahogany (*Cercocarpus montanus*), slenderbush eriogonum (*Eriogonum microthecum*), dwarf rabbitbrush (*Chrysothamnus depressus*), and Gambel oak (*Quercus gambelii*). The mahogany species consist of mature plants that are very short due to heavy browsing each year. In 2003, dwarf rabbitbrush was noted as being

heavily browsed. In 2008, dwarf rabbitbrush showed mostly light use. Gambel oak has been fairly stable since 1998 with a slight drop in strip frequency in 2008. The increase noted in 2003 to 1,040 stems/acre may be due to reader differences as strip frequency did not change and density is slightly lower in 2008. Oak displayed moderate to heavy use in 2003 and mostly light to moderate use in 2008. There were no decadent plants sampled until 2008 when decadence was 13%.

Less desirable species include broom snakeweed (*Gutierrezia sarothrae*), pricklypear cactus (*Opuntia* sp.), stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), and gray horsebrush (*Tetradymia canescens*). These species all occur in very low densities. In the absence of some type of disturbance, these species do not appear to be a threat to increase in the near future. In 2003 and 2008, pinyon (*Pinus edulis*) and juniper (*Juniperus osteosperma*) had estimated densities of 55 and 22 trees/acre, respectively. Although tree density remains relatively low, photographs show a noticeable increase in the size of the trees across the site. Pinyon canopy cover has increased from 4% in 2003 to 10% in 2008.

Herbaceous Understory

The herbaceous understory is highly diverse, but production is on average only moderate. Crested wheatgrass (*Agropyron cristatum*) is the most abundant grass on the site and has maintained a fairly stable nested frequency over all years. Crested wheatgrass provided 35% of the grass cover in 1998, 48% in 2003, and only 26% in 2008. Other fairly abundant grasses include smooth brome (*Bromus inermis*), mutton bluegrass (*Poa fendleriana*), and bottlebrush squirreltail (*Sitanion hystrix*). These grasses are desirable species that add variety to the diets of wildlife and livestock. A total of 11 perennial grass species were sampled on the site in 2003 with crested wheatgrass and smooth brome showing light to moderate use. Cheatgrass was sampled in 1998, 2003 and 2008. However, abundance is low due to the highly competitive perennial grass component. Although diverse, forbs offer little forage value or cover. Longleaf phlox (*Phlox longifolia*) and redroot eriogonum (*Eriogonum racemosum*) are the most common perennial species. Annual stickseed (*Lappula occidentalis*) had the highest nested frequency value of all the forb species in 2003. While pale agroseris (*Agoseris glauca*) had the highest nested frequency in 2008.

1991 TREND ASSESSMENT

Most of the key shrubs (black sagebrush, mountain big sagebrush, curlleaf mountain mahogany) have experienced some kind of increase in their respective densities. Mountain mahogany was the only key browse species that experienced a noticeable decrease in density. Decadence has increased for all key browse species regardless of the direction of their respective population changes. Another important characteristic to monitor is the proportion of the plants that are considered to be in poor vigor. This trend should turn around with better precipitation. The browse trend is slightly up. Most of the herbaceous understory species are also experiencing increased values for nested and quadrat frequency. The perennial grasses show a slight increase in sum of nested frequency. The perennial forbs also show a slight increase in sum of nested frequency values.

browse - slightly up (+1) grass - slightly up (+1) forb - slightly up (+1)

1998 TREND ASSESSMENT

With the exception of black sagebrush, the browse populations show a decrease in their respective densities. The difference in densities may be due to the larger sample size now used to estimate density. Mountain big sagebrush age structure indicates a maturing population that is currently healthy. The black sagebrush population is also healthy. The browse trend is stable. The herbaceous understory trend is slightly downward due a decrease in sum of nested frequency for perennial grasses and forb species. Grasses dominate the herbaceous understory and account for most of the nested frequency decline.

winter range condition (DCI) – good (78) mid-level potential scale
browse - stable (0) grass - down (-2) forb - slightly down (-1)

