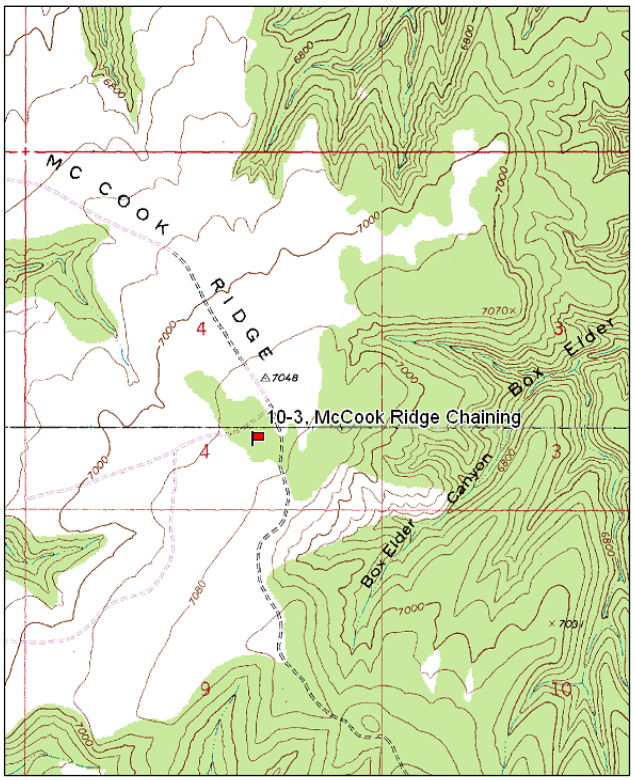
MCCOOK RIDGE CHAINING - TREND STUDY NO. 10-3-10

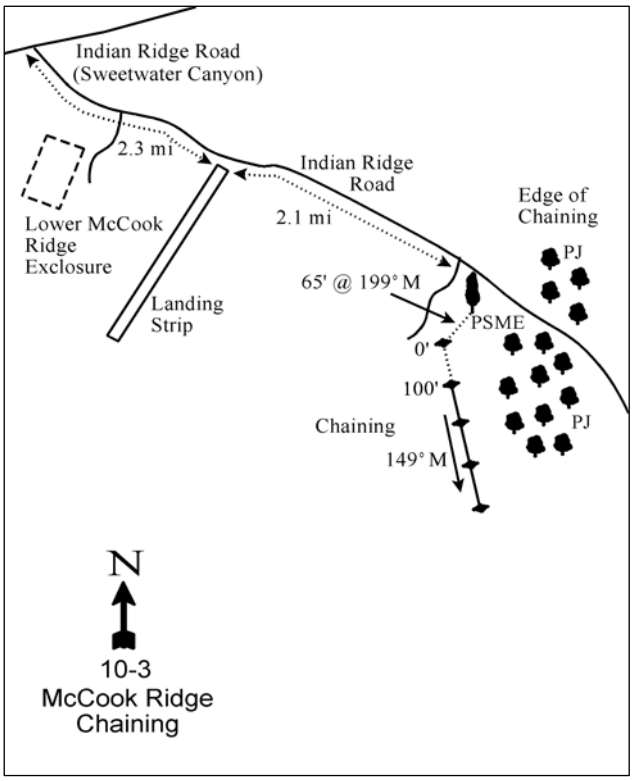
Vegetation Type: Chained, Seeded Pinyon-Juniper
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Upland Stony Loam (Wyoming Big Sagebrush), R034XY334UT
Land Ownership: BLM
Elevation: 7030 ft. (2143 m)
Aspect: Southwest
Slope: 5%
Transect bearing: 149° magnetic
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:
From the intersection of the Indian Ridge and McCook Ridge roads, go southeast on McCook Ridge for 2.3 miles to a landing strip on the right side of the road (just past the exclosure). Proceed an aditiona1 2.1 miles up McCook Ridge into a chained area. Turn right off the main road before the edge of the chaining, and proceed over to a large, lone douglas fir (*Pseudotsuga menziesii*). The 0-foot baseline stake, marked by browse tag # 9036, is 13 paces from the tree at a bearing of 199°M.

