

Trend Study 10R-9-05

Study site name: Winter Ridge Exclosure Out .

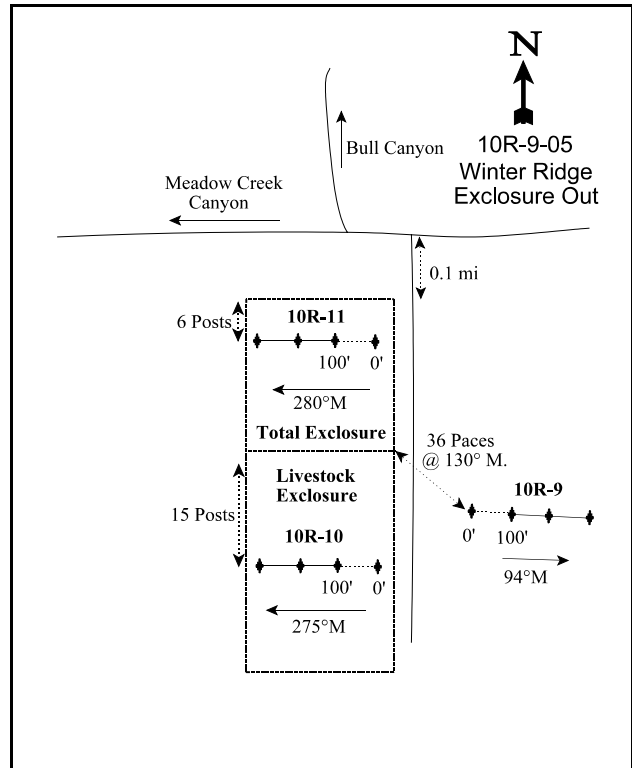
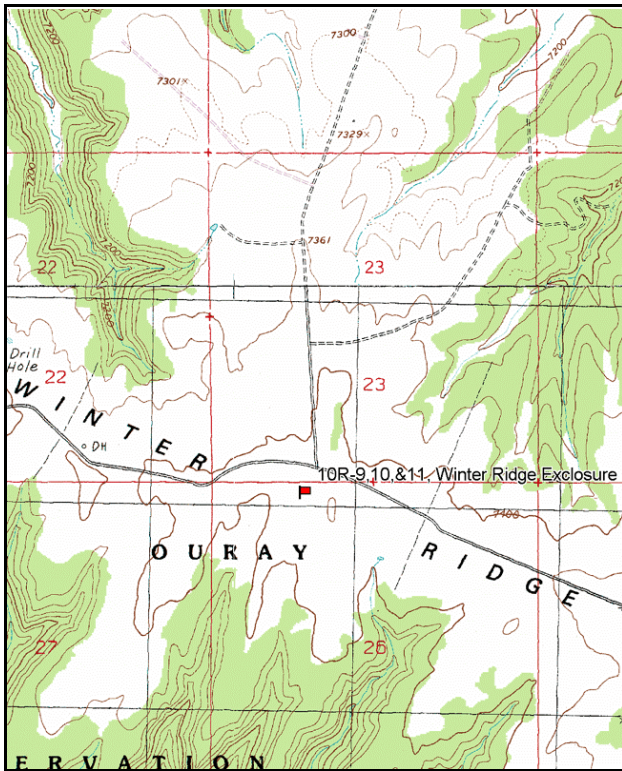
Vegetation Type: Mountain big sagebrush .

Compass bearing: Frequency baseline 94 degrees magnetic.

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

LOCATION DESCRIPTION

From the intersection of the Seep Ridge and Book Cliff Divide road, proceed west along the divide for 9.4 miles to the major Three Pines-Hay Canyon intersection. Drive west along the Winter Ridge Rd for 9.8 miles to a fork. From the intersection where Meadow Creek Canyon and Bull Canyon meet, take the road to the south. Go 0.1 miles to the Winter Ridge Exclosure. From the "T" in the fence on the west side of the exclosure where the two parts of the exclosure meet, walk 36 paces at an azimuth of 130°M, to the 0-foot stake. The 0-foot stake is marked by browse tag number 63.