2003 TREND ASSESSMENT

Trend for browse is down slightly. The key species, mountain big sagebrush and black sagebrush show slight declines in density, but higher decadence and very low recruitment rates in 2003. More preferred yet less abundant species such as curlleaf and true mountain mahogany display heavy browsing and no reproduction. The drought is likely the main factor driving these downward trends for browse populations. The herbaceous understory trend is slightly down due to the decrease in sum of nested frequency for perennial grasses and forbs. The most abundant perennial grass, crested wheatgrass, remained stable in 2003. The second most abundant grass, mutton bluegrass, declined in frequency, but not significantly. Grass production declined by nearly one-half as average cover of perennial grasses was 7% in 2003. Forbs are diverse but provide very little forage or cover. Sum of nested frequency for forbs slightly decreased in 2003.

winter range condition (DCI) - poor (45) mid-level potential scale
browse – slightly down (-1) grass - slightly down (-1) forb - slightly down (-1)

2008 TREND ASSESSMENT

Trend for browse continues to be slightly down. The key species, mountain big sagebrush and black sagebrush show declines in density of 16% and 12%, respectively. Decadence continues to be almost 50% for both species. Allowable rates of decadence would be less than 20%, if recruitment of young is on average above 10%. However, black sagebrush recruitment has on average been 10% since 1998 (borderline value), but since 2003, decadence has averaged 49% with very low recruitment rates in 2003. Mountain big sagebrush recruitment has averaged only about 7% since 1998, but decadence has averaged 45% since 2003. More preferred yet less abundant species such as curlleaf and true mountain mahogany display heavy browsing and no reproduction. However, these species are much more long-lived and can tolerate much heavier use than the sagebrush species; therefore recruitment is not as critical. The current drought period is likely the main factor driving these downward trends for browse populations, especially for the sagebrush species. The herbaceous understory trend is up from 2003 due to the increase in sum of nested frequency for perennial grasses and forbs. However, this combined value is still less than any sampled year since 1985. Grass cover has nearly doubled since 2003 (12%), but still less than the value noted in 1998 (14%). Forbs are diverse but provide very little forage or cover of value. Sum of nested frequency for perennial forbs increased in 2008. Total perennial cover more than doubled, but it is still less than 3%.

winter range condition (DCI) – fair (61) mid-level potential scale
browse - slightly down (-1) grass – up (+2) forb - up (+2)

HERBACEOUS TRENDS --
Management unit 22 , Study no: 1

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
G	Agropyron cristatum	75	104	107	114	99	5.05	3.38	3.14
G	Agropyron intermedium	a-	a-	a-	a-	b31	-	-	2.02
G	Agropyron spicatum	a4	ab10	b14	a3	a-	.42	.04	-
G	Bouteloua gracilis	ab14	b39	a10	ab12	ab23	.07	.20	.45
G	Bromus inermis	a27	a45	a41	a48	b97	1.92	1.52	3.14
G	Bromus tectorum (a)	-	-	b37	a15	a5	.56	.06	.01
G	Carex sp.	a12	ab14	b20	a1	a-	.14	.00	-
G	Koeleria cristata	c59	bc43	c60	a9	ab23	1.04	.05	.21
G	Oryzopsis hymenoides	a-	a5	a-	a3	b12	-	.03	.10
G	Poa fendleriana	c255	b195	a107	a65	a68	3.30	.93	2.45
G	Poa secunda	a-	a-	b45	a3	b31	1.68	.03	.23
G	Sitanion hystrix	b40	c65	ab21	ab37	a19	.20	.62	.28
G	Stipa comata	a9	b49	a7	a9	a5	.19	.11	.06
Total for Annual Grasses		0	0	37	15	5	0.56	0.06	0.01
Total for Perennial Grasses		495	569	432	304	408	14.05	6.94	12.13
Total for Grasses		495	569	469	319	413	14.61	7.00	12.14
F	Agoseris glauca	a-	b9	a6	a3	c84	.04	.01	.58
F	Alyssum alyssoides (a)	-	-	-	2	-	-	.00	-
F	Antennaria rosea	-	2	3	-	3	.03	-	.00
F	Arabis demissa	3	-	1	-	2	.03	-	.00
F	Astragalus sp.	b11	a5	b9	a-	a-	.08	-	-
F	Astragalus utahensis	-	-	2	1	3	.00	.00	.03
F	Castilleja chromosa	a-	b11	a1	a-	ab11	.00	-	.19
F	Camelina microcarpa (a)	-	-	1	-	-	.00	-	-
F	Calochortus nuttallii	b14	bc18	a-	a8	c35	-	.01	.22
F	Collinsia parviflora (a)	-	-	-	6	4	-	.01	.01
F	Crepis acuminata	-	-	-	-	2	-	-	.03
F	Delphinium nuttallianum	-	-	-	-	3	-	-	.03
F	Descurainia pinnata (a)	-	-	-	8	10	-	.04	.02
F	Erigeron pumilus	-	3	6	4	-	.06	.03	-
F	Eriogonum racemosum	23	26	31	26	14	.25	.39	.08
F	Eriogonum umbellatum	-	-	-	3	1	-	.03	.00
F	Hymenoxys acaulis	-	-	-	-	4	-	-	.06
F	Lappula occidentalis (a)	-	-	a-	c100	b56	-	.92	.18

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
F	Lesquerella intermedia	-	-	1	3	-	.00	.03	-
F	Lithospermum ruderale	$_{a}$2	$_{a}$1	$_{a}$3	$_{a}$2	$_{b}$15	.30	.15	.20
F	Lomatium sp.	$_{a}$-	$_{a}$3	$_{a}$-	$_{a}$7	$_{b}$26	.00	.01	.21
F	Machaeranthera canescens	-	-	-	-	-	.01	-	-
F	Microsteris gracilis (a)	-	-	2	11	7	.00	.02	.01
F	Orobanche fasciculata	-	-	7	-	-	.04	-	-
F	Petradoria pumila	14	12	15	9	2	.66	.10	.03
F	Phlox longifolia	$_{abc}$41	$_{c}$58	$_{bc}$55	$_{a}$26	$_{ab}$29	.23	.13	.23
F	Polygonum douglasii (a)	-	-	$_{b}$15	$_{a}$6	$_{ab}$12	.04	.01	.03
F	Sphaeralcea coccinea	7	7	3	-	-	.03	-	-
F	Tragopogon dubius	4	-	-	-	-	-	-	-
F	Trifolium sp.	$_{ab}$28	$_{b}$31	$_{a}$12	$_{a}$10	$_{ab}$33	.03	.05	.80
F	Unknown forb-perennial	2	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	18	133	89	0.05	1.02	0.25
Total for Perennial Forbs		149	186	155	102	267	1.82	0.96	2.73
Total for Forbs		149	186	173	235	356	1.87	1.99	2.98

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

BROWSE TRENDS --
Management unit 22 , Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
B	Artemisia nova	53	48	52	8.77	6.34	5.57
B	Artemisia tridentata vaseyana	83	79	77	18.67	15.26	12.76
B	Cercocarpus ledifolius	5	2	4	.06	.00	.04
B	Cercocarpus montanus	18	21	14	.38	.33	.56
B	Chrysothamnus depressus	5	8	6	.01	.03	.00
B	Chrysothamnus parryi	0	2	3	-	.00	.06
B	Chrysothamnus viscidiflorus viscidiflorus	1	0	3	.00	-	.00
B	Eriogonum microthecum	14	18	15	.73	.23	.45
B	Gutierrezia sarothrae	1	2	3	.03	.15	.04
B	Juniperus osteosperma	0	1	1	-	1.25	.66
B	Opuntia sp.	26	23	27	.41	.43	.58
B	Pediocactus simpsonii	0	3	0	-	.00	.00

B	Pinus edulis	5	3	8	2.64	2.34	6.52
B	Quercus gambelii	9	9	4	1.80	1.08	1.14
B	Sclerocactus sp.	2	0	2	.01	-	.00
B	Tetradymia canescens	0	2	2	-	.00	.03
Total for Browse		222	221	221	33.52	27.48	28.45

CANOPY COVER, LINE INTERCEPT --
Management unit 22 , Study no: 1

Species	Percent Cover	
	'03	'08
Artemisia nova	6.40	5.40
Artemisia tridentata vaseyana	12.98	15.85
Cercocarpus ledifolius	-	.01
Cercocarpus montanus	.51	.15
Chrysothamnus depressus	.06	-
Eriogonum microthecum	.26	.03
Gutierrezia sarothrae	-	.08
Juniperus osteosperma	2.40	.25
Opuntia sp.	.45	.10
Pinus edulis	4.43	9.66
Quercus gambelii	6.71	2.25