Map Name: Burnt Timber Canyon



Diagrammatic Sketch:



Township: 14S Range: 24E Section: 4

GPS: NAD 83, UTM 12S 651670 E 4387542 N

MCCOOK RIDGE CHAINING - TREND STUDY NO. 10-3

Site Information

Site Description: The study is located on a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) chaining that was chained in the 1960's. The area was retreated in April of 2005 by a bullhog as part of the McCook ridge P/J Removal (WRI Project #260). A total of 520 acres were bullhogged and no seeding took place. The study was also sampled in 2007 and 2009 as part of the Watershed Restoration Initiative monitoring project to monitor the treatment. Data for those years is available in the 2010 WRI Report. The Sweetwater wildfire started in the area in late May of 2000 and burned 3,642 acres. The firefighters were finishing putting the fire out when the site was read during the first week of June 2000. The edge of the fire came within a thousand feet of the study area to the east, but did not burn the study site. In 2005, grasses were abundant in the burned area. The study site is located about two miles southeast of the Lower McCook Ridge exclosure on important deer and elk winter range. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Sweetwater allotment. Pellet transect data indicates that wildlife use by deer and elk has been fairly light since 2000 and use from cattle has also been light since 2000 (Table - Pellet Group Data).

Browse: Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is the key browse species on the site. There are some individual sagebrush plants that appear to be hybrids between mountain big sagebrush and basin big sagebrush (*A. tridentata* spp. *tridentata*) or black sagebrush (*A. nova*), but all big sagebrush was classified as mountain big sagebrush. The sagebrush population is mostly mature with a moderate amount of decadence and poor vigor. Recruitment of young plants was low in 2000 and 2005, but has been good in all other sample years. Utilization of big sagebrush has been mostly moderate with some years of heavy use. Dwarf rabbitbrush (*Chrysothamnus depressus*) is the only other abundant browse species on the site. This small, prostate shrub has a mostly mature population with low decadence, good vigor and moderate recruitment of young plants. Utilization of dwarf rabbitbrush has been mostly light to moderate, but heavy use was noted in 1982 and 2005 (Table - Browse Characteristics). Other preferred browse species that occur less frequently include: rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *hololeucus*), winterfat (*Ceratoides lanata*) and fourwing saltbush (*Atriplex canescens*).

Prior to the bullhog treatment in 2005, pinyon and juniper trees that had survived or reestablished since the original chaining were increasing in size. Photos indicate that juniper and pinyon trees increased considerably in size from 1982 to 1995. Point-center quarter data also showed an increase in the density of both species from 1995 to 2000. Following the treatment, density and average basal diameter decreased markedly (Table - Point-Quarter Tree Data). Most of the trees sampled in 2005 were treated trees that still had live branches, but none of the trees sampled in 2010 had been treated and all of the sampled trees sampled were less than 4 feet tall. Cover of the two tree species was also reduced substantially (Table - Browse Trends).

Herbaceous Understory: Grasses on the site are diverse and abundant consisting of only perennial species. The most common species is crested wheatgrass (*Agropyron cristatum*), which has provided about 50% or more of the grass cover since 1995. Other common species include thickspike wheatgrass (*A. dasystachyum*), intermediate wheatgrass (*A. intermedium*), blue grama (*Bouteloua gracilis*), prairie junegrass (*Koeleria cristata*), and Sandberg bluegrass (*Poa secunda*). Grasses were reportedly heavily grazed in the past. Smooth brome (*Bromus inermis*) decreased with each sampling and has not been sampled since 2005. Forb composition is diverse, but not abundant. The only seeded forb encountered was alfalfa (*Medicago sativa*) (Table - Herbaceous Trends).

Soil: Soils texture is a clay loam with a neutral soil reaction (pH 7.1). Organic matter is moderately high at 4% (Table - Soil Analysis Data). There is evidence of shrinking clays in the soil with surface cracks present. Bare ground cover has been moderate to low with good protective ground cover provided by perennial grasses and litter from the chaining and bullhog treatments. The soil erosion condition was classified as stable in 2010.

Trend Assessments

Browse:

- **1982 to 1988 - slightly down (-1):** The density of the key browse species, mountain big sagebrush, decreased by 21% with a slight decrease in recruitment of young plants and an increase in decadence. The density of dwarf rabbitbrush increased markedly.
- **1988 to 1995 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1995; therefore, trend was determined using other parameters. Decadence of mountain big sagebrush decreased from 26% to 3% of the population. Recruitment of young sagebrush plants increased markedly and comprised 50% of the population.
- **1995 to 2000 - slightly down (-1):** The density of mountain big sagebrush decreased slightly, but cover increased from 6% to 8%. However, decadence increased to 34% and poor vigor increased to 19% of the population. Recruitment of young plants decreased to only 5% of the population.
- **2000 to 2005 - down (-2):** Mountain big sagebrush density decreased 22% from 2,980 plants/acre to 2,320 plants/acre and cover decreased to 4%. Much of this decrease is likely due to trampling during the bullhog treatment of pinyon and juniper that occurred in the spring of 2005. Decadence decreased slightly, but remained high at 27% and poor vigor increased to 28%. Recruitment of young plants remained low at 3%.
- **2005 to 2010 - slightly up (+1):** There was little change in the density of mountain big sagebrush, but cover increased slightly to 6%. Mountain big sagebrush decadence decreased to 17% and poor vigor decreased to 13% of the population. Recruitment of young plants improved and now comprises 23% of the population.

Grass:

- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for grasses are available from 1982, so no trend was given.
- **1988 to 1995 - up (+2):** The sum of nested frequency of perennial grasses increased by 31% with significant increases in the nested frequency of many of the perennial grasses. However, both crested wheatgrass and smooth brome decreased significantly in nested frequency.
- **1995 to 2000 - down (-2):** Perennial grass sum of nested frequency returned to 1988 levels, but cover increased from 12% to 15%.
- **2000 to 2005 - stable (0):** There was little change in the sum of nested frequency or of perennial grasses, but cover decreased slightly to 12%.
- **2005 to 2010 - up (+2):** The sum of nested frequency of perennial grasses increased y 20% and cover increased to 30%.

Forb:

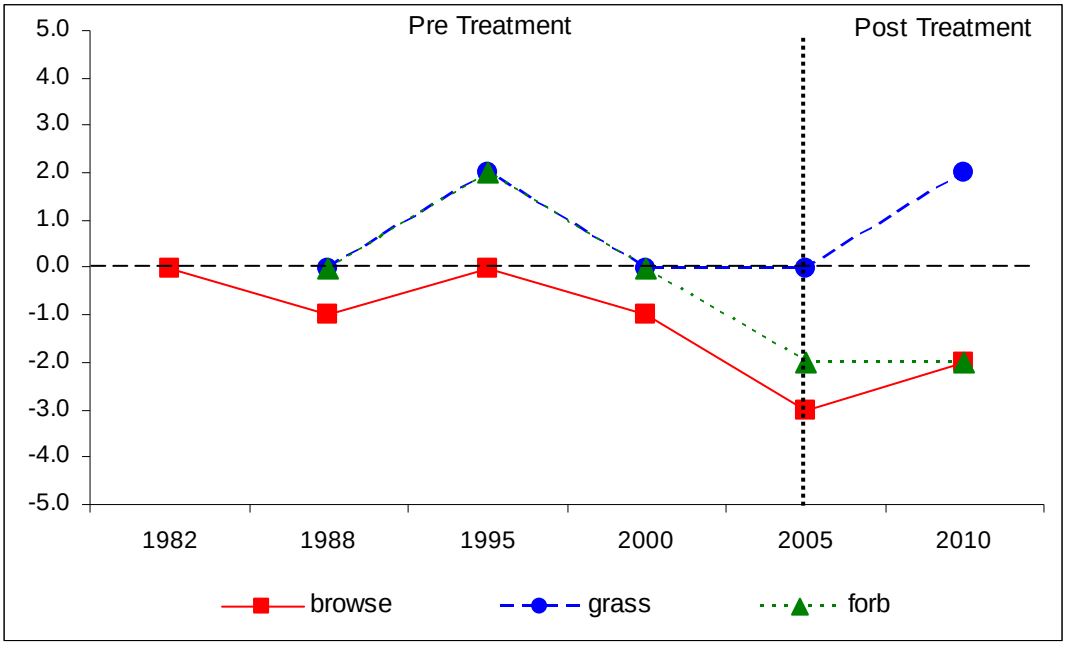
- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for forbs are available from 1982, so no trend was given.
- **1988 to 1995 - up (+2):** The sum of nested frequency of perennial forbs increased 60% and the number of species sampled increased from 9 to 17. Few annual forbs were sampled.
- **1995 to 2000 - down (-2):** Perennial forb sum of nested frequency decreased by 48% and cover decreased from 4% to 1%. Most of the decrease in cover was due to a large decrease in the cover of alfalfa.
- **2000 to 2005 - down (-2):** There was a 25% decrease in the sum of nested frequency and cover decreased to less than 1%.
- **2005 to 2010 - stable (0):** The sum of nested frequency of perennial forbs remained similar, though cover did increase to near 2%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 10, study no: 3

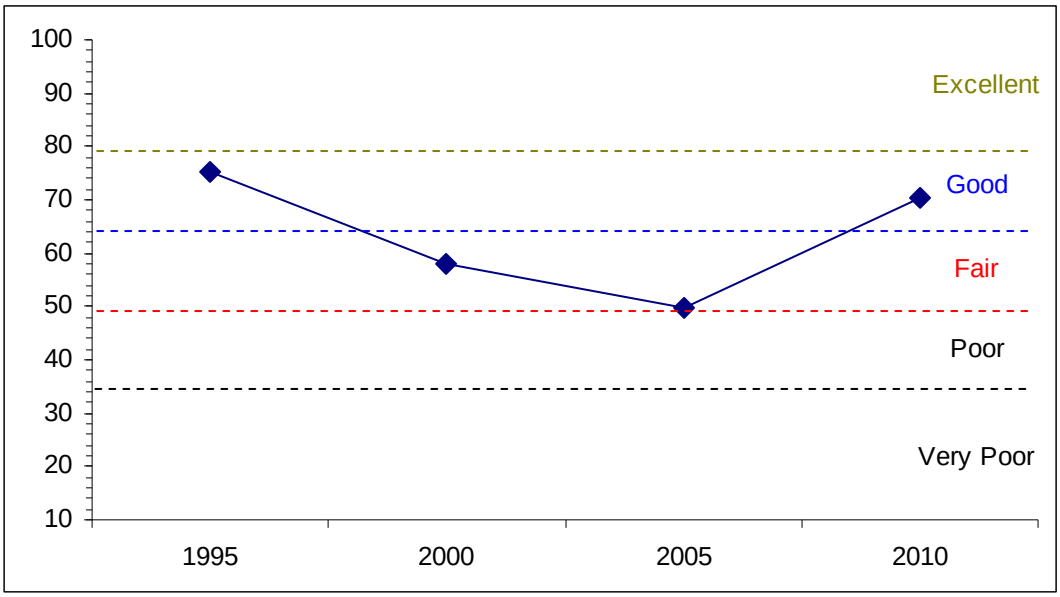
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
95	14.0	14.5	14.3	24.3	0.0	8.0	0.0	**75.1**	Good
00	16.0	6.9	3.4	29.0	0.0	2.7	0.0	**57.9**	Fair
05	11.6	10.3	1.5	24.8	0.0	1.8	0.0	**49.9**	Poor-Fair
10	15.6	12.6	8.6	30.0	0.0	3.6	0.0	**70.4**	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10, Study no: 3



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 10, Study no: 3



HERBACEOUS TRENDS--
Management unit 10, Study no: 3

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron cristatum	c257	ab168	ab196	a143	ab168	6.43	10.21	5.64	15.53
G	Agropyron dasystachyum	a2	b132	b104	a41	b101	.56	.64	.37	3.20
G	Agropyron intermedium	c67	b21	a-	b14	b24	.16	-	.24	2.10
G	Agropyron spicatum	b13	b16	a-	ab4	a-	.16	-	.03	-
G	Bouteloua gracilis	a6	c106	b86	b58	b79	1.25	1.59	1.49	2.11
G	Bromus inermis	c52	b22	ab3	a-	a-	.28	.03	-	-
G	Carex sp.	b33	a11	a3	a10	a-	.36	.30	.12	-
G	Elymus junceus	16	12	3	6	2	.33	.15	.33	.30
G	Koeleria cristata	a11	c54	ab28	bc43	bc44	.48	.14	.77	2.11
G	Oryzopsis hymenoides	ab6	b6	a-	ab7	ab2	.07	-	.19	.15
G	Poa fendleriana	a-	a-	a-	a-	b13	-	-	-	.36
G	Poa secunda	a18	b81	b73	b90	b86	2.02	1.40	2.41	2.73
G	Sitanion hystrix	b8	ab4	a-	ab4	a-	.01	-	.06	-
G	Stipa comata	a1	ab9	a-	c31	bc23	.01	-	.71	1.03
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		490	642	496	451	542	12.16	14.48	12.39	29.65
Total for Grasses		490	642	496	451	542	12.16	14.48	12.39	29.65
F	Agoseris glauca	-	-	-	-	3	-	-	-	.01
F	Antennaria rosea	a-	b30	a12	ab19	ab17	.17	.03	.11	.11
F	Arabis sp.	a7	b29	a5	a2	a2	.87	.01	.03	.00
F	Arenaria fendleri	14	3	5	11	2	.03	.04	.02	.03
F	Astragalus spatulatus	b34	a-	a5	a-	a-	-	.03	-	-
F	Calochortus nuttallii	-	6	-	2	1	.01	-	.00	.00
F	Castilleja sp.	a-	b22	a-	a-	a-	.11	-	-	-

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
F	Caulanthus crassicaulis	2	-	-	-	-	-	-	-	-
F	Crepis acuminata	-	6	-	-	-	.01	-	-	-
F	Cymopterus sp.	-	-	-	5	-	-	-	.01	-
F	Delphinium sp.	-	2	-	-	-	.00	-	-	-
F	Erigeron pumilus	-	3	6	1	-	.04	.02	.00	-
F	Erigeron sp.	-	-	5	-	-	-	.01	-	-
F	Haplopappus acaulis	11	8	15	8	6	.33	.54	.21	.48
F	Hymenoxys acaulis	$_{a}$-	$_{b}$12	$_{ab}$1	$_{ab}$3	$_{ab}$3	.80	.00	.03	.15
F	Lappula occidentalis (a)	-	2	-	2	-	.00	-	.00	-
F	Machaeranthera grindelioides	$_{b}$62	$_{a}$13	$_{a}$23	$_{a}$8	$_{a}$15	.14	.17	.08	.17
F	Medicago sativa	1	14	8	5	4	1.24	.39	.06	.53
F	Oenothera caespitosa	-	-	1	-	-	-	.00	-	-
F	Orthocarpus sp. (a)	-	4	-	-	-	.01	-	-	-
F	Penstemon pachyphyllus	-	3	-	4	-	.02	-	.06	-
F	Phlox austromontana	2	-	-	-	-	-	-	-	-
F	Phlox longifolia	$_{a}$-	$_{c}$41	$_{b}$13	$_{ab}$2	$_{b}$15	.08	.03	.00	.03
F	Physaria acutifolia	-	-	1	-	-	-	.00	-	-
F	Physaria sp.	9	-	-	-	-	-	-	-	-
F	Polygonum douglasii (a)	-	7	-	-	-	.02	-	-	-
F	Sphaeralcea coccinea	$_{a}$-	$_{b}$28	$_{b}$19	$_{b}$18	$_{b}$23	.08	.04	.22	.14
F	Streptanthus cordatus	-	1	-	1	-	.00	-	.03	-
F	Taraxacum officinale	-	6	-	-	-	.01	-	-	-
F	Unknown forb-perennial	-	-	-	-	2	-	-	-	.15
Total for Annual Forbs		0	13	0	2	0	0.03	0	0.00	0
Total for Perennial Forbs		142	227	119	89	93	3.99	1.34	0.89	1.81
Total for Forbs		142	240	119	91	93	4.02	1.34	0.89	1.81

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

BROWSE TRENDS--
Management unit 10, Study no: 3

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia frigida	1	1	1	2	-	.15	.03	.00
B	Artemisia tridentata vaseyana	52	54	46	48	5.73	7.76	4.46	5.78
B	Ceratoides lanata	5	7	3	5	.09	.01	-	-
B	Chrysothamnus depressus	47	48	43	42	5.34	4.88	4.76	6.68
B	Chrysothamnus nauseosus hololeucus	1	1	2	3	-	.00	.00	.03
B	Gutierrezia sarothrae	31	29	30	34	.35	.36	.42	.17
B	Juniperus osteosperma	0	7	4	2	1.62	1.14	.18	-
B	Leptodactylon pungens	0	3	1	0	-	.15	-	-
B	Opuntia fragilis	1	0	0	0	.01	-	-	-
B	Pediocactus simpsonii	0	0	5	1	-	-	-	.00
B	Pinus edulis	0	4	3	1	1.79	3.83	.78	-
Total for Browse		138	154	138	138	14.95	18.32	10.67	12.68

CANOPY COVER, LINE INTERCEPT--
Management unit 10, Study no: 3

Species	Percent Cover		
	'00	'05	'10
Artemisia tridentata vaseyana	-	4.88	6.30
Chrysothamnus depressus	-	3.40	5.75
Chrysothamnus nauseosus hololeucus	-	-	.18
Gutierrezia sarothrae	-	.25	.48
Juniperus osteosperma	-	.61	.01
Pinus edulis	4.40	.35	.01

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 10, Study no: 3

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	1.9	2.2

POINT-QUARTER TREE DATA--
Management unit 10, Study no: 3

Species	Trees per Acre			
	'95	'00	'05	'10
Juniperus osteosperma	88	147	65	43
Pinus edulis	106	127	42	22

Average diameter (in)			
'95	'00	'05	'10
7.5	2.5	3.4	0.8
11.2	4.2	3.2	1.1

BASIC COVER--
Management unit 10, Study no: 3

Cover Type	Average Cover %					
	'82	'88	'95	'00	'05	'10
Vegetation	5.25	12.50	32.93	34.54	21.94	45.37
Rock	1.00	2.50	2.11	1.52	.46	.84
Pavement	.75	5.25	2.95	1.11	1.33	.76
Litter	73.25	69.00	36.46	34.29	46.71	57.17
Cryptogams	0	.50	6.62	5.81	2.19	.53
Bare Ground	19.75	10.25	26.86	37.16	36.87	18.92

SOIL ANALYSIS DATA --
Management unit 10, Study no: 3, Study Name: Lower McCook Ridge Chaining

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
15.7	7.1	34.0	31.4	34.6	4.0	7.8	144.0	0.8

PELLET GROUP DATA--
Management unit 10, Study no: 3

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	16	33	47	13
Elk	24	5	11	6
Deer	13	6	18	18
Cattle	2	1	1	4

Days use per acre (ha)		
'00	'05	'10
-	-	-
19 (48)	20 (50)	10 (25)
25 (62)	24 (60)	9 (22)
-	2 (4)	8 (20)

BROWSE CHARACTERISTICS--
Management unit 10, Study no: 3

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia frigida									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**60**	0	100	-	-	0	0	0	9/11
00	**80**	0	100	-	-	0	0	0	7/5
05	**20**	0	100	-	-	0	0	0	2/4
10	**40**	0	100	-	-	50	0	0	4/6
Artemisia tridentata tridentata									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	83/37

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana									
82	**1932**	34	66	0	399	48	17	0	22/25
88	**1531**	17	57	26	266	57	13	9	24/29
95	**3160**	50	47	3	40	27	0	.63	24/31
00	**2980**	5	60	34	-	40	9	19	23/26
05	**2320**	3	71	27	-	38	33	28	19/24
10	**2380**	23	61	17	-	68	24	13	20/27
Atriplex canescens									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	26/24
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-
Ceratoides lanata									
82	**0**	0	0	0	-	0	0	0	-/-
88	**199**	67	33	0	-	0	0	0	15/5
95	**120**	0	100	0	-	0	0	0	6/8
00	**160**	0	88	13	-	38	0	13	9/8
05	**100**	20	60	20	-	20	60	20	5/6
10	**160**	38	63	0	-	63	0	0	5/6
Chrysothamnus depressus									
82	**6266**	0	100	0	-	0	100	0	3/9
88	**27265**	45	53	2	1266	40	.48	.24	4/9
95	**13660**	6	94	0	140	0	0	0	5/11
00	**15500**	10	73	17	-	54	.25	3	3/10
05	**11020**	3	92	5	-	42	39	3	4/8
10	**10700**	12	87	0	-	0	0	0	4/11
Chrysothamnus nauseosus hololeucus									
82	**0**	0	0	0	-	0	0	0	-/-
88	**0**	0	0	0	-	0	0	0	-/-
95	**60**	67	33	0	60	0	0	0	36/43
00	**20**	100	0	0	-	0	0	0	37/38
05	**40**	50	0	50	-	50	0	50	18/9
10	**100**	0	100	0	-	0	0	0	25/29
Gutierrezia sarothrae									
82	**66**	0	100	0	-	0	0	0	4/1
88	**4598**	23	75	1	-	0	0	0	8/5
95	**1480**	23	77	0	120	0	0	0	7/7
00	**1380**	26	65	9	-	0	0	1	4/5
05	**1120**	13	88	0	40	0	0	0	6/7
10	**1660**	23	77	0	-	1	0	0	6/7

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Juniperus osteosperma									
82	**66**	100	0	0	-	0	0	0	-/-
88	**132**	50	50	0	66	50	0	0	118/79
95	**0**	0	0	0	-	0	0	0	-/-
00	**140**	71	29	0	-	0	0	0	-/-
05	**80**	75	0	25	20	0	0	25	-/-
10	**40**	100	0	0	60	0	0	0	-/-
Leptodactylon pungens									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**80**	0	100	-	-	0	0	0	8/11
05	**20**	0	100	-	-	0	0	0	4/9
10	**0**	0	0	-	-	0	0	0	3/7
Opuntia fragilis									
82	**0**	0	0	-	-	0	0	0	-/-
88	**66**	100	0	-	-	0	0	0	-/-
95	**20**	100	0	-	-	0	0	0	4/14
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	3/12
10	**0**	0	0	-	-	0	0	0	-/-
Pediocactus simpsonii									
82	**66**	0	100	-	-	0	0	0	1/4
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	0/1
05	**120**	0	100	-	-	0	0	0	1/2
10	**20**	100	0	-	-	0	0	0	-/-
Pinus edulis									
82	**399**	0	100	-	-	0	0	0	33/18
88	**399**	67	33	-	-	0	0	0	94/73
95	**0**	0	0	-	-	0	0	0	-/-
00	**80**	50	50	-	40	0	0	0	-/-
05	**60**	100	0	-	20	0	0	0	-/-
10	**20**	100	0	-	20	0	0	0	-/-