

LOWER MCCOOK RIDGE TOTAL EXCLOSURE - TREND STUDY NO. 10R-14-10

Vegetation Type: Desert Shrub

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: Upland Stony Loam (Wyoming Big Sagebrush), R034XY334UT

Land Ownership: BLM

Elevation: 6580 ft. (2006 m)

Aspect: Southwest

Slope: 4%

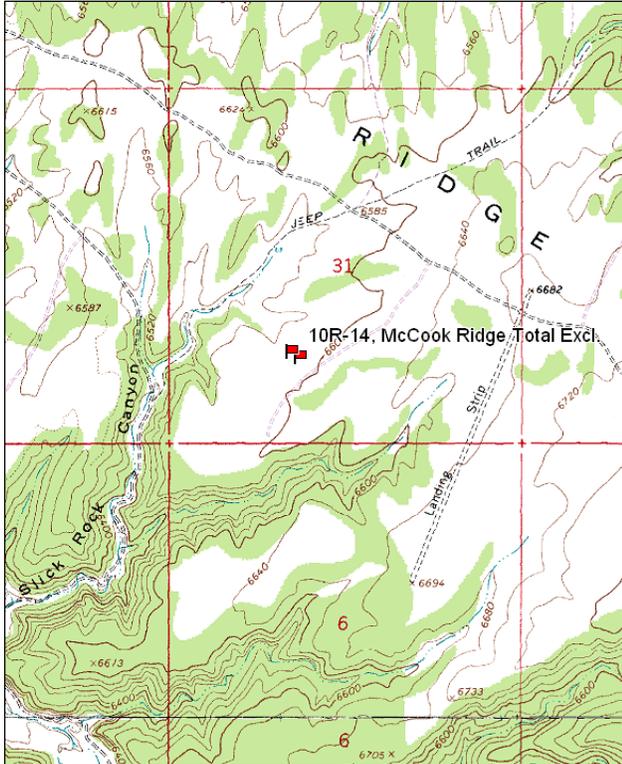
Transect bearing: 83° magnetic

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

Directions:

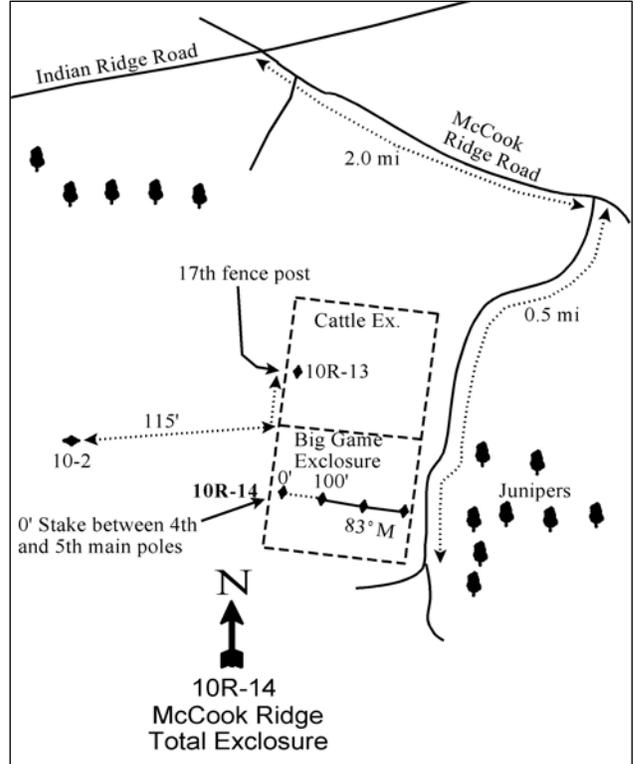
From Ouray, go 38 miles south to the McCook Ridge-Indian Ridge turnoff. Turn left (east) and travel on the Indian Ridge road towards Sweetwater Canyon and McCook Ridge 9.1 miles to the intersection of Cooper Canyon, Indian Ridge and McCook Ridge. From Indian Ridge road, turn southeast and proceed up McCook Ridge approximately 2 miles to road on the right (A large enclosure can be seen off the south side of the road.). Turn right and drive approximately 0.5 miles to the enclosure. Go inside the total enclosure. The 0-foot stake is on the west side between the 4<sup>th</sup> and 5<sup>th</sup> main poles of the fence. The 0-foot stake is marked with browse tag #78.