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 22 , Study no: 1

Species	Average leader growth (in)	
	'03	'08
Artemisia tridentata vaseyana	2.7	1.2
Cercocarpus ledifolius	3.2	-
Cercocarpus montanus	3.7	1.2

POINT-QUARTER TREE DATA --
Management unit 22 , Study no: 1

Species	Trees per Acre		
	'98	'03	'08
Juniperus osteosperma	13	22	22
Pinus edulis	39	55	54

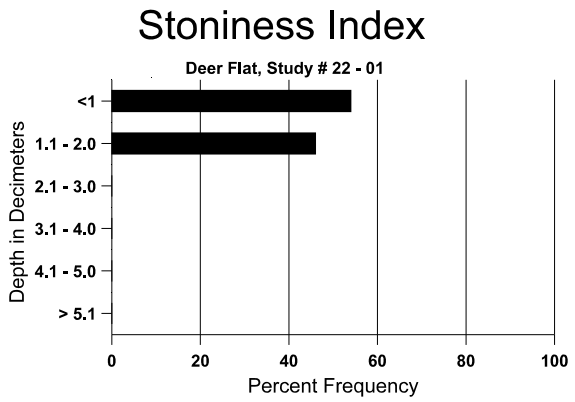
Average diameter (in)		
'98	'03	'08
3.8	4.7	6.1
4.2	4.3	5.7

BASIC COVER --
Management unit 22 , Study no: 1

Cover Type	Average Cover %				
	'85	'91	'98	'03	'08
Vegetation	9.50	11.00	42.20	36.33	43.91
Rock	9.50	11.75	15.98	17.59	14.94
Pavement	8.00	3.50	9.25	5.68	5.60
Litter	60.00	53.50	50.24	40.18	42.63
Cryptogams	0	.25	.58	.18	.32
Bare Ground	13.00	20.00	12.41	14.11	14.40

SOIL ANALYSIS DATA --
Management unit 22, Study no: 1, Study Name: Deer Flat

Effective rooting depth (in)	Temp °F (depth)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
			%sand	%silt	%clay				
8.7	53.8 (10.5)	6.2	52.0	27.4	20.6	6.5	12.1	233.6	1.0



PELLET GROUP DATA --
Management unit 22 , Study no: 1

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	37	13	38
Elk	5	8	4
Deer	55	31	51
Cattle	7	2	3

Days use per acre (ha)		
'98	'03	'08
-	-	-
12 (30)	39 (96)	5 (12)
58 (143)	149 (369)	38 (94)
11 (27)	8 (20)	20 (50)

BROWSE CHARACTERISTICS --
Management unit 22 , Study no: 1

		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 nova												
85	**1998**	466	1266	599	133	-	30	0	7	-	3	13/20
91	**3265**	-	1066	1666	533	-	22	49	16	2	6	10/17
98	**3920**	20	500	2800	620	140	17	1	16	2	2	15/23
03	**3520**	-	20	1740	1760	220	7	3	50	4	4	16/20
08	**3100**	340	460	1160	1480	180	47	0	48	14	14	11/20
Artemisia tridentata vaseyana												
85	**9331**	1199	4999	3933	399	-	44	2	4	-	.71	23/29
91	**9598**	-	4533	2999	2066	-	35	31	22	.62	6	24/28
98	**3640**	-	480	2480	680	140	39	6	19	.54	1	22/32
03	**3480**	-	20	1900	1560	380	32	52	45	9	9	25/29
08	**2920**	120	240	1360	1320	500	35	.68	45	23	23	23/32
Cercocarpus ledifolius												
85	**66**	-	66	-	-	-	0	0	0	-	0	-/-
91	**133**	-	133	-	-	-	50	50	0	-	0	-/-
98	**120**	-	100	20	-	-	0	0	0	-	0	16/16
03	**40**	-	-	40	-	-	0	100	0	-	0	11/13
08	**80**	20	60	-	20	-	0	0	25	-	0	13/13
Cercocarpus montanus												
85	**1399**	933	1266	133	-	-	19	71	0	-	0	15/13
91	**931**	133	266	466	199	-	0	86	21	2	7	9/11
98	**380**	60	260	120	-	20	32	5	0	-	0	18/18
03	**480**	-	-	480	-	-	8	75	0	-	0	14/14
08	**320**	-	80	200	40	-	25	31	13	-	0	12/18
Chrysothamnus depressus												
85	**133**	-	-	133	-	-	0	0	0	-	0	2/5
91	**0**	-	-	-	-	-	0	0	0	-	0	-/-
98	**120**	-	60	60	-	-	17	0	0	-	0	2/8
03	**280**	-	-	260	20	-	14	86	7	-	0	6/8
08	**160**	-	20	120	20	-	25	25	13	-	0	3/9

		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)
Chrysothamnus parryi												
85	**0**	-	-	-	-	-	0	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	0	-	0	-/-
03	**40**	-	-	40	-	-	0	0	0	-	0	13/18
08	**60**	-	-	20	40	-	0	0	67	-	0	-/-
Chrysothamnus viscidiflorus viscidiflorus												
85	**66**	-	-	66	-	-	0	0	0	-	0	4/9
91	**66**	-	-	-	66	-	0	100	100	-	0	-/-
98	**20**	-	-	20	-	-	0	0	0	-	0	11/13
03	**0**	-	-	-	-	-	0	0	0	-	0	-/-
08	**80**	-	-	80	-	-	0	0	0	-	0	7/13
Eriogonum microthecum												
85	**1399**	-	533	866	-	-	5	10	0	-	0	5/7
91	**2199**	-	333	1733	133	-	15	21	6	.90	3	6/6
98	**400**	-	20	360	20	-	10	0	5	5	5	6/12
03	**680**	-	40	640	-	-	24	35	0	-	0	5/6
08	**480**	-	80	360	40	-	8	8	8	-	0	6/7
Gutierrezia sarothrae												
85	**1799**	-	333	1466	-	-	0	0	0	-	0	7/5
91	**399**	-	-	333	66	-	0	0	17	-	0	8/8
98	**20**	-	-	20	-	-	0	0	0	-	0	7/5
03	**40**	-	20	20	-	-	0	0	0	-	0	6/6
08	**60**	20	20	40	-	-	0	0	0	-	0	6/8
Juniperus osteosperma												
85	**66**	-	-	66	-	-	0	0	-	-	0	44/33
91	**66**	-	-	66	-	-	0	0	-	-	0	63/67
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
03	**20**	-	-	20	-	-	0	0	-	-	0	-/-
08	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Opuntia sp.												
85	**2931**	-	666	2066	199	-	0	7	7	-	18	4/6
91	**2465**	199	1333	999	133	-	0	14	5	-	0	5/11
98	**720**	40	180	500	40	-	0	0	6	6	6	5/10
03	**820**	-	-	700	120	-	0	7	15	5	5	5/10
08	**860**	-	140	620	100	-	0	0	12	-	7	4/11

		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)
Pediocactus simpsonii												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**40**	-	-	-	-	-	0	0	-	-	0	-/-
03	**100**	-	40	60	-	-	0	0	-	-	0	2/4
08	**0**	-	-	-	-	-	0	0	-	-	0	1/3
Pinus edulis												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**66**	-	66	-	-	-	0	0	-	-	0	-/-
98	**100**	-	-	100	-	20	0	0	-	-	0	-/-
03	**60**	-	-	60	-	-	0	0	-	-	0	-/-
08	**160**	-	20	140	-	-	0	0	-	-	13	-/-
Quercus gambelii												
85	**66**	199	66	-	-	-	100	0	0	-	0	-/-
91	**133**	-	133	-	-	-	50	50	0	-	0	-/-
98	**540**	-	100	420	20	40	7	26	4	4	4	31/28
03	**1040**	-	200	840	-	20	63	17	0	-	0	19/16
08	**480**	-	100	320	60	20	33	0	13	-	0	29/21
Sclerocactus sp.												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**66**	-	66	-	-	-	0	0	-	-	0	-/-
98	**40**	20	20	20	-	-	0	0	-	-	0	2/3
03	**0**	-	-	-	-	-	0	0	-	-	0	-/-
08	**40**	-	-	40	-	-	0	0	-	-	0	3/5
Tetradymia canescens												
85	**66**	-	-	66	-	-	0	0	0	-	0	4/6
91	**133**	-	-	133	-	-	0	0	0	-	0	6/7
98	**0**	-	-	-	-	-	0	0	0	-	0	-/-
03	**40**	-	20	20	-	-	0	0	0	-	0	6/10
08	**40**	-	20	-	20	-	0	0	50	-	0	-/-