Map name: Tenmile Canyon North

Diagrammatic Sketch

Township 15S, Range 21E, Section 26

GPS: NAD 27, UTM 12S 4371961 N, 625766 E

DISCUSSION

Winter Ridge Exclosure Outside - Trend Study 10R-9

This study is found outside of the exclosure complex on Winter Ridge. The exclosure was constructed in 1964. The trend study was established in 1997. The site has a slope of 4% with a westerly aspect and an elevation of 7,400 feet. The area is a mountain big sagebrush/grass type in association with scattered pinyon and juniper. It is used as winter range for deer and elk and is grazed by cattle in the Horse Point allotment during the summer. At the time the study was established on June 5, 1997, cattle were grazing on the site. Pellet group data estimates were 44 elk, 2 deer and 30 cow days use/acre (109 edu/ha, 5 edu/ha and 74 cdu/ha). Data from 2000 were estimated at 22 elk, 2 deer and 19 cow days use/acre (54 edu/ha, 5 ddu/ha and 47 cdu/ha). Most of the cattle pats sampled in 2000 appeared to be from the late summer or previous fall. Pellet data from 2005 estimated 32 elk, 2 deer, 7 cow, and 5 horse days use/acre (79 edu/ha, 5 ddu/ha, 16 cdu/ha, and 13 hdu/ha).

Soil at the site is moderately deep with an effective rooting depth estimated at just over 15 inches. It has a loam texture with a neutral soil reaction (7.2 pH). Phosphorus and potassium are low at 5.4 ppm P and 3.2 ppm K. Values less than 6 ppm for phosphorus and 60 ppm for potassium may limit normal plant growth and development (Tiedemann and Lopez 2004). Soil pedestaling is evident around the base of shrubs, indicative of soil loss in the past. An erosion condition class assessment rated erosion as stable in 2005.

Mountain big sagebrush is the most abundant browse species. Sagebrush cover was 13% in 1997 and 16% in 2000. This declined to 9% in 2005. Sagebrush density was 7,960 plants/acre in 2000, which dropped by 35% to 5,140 plants/acre in 2005. Decadence was very high in 2000 at 51%, while 20% of the population was classified as dying. Drought conditions after 2000 must have led to a die-off of many of these plants. Decadence was still high in 2005 at 42%, with 27% of the population classified as dying. Young plants were not abundant in 2005, but seedlings were estimated at 740 seedlings/acre.

Broom snakeweed was present at an estimated density of only 1,440 plants/acre in 1997. Density rapidly increased in 2000 to 19,460 plants/acre. In 2005, density decreased to 8,040 plants/acre, but plants were much bigger. Cover for broom snakeweed increased from less than 3% in 2000 to 10% in 2005. Snakeweed made up more than half of the total browse cover in 2005. Other browse species encountered in low densities include dwarf and stickyleaf low rabbitbrush, and winterfat.

Perennial grasses are abundant with six species sampled. Thickspike, mutton bluegrass, and Sandberg bluegrass were the most abundant prior to 2005. In 2005, both bluegrass species declined significantly while needle-and-thread and prairie junegrass increased significantly. Forbs are diverse but most provide little cover. Mat penstemon, desert phlox, and scarlet globe mallow have been the most abundant forbs. Mat penstemon was not sampled at all in 2005. Most of the forbs associated with this site are low growing species. Although they afford some protection to the soil, they offer little forage value. Other prevalent species include Rose's pussytoes and longleaf phlox.

1997 APPARENT TREND ASSESSMENT

Soil is adequately protected at this time with some past erosion apparent. Bare ground is most vulnerable in the unprotected shrub interspaces. Mountain big sagebrush is the dominant browse with an overly mature age structure. Other browse are present, but in low densities. Grass accounts for two-thirds of the herbaceous cover with thickspike wheatgrass being the most abundant. Forbs are mostly low growing increaser species providing little forage. The Desirable Components Index (see methods) rated this site as fair due to moderate browse and perennial grass cover.

winter range condition (DC Index) - fair (60) Mid-level potential scale

2000 TREND ASSESSMENT

Trend for soil appears stable. There is some limited erosion occurring within the shrub interspaces, but the abundant herbaceous vegetation and litter cover adequately protect the soil from serious erosion. Trend for browse is down slightly for the key species, mountain big sagebrush. Use is moderate to heavy (74% of the population), percentage of plants classified with poor vigor has increased (10 to 20%), and decadence has doubled from 24% to 51%. There are currently not enough seedlings and young to replace the decadent plants that are classified as dying. In addition, the density of the increaser, broom snakeweed has increased almost exponentially to 19,460 plants/acre, a 15-fold increase. Trend for the herbaceous understory is stable. Sum of nested frequency for grasses and forbs changed very little. The nested frequency of mutton bluegrass and Sandberg bluegrass has increased significantly, while prairie junegrass decreased. The DCI score rated this site as fair to good due to increased browse and perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - stable (0)

winter range condition (DC Index) - fair to good (67) Mid-level potential scale

2005 TREND ASSESSMENT

The soil trend is considered slightly down. Relative percent bare ground cover increased from 29% to 38%. Vegetation and litter cover did not change, but relative cryptogam cover decreased from 10% to less than 2%. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) also decreased. The browse trend is also down. Mountain big sagebrush density declined 35%. The ratio of living to dead plants was very high at 1:1.9. Decadence was slightly better than 2000, but was still high at 42%. Plants classified as dying also increased from 20% to 27%. Broom snakeweed density declined, but it appears the population has matured and plants were much bigger. Snakeweed cover increased and was higher than 10%. Strip frequency for snakeweed increased from 75 to 81%. The herbaceous understory trend is slightly down. Sum of nested frequency for grasses and forbs combined decreased 25%. Grasses only decreased very slightly, but there was a major decline for forbs. The DCI score rated this site as fair due to a large decrease in browse cover.

TREND ASSESSMENT

soil - slightly down (-1)

browse - down (-2)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - fair (55) Mid-level potential scale

HERBACEOUS TRENDS --

Management unit 10R, Study no: 9

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron dasystachyum	_b 340	_{ab} 324	_a 296	3.00	4.00	4.88
G	Bouteloua gracilis	26	37	39	.93	1.74	2.40
G	Koeleria cristata	_c 152	_a 45	_b 84	1.75	.48	1.77
G	Poa fendleriana	_a 171	_b 249	_a 184	2.79	5.97	3.26

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
		G	<i>Poa secunda</i>	_b 191	_c 251	_a 43	2.06
G	<i>Stipa comata</i>	_b 56	_a 11	_c 177	.26	.07	4.30
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		936	917	823	10.83	16.03	17.12
Total for Grasses		936	917	823	10.83	16.03	17.12
F	<i>Agoseris glauca</i>	-	-	-	-	-	.00
F	<i>Antennaria rosea</i>	_b 28	_b 25	_a 1	.53	.32	.00
F	<i>Arabis</i> sp.	_b 17	_a 2	_a 1	.03	.00	.00
F	<i>Arenaria fendleri</i>	-	3	-	-	.00	-
F	<i>Astragalus convallarius</i>	12	10	9	.02	.05	.08
F	<i>Astragalus lentiginosus</i>	-	-	1	-	-	.00
F	<i>Castilleja linariaefolia</i>	7	3	-	.04	.00	-
F	<i>Crepis acuminata</i>	4	-	1	.03	-	.03
F	<i>Cryptantha</i> sp.	4	-	6	.04	-	.04
F	<i>Eriogonum alatum</i>	-	-	4	-	-	.03
F	<i>Erigeron eatonii</i>	_b 30	_b 16	_a -	.06	.06	-
F	<i>Erigeron pumilus</i>	_a -	_c 48	_b 14	-	.19	.14
F	<i>Hymenoxys acaulis</i>	-	-	6	-	-	.06
F	<i>Lesquerella</i> sp.	22	13	19	.10	.20	.06
F	<i>Lithospermum</i> sp.	-	2	-	-	.00	-
F	<i>Lygodesmia grandiflora</i>	1	-	-	.03	-	-
F	<i>Machaeranthera grindelioides</i>	-	-	2	-	-	.03
F	<i>Penstemon caespitosus</i>	_b 64	_b 54	_a -	1.02	.94	-
F	<i>Petroradia pumila</i>	-	3	-	-	.03	-
F	<i>Physaria acutifolia</i>	-	3	-	-	.15	-
F	<i>Phlox austromontana</i>	_b 190	_b 228	_a 65	2.20	3.54	.62
F	<i>Phlox longifolia</i>	_b 56	_a 22	_a 6	.15	.06	.02
F	<i>Sphaeralcea coccinea</i>	_a 78	_b 104	_c 126	.70	.61	2.48
F	<i>Townsendia</i> sp.	-	-	4	-	-	.01
Total for Annual Forbs		0	0	0	0	0	0
Total for Perennial Forbs		513	536	265	4.98	6.19	3.62
Total for Forbs		513	536	265	4.98	6.19	3.62

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

BROWSE TRENDS --

Management unit 10R, Study no: 9

Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	<i>Artemisia tridentata vaseyana</i>	94	98	91	12.95	15.57	9.22
B	<i>Ceratoides lanata</i>	1	2	3	.03	-	.03
B	<i>Chrysothamnus depressus</i>	6	7	4	.16	.19	.06
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	0	0	0	-	.00	-
B	<i>Gutierrezia sarothrae</i>	30	75	81	.16	2.52	10.31
B	<i>Pediocactus simpsonii</i>	6	8	8	.01	.01	-
B	<i>Pinus edulis</i>	0	2	2	.03	-	.15
B	<i>Tetradymia canescens</i>	0	1	0	-	-	-
Total for Browse		137	193	189	13.34	18.30	19.78

CANOPY COVER, LINE INTERCEPT --

Management unit 10R, Study no: 9

Species	Percent Cover
	'05
<i>Artemisia tridentata vaseyana</i>	9.25
<i>Chrysothamnus depressus</i>	.08
<i>Gutierrezia sarothrae</i>	13.08

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 10R, Study no: 9

Species	Average leader growth (in)
	'05
<i>Artemisia tridentata vaseyana</i>	1.9

BASIC COVER --

Management unit 10R, Study no: 9

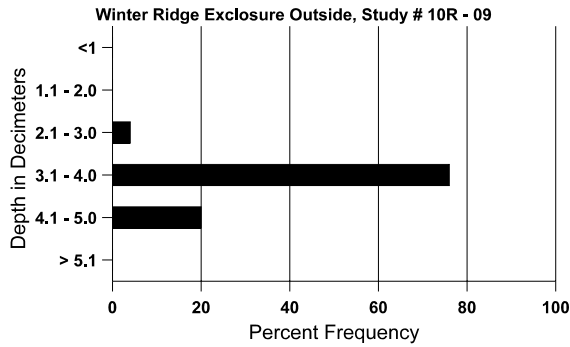
Cover Type	Average Cover %		
	'97	'00	'05
Vegetation	31.92	40.52	37.43
Rock	.11	.04	.05
Pavement	.54	.18	.07
Litter	25.17	33.08	29.99
Cryptogams	15.88	12.26	1.79
Bare Ground	31.46	35.23	42.84

SOIL ANALYSIS DATA --

Herd Unit 10R, Study no: 09, Study Name: Winter Ridge Exclosure Outside

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
15.4	61.2 (14.6)	7.2	35.6	38.8	25.6	1.4	5.4	3.2	0.5

Stoniness Index



PELLET GROUP DATA --

Management unit 10R, Study no: 9

Type	Quadrat Frequency		
	'97	'00	'05
Rabbit	14	5	20
Horse	-	-	5
Elk	24	15	24
Deer	4	9	9
Cattle	2	3	8

Days use per acre (ha)	
'00	'05
-	-
-	5 (13)
22 (55)	32 (79)
2 (5)	2 (5)
19 (47)	7 (16)

BROWSE CHARACTERISTICS --

Management unit 10R, Study no: 9

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata vaseyana</i>												
97	6920	40	220	5060	1640	1600	53	25	24	10	10	21/27
00	7960	60	660	3220	4080	1520	44	30	51	20	20	20/22
05	5140	740	140	2860	2140	2740	49	9	42	27	27	19/23
<i>Ceratoides lanata</i>												
97	20	-	-	20	-	-	0	0	-	-	0	6/6
00	40	-	-	40	-	-	0	100	-	-	0	4/5
05	80	-	-	80	-	-	0	100	-	-	0	3/4

		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 depressus												
97	260	-	40	220	-	-	0	0	0	-	0	3/7
00	420	-	100	260	60	-	0	5	14	10	10	3/7
05	280	-	-	240	40	-	100	0	14	-	0	3/7
Gutierrezia sarothrae												
97	1440	-	160	1280	-	-	0	0	0	-	0	5/6
00	19460	1140	5380	14020	60	220	0	0	0	-	0	4/4
05	8040	520	2560	5420	60	-	0	0	1	.24	.24	7/9
Opuntia sp.												
97	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	4/5
05	0	-	-	-	-	-	0	0	-	-	0	-/-
Pediocactus simpsonii												
97	120	-	20	100	-	-	0	0	-	-	0	1/3
00	200	-	100	100	-	-	0	0	-	-	0	1/2
05	300	-	-	300	-	20	0	0	-	-	0	1/2
Pinus edulis												
97	0	-	-	-	-	-	0	0	-	-	0	-/-
00	40	-	40	-	-	-	0	0	-	-	0	-/-
05	40	-	40	-	-	-	0	0	-	-	0	-/-
Tetradymia canescens												
97	0	-	-	-	-	-	0	0	-	-	0	-/-
00	20	-	20	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-

WINTER RIDGE EXCLOSURE COMPARISON SUMMARY

Trend Study No. 10R-9 (outside), 10R-10 (livestock), and 10R-11 (total)

Ground cover characteristics are similar between the livestock enclosure and outside of the enclosure where percent bare ground is relatively high, yet litter and vegetation cover are abundant and appear adequate to protect the soil. Inside the total enclosure, herbaceous cover is more abundant and percent bare ground lower.

The key browse for this study area is mountain big sagebrush (Tables 1 and 2). Sagebrush density decreased outside the enclosure and inside the total enclosure in 2005. Sagebrush density was nearly equal for each study in 2005 at about 5,400 plants/acre. Sagebrush cover was much higher in the total enclosure where no browsing takes place. Cover was 22% in 2005 in the total enclosure, compared to 9% outside and 10% in the livestock enclosure. Plants in the total enclosure were on average much larger (28 inches tall, 32 inches crown width) than those that can be browsed outside the enclosure (19/23 inches) or in the livestock enclosure (22/26 inches). Percent decadence and percent dying were similar for each study. Decadency and plants classified as dying increased in 2005 compared to 2000. This shows the impact of the recent drought as each study was similarly effected. Percent young was also similar for each study in 2005.

	<u>Outside Enclosure</u>	<u>Livestock Enclosure</u>	<u>Total Enclosure</u>
Mountain big sagebrush			
Average Cover %	15.6	14.8	20.1
Density (plants/acre)	7,960	4,720	7,460
% young	8% (660/acre)	11% (540cre)	6% (460/acre)
% decadent	51% (4,080/acre)	23% (1,080/acre)	51% (3,840/acre)
% dying	20% (1,560/acre)	15% (720/acre)	6% (460/acre)
% heavy use	30% (2,360/acre)	7% (320/acre)	0% (0/acre)
Average height/crown	20/22	30/33	30/31

Table 1. Mountain big sagebrush data comparisons for Winter Ridge Enclosure complex in 2000.

	<u>Outside Enclosure</u>	<u>Livestock Enclosure</u>	<u>Total Enclosure</u>
Mountain big sagebrush			
Average Cover %	9.2	10.4	22.0
Density (plants/acre)	5,140	5,600	5,360
% young	3% (140/acre)	4% (240/acre)	2% (120/acre)
% decadent	42% (2,140/acre)	39% (2,200/acre)	37% (2,000/acre)
% dying	20% (1,380/acre)	23% (1,260/acre)	18% (980/acre)
% heavy use	9% (480/acre)	16% (900/acre)	0% (0/acre)
Average height/crown	19/23	22/26	28/32

Table 2. Mountain big sagebrush data comparisons for Winter Ridge Enclosure complex in 2005.

The herbaceous understories are relatively abundant and diverse on all treatment effects with perennial grasses dominating the herbaceous understory. Six grass species are common to each study site, but vary in their abundance (Tables 3 and 4). The most common species include: thickspike wheatgrass, blue grama, prairie Junegrass, mutton bluegrass, Sandberg bluegrass, and needle-and-thread grass. A major difference between the three site treatment effects is the abundance of mutton bluegrass in the total enclosure. In 2000, it provided 69% of the grass cover in the total enclosure with a cover value nearly 4 times more than outside of the enclosure and 7 times more than the livestock enclosure. In 2005, mutton bluegrass declined, but was still the most abundant species in the total enclosure. Prairie junegrass was much more abundant in the livestock and total enclosure, which shows its sensitivity to spring grazing. The only warm season species, blue grama, was slightly more abundant outside the enclosure where cool season species are grazed in the spring. Forbs are diverse on all sites, but only provided about 3-4% cover in 2005. The most common forb for all sites is desert phlox.

Species	Nested Frequency 2000			Average Cover % 2000		
	<i>Outside</i>	<i>Livestock</i>	<i>Total Ex.</i>	<i>Outside</i>	<i>Livestock</i>	<i>Total Ex.</i>
G Agropyron dasystachyum	400	227	287	5.98	3.01	4.11
G Bouteloua gracilis	50	15	42	2.45	.51	2.17
G Koeleria cristata	56	255	114	.84	10.16	3.57
G Poa fendleriana	271	158	352	6.46	3.38	24.99
G Poa secunda	286	99	99	4.77	1.02	1.23
G Stipa comata	14	10	17	.10	.13	.13
Total for Grasses	1077	770	911	20.63	18.53	36.21

Table 3. Comparisons of grass abundance by species for Winter Ridge outside enclosure, livestock enclosure, and total enclosure in 2000.

Species	Nested Frequency 2005			Average Cover % 2005		
	<i>Outside</i>	<i>Livestock</i>	<i>Total Ex.</i>	<i>Outside</i>	<i>Livestock</i>	<i>Total Ex.</i>
G Agropyron dasystachyum	296	282	227	4.88	4.45	3.15
G Bouteloua gracilis	39	21	35	2.40	1.08	1.01
G Koeleria cristata	84	262	211	1.77	8.50	10.11
G Poa fendleriana	184	177	266	3.26	5.25	14.99
G Poa secunda	43	92	7	.50	1.29	.16
G Stipa comata	177	58	108	4.30	2.11	4.51
Total for Grasses	823	897	854	17.12	22.74	33.95

Table 4. Comparisons of grass abundance by species for Winter Ridge outside enclosure, livestock enclosure, and total enclosure in 2005.

It is difficult much of the time to determine which of many factors may be the most influential in effecting the trend for a key species. Transects were established in 1997 and read again in 2000 and 2005 for this relatively

high elevation three-way exclosure. When comparing the effects of the different grazing treatments on this area it appears that drought has the biggest effect on the sagebrush population as sagebrush density for each treatment was similar in 2005 and had declined after drought. Browsing does appear to have an effect on sagebrush cover as the unbrowsed plants were on average larger and provided more cover. Grazing has appeared to effect the abundance of some of the grass species. Mutton bluegrass and prairie junegrass decreased when grazed and were more abundant when protected from grazing.