Map Name: Cooper Canyon



Township: 13S Range: 24E Section: 31

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 647975 E 4389151 N

## LOWER MCCOOK RIDGE TOTAL EXCLOSURE - TREND STUDY NO. 10R-14

### Site Information

Site Description: The study is located within the Lower McCook Ridge enclosure complex that was constructed in 1964. The enclosure complex is within the Lower McCook allotment, which is managed by the Bureau of Land Management (BLM). The trend study was established in 1997 and samples inside of the total enclosure, which excludes grazing. Parts of the enclosure were in poor repair in 2005, but were fixed between the 2005 and 2010 sample years. As a result, evidence of deer entering the enclosure was noted in 2005 with deer pellet groups sampled in 16% of the quadrats. Rabbit use was also very high in 2005 (Table - Pellet Group Data).

Browse: There is a good mixture of preferred browse species in the enclosure including: basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), fringed sagebrush (*A. frigida*), fourwing saltbush (*Atriplex canescens*) and winterfat (*Ceratoides lanata*). Big sagebrush on the site has characteristics of basin big sagebrush and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Identification was difficult due to the level of hybridization resulting in all sagebrush being classified as basin big sagebrush. Winterfat has the highest browse density in the total enclosure, but winterfat density has steadily decreased since 2000. Fourwing saltbush has also decreased in density since 1997 (Table - Browse Characteristics), but cover has fluctuated with a low of 2% in 2005 and a high of 12% in 2000 (Table - Browse Trends). Big sagebrush density has also fluctuated on the site, mostly due to fluctuations in the recruitment of young sagebrush plants with most of the population comprised of young plants in most sample years. The big sagebrush population has had low decadence and good vigor over the course of the study. Fringed sagebrush is abundant with a mostly mature population that has had low decadence, good vigor and good recruitment of young plants (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses are limited within the enclosure and the herbaceous component is dominated by cheatgrass (*Bromus tectorum*). Cheatgrass nested frequency and cover decreased substantially in 2000, but has been very high in all other sample years. The only common perennial grass is thickspike wheatgrass (*Agropyron dasystachyum*). Perennial forbs are also limited within the enclosure with the most common species being scarlet globemallow (*Sphaeralcea coccinea*) and prickly lettuce (*Lactuca serriola*).

Soil: The soil texture is clay loam with a neutral soil reaction (pH 6.7) (Table - Soil Analysis Data). Bare ground cover is low with good protective ground cover. Most of the protective ground cover comes from vegetation and litter, with much of this provided by cheatgrass (Table - Basic Cover). There appears to be a soil gradient with deeper soils down slope (west) and more shallow soils up slope (east). It was observed that less cheatgrass and an increase of young basin big sagebrush plants were associated with the more shallow soils, while the opposite was observed with the deeper soils. Past erosion is apparent with pedestaling around shrubs, yet there are no signs of recent erosion events. The soil erosion condition was classified as stable in 2005 and 2010.

### Trend Assessments

Browse:

- **1997 to 2000 - stable (0):** Density of winterfat increased slightly, but cover remained the similar. Decadence of winterfat increased from 8% to 37%, though vigor remained good. Fourwing saltbush remained similar in density, but cover increased from 7% to 13%. Big sagebrush had a large increase in density with high recruitment of young plants.
- **2000 to 2005 - down (-2):** The densities of winterfat and fourwing saltbush have decreased and cover of the two species decreased to 4% and 2%, respectively. Decadence of fourwing saltbush increased from 40% to 91% and poor vigor increased from 5% to 72%. Big sagebrush density declined, but the number of mature plants has increased with each reading. It appears many of the young plants from

1997 and 2000 have been successfully established into the population, though recruitment of young sagebrush plants was low in 2005.

- **2005 to 2010 - slightly down (-1):** There was a large decrease in the densities of winterfat and fourwing saltbush, though cover of fourwing saltbush increased to 7% and there was little change in the cover of winterfat. Decadence and poor vigor of fourwing saltbush both decreased markedly to 18%. Big sagebrush density and cover increased with a large increase in the recruitment of young plants.

Grass:

- **1997 to 2000 - up (+2):** The sum of nested frequency of perennial grasses had a large increase and cover increased to over 1%. However, perennial grasses remained rare on the site. There was a significant decrease in the nested frequency of cheatgrass and cover decreased from 29% to 2%.
- **2000 to 2005 - slightly down (-1):** There was little change in the sum of nested frequency of perennial grasses, but cover decreased to less than 1%. Cheatgrass increased significantly in nested frequency and cover increased to 24%.
- **2005 to 2010 - slightly up (+1):** Cheatgrass increased significantly in nested frequency and still dominated the site at 27%. However, there was a large increase in the sum of nested frequency and cover of perennial grasses due to a significant increase in the nested frequency of thickspike wheatgrass with a subsequent increase in cover from less than 1% to 5%.

Forb:

- **1997 to 2000 - up (+2):** The sum of nested frequency of perennial forbs increased four-fold and cover increased to 2%.
- **2000 to 2005 - down (-2):** The perennial forb sum of nested frequency decreased to 1997 levels and perennial forbs provided almost no cover.
- **2005 to 2010 - slightly up (+1):** The perennial forb sum of nested frequency doubled, but perennial forbs remain very rare on the site. Perennial forb cover increased to 1%.

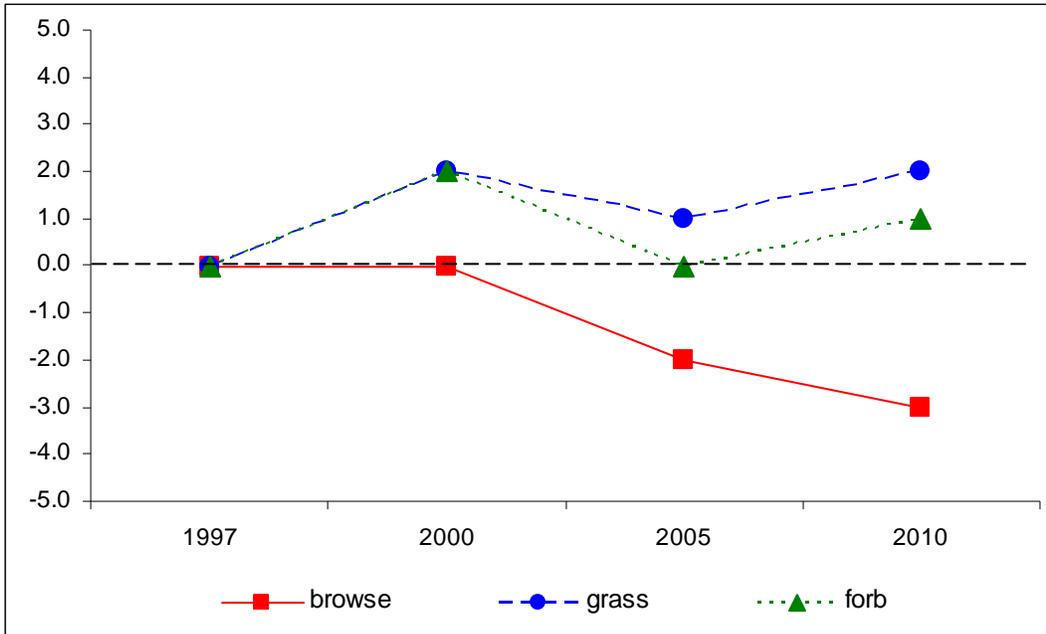
DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 10R, study no: 14

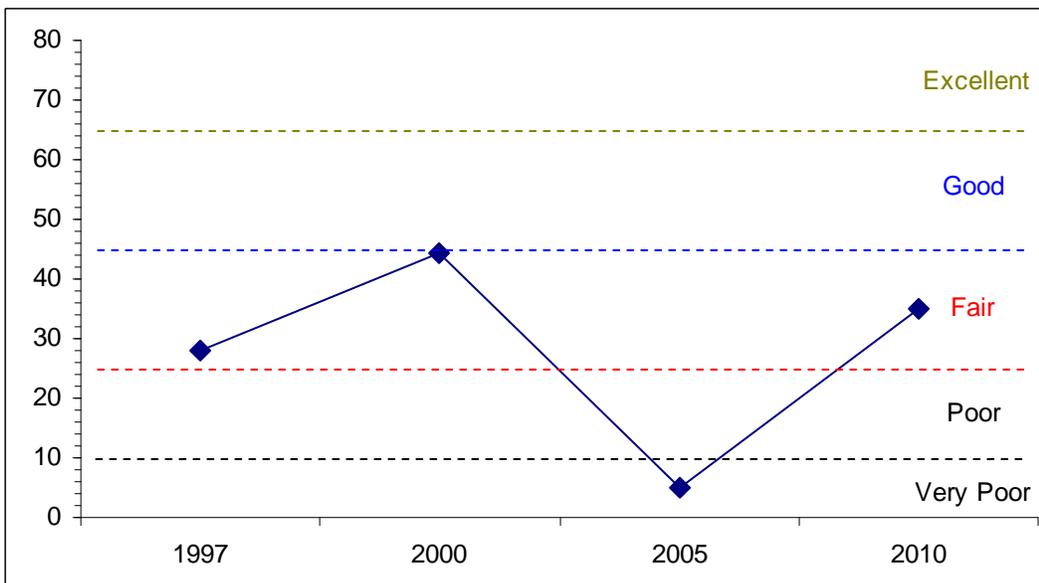
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
97	30.0	9.9	6.2	1.1	-20.0	0.8	0.0	<b>28.0</b>	Fair
00	30.0	5.9	4.2	2.3	-1.6	3.7	0.0	<b>44.5</b>	Fair-Good
05	11.0	7.6	3.1	1.0	-17.8	0.1	0.0	<b>5.0</b>	Very Poor
10	20.2	12.3	10.9	9.5	-20.0	2.0	0.0	<b>34.9</b>	Fair

## Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--  
Management unit 10R, Study no: 14



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--  
Management unit 10R, Study no: 14



HERBACEOUS TRENDS--

Management unit 10R, Study no: 14

Type	Species	Nested Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
G	Agropyron dasystachyum	a <sup>5</sup>	a <sup>23</sup>	a <sup>26</sup>	b <sup>71</sup>	.15	.84	.31	4.49
G	Bromus tectorum (a)	d <sup>473</sup>	a <sup>178</sup>	b <sup>369</sup>	c <sup>422</sup>	28.89	2.16	23.75	26.81
G	Oryzopsis hymenoides	-	-	-	4	-	-	-	.15
G	Poa secunda	9	11	15	5	.36	.12	.13	.06
G	Sitanion hystrix	1	6	4	4	.03	.18	.06	.03
Total for Annual Grasses		473	178	369	422	28.89	2.16	23.75	26.81
Total for Perennial Grasses		15	40	45	84	0.54	1.14	0.49	4.73
Total for Grasses		488	218	414	506	29.44	3.30	24.24	31.55
F	Descurainia pinnata (a)	a <sup>16</sup>	a <sup>25</sup>	b <sup>52</sup>	a <sup>5</sup>	.23	.13	.92	.01
F	Draba sp. (a)	-	2	-	-	-	.00	-	-
F	Lactuca serriola	a <sup>-</sup>	b <sup>61</sup>	a <sup>-</sup>	a <sup>7</sup>	-	.88	-	.04
F	Lappula occidentalis (a)	a <sup>3</sup>	a <sup>5</sup>	b <sup>137</sup>	c <sup>178</sup>	.01	.01	2.61	1.91
F	Orobancha fasciculata	-	-	-	2	-	-	-	.00
F	Schoenrambe linifolia	-	-	4	1	-	-	.01	.00
F	Sisymbrium altissimum (a)	-	1	1	-	-	.00	.03	-
F	Sphaeralcea coccinea	ab <sup>25</sup>	ab <sup>31</sup>	a <sup>16</sup>	b <sup>39</sup>	.31	.36	.06	.95
F	Taraxacum officinale	-	-	-	-	.00	-	-	-
F	Tragopogon dubius	b <sup>9</sup>	c <sup>45</sup>	a <sup>-</sup>	a <sup>-</sup>	.07	.61	-	-
Total for Annual Forbs		19	33	190	183	0.24	0.15	3.56	1.92
Total for Perennial Forbs		34	137	20	49	0.38	1.85	0.07	1.00
Total for Forbs		53	170	210	232	0.63	2.01	3.64	2.93

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

BROWSE TRENDS--

Management unit 10R, Study no: 14

Type	Species	Strip Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
B	Artemisia frigida	41	58	44	46	2.42	5.33	.59	3.82
B	Artemisia tridentata tridentata	7	6	7	8	1.33	2.62	2.53	3.12
B	Atriplex canescens	45	44	32	27	7.39	12.48	2.00	7.08
B	Ceratoides lanata	94	93	88	72	13.34	13.75	3.83	2.94
B	Opuntia sp.	0	0	0	1	-	-	-	-
Total for Browse		187	201	171	154	24.50	34.18	8.96	16.97

CANOPY COVER, LINE INTERCEPT--

Management unit 10R, Study no: 14

Species	Percent Cover	
	'05	'10
Artemisia frigida	.61	4.09
Artemisia tridentata tridentata	3.04	4.63
Atriplex canescens	3.56	9.83
Ceratoides lanata	4.43	3.63

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 10R, Study no: 14

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata tridentata	3.6	2.1
Atriplex canescens	5.2	3
Ceratoides lanata	5.2	2.3

BASIC COVER--

Management unit 10R, Study no: 14

Cover Type	Average Cover %			
	'97	'00	'05	'10
Vegetation	51.66	38.90	37.27	47.98
Rock	.13	.01	.11	0
Pavement	1.81	.74	1.84	.74
Litter	61.01	76.09	45.46	76.22
Cryptogams	3.45	.23	.09	.13
Bare Ground	7.03	10.85	27.53	5.23

SOIL ANALYSIS DATA --

Management unit 10R, Study no: 14, Study Name: McCook Ridge Total Enclosure

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
25.9	6.7	31.0	37.8	31.2	5.0	7.2	153.6	0.7

PELLET GROUP DATA--

Management unit 10R, Study no: 14

Type	Quadrat Frequency			
	'97	'00	'05	'10
Rabbit	2	6	82	26
Elk	-	-	1	-
Deer	-	-	16	-

BROWSE CHARACTERISTICS--

Management unit 10R, Study no: 14

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia frigida									
97	<b>2320</b>	9	90	1	-	0	0	0	15/16
00	<b>4620</b>	13	80	6	2060	0	0	0	6/13
05	<b>3140</b>	22	78	1	60	26	0	.63	4/6
10	<b>4120</b>	25	75	0	140	0	0	0	10/13
Artemisia tridentata tridentata									
97	<b>640</b>	81	19	0	2480	0	0	0	33/37
00	<b>1200</b>	68	32	0	80	0	0	0	30/31
05	<b>700</b>	6	86	9	-	14	0	0	37/45
10	<b>1260</b>	63	29	8	40	0	0	8	40/52

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Atriplex canescens</i>										
97	<b>1280</b>	2	58	41	-	0	0	14	34/40	
00	<b>1160</b>	0	60	40	-	2	0	5	38/52	
05	<b>920</b>	2	7	91	20	2	2	72	37/40	
10	<b>680</b>	6	76	18	-	3	0	18	35/52	
<i>Ceratoides lanata</i>										
97	<b>8020</b>	12	80	8	-	0	0	2	23/18	
00	<b>9060</b>	3	60	37	20	0	.22	2	17/19	
05	<b>8860</b>	6	90	4	-	24	19	4	10/11	
10	<b>4560</b>	12	86	1	20	.87	.87	1	11/12	
<i>Juniperus osteosperma</i>										
97	<b>0</b>	0	0	-	-	0	0	0	-/-	
00	<b>0</b>	0	0	-	20	0	0	0	-/-	
05	<b>0</b>	0	0	-	-	0	0	0	-/-	
10	<b>0</b>	0	0	-	-	0	0	0	-/-	
<i>Opuntia sp.</i>										
97	<b>0</b>	0	0	-	-	0	0	0	-/-	
00	<b>0</b>	0	0	-	-	0	0	0	-/-	
05	<b>0</b>	0	0	-	-	0	0	0	-/-	
10	<b>20</b>	0	100	-	-	0	0	0	4/2	

LOWER MCCOOK RIDGE EXCLOSURE COMPARISON  
TREND STUDY NO. 10-2, 10R-13 & 10R-14

**Site Information**

Site Description: The Lower McCook Ridge area is important big game winter range. Several important key browse species are present in the area including big sagebrush (*Artemisia spp.*), winterfat (*Ceratoides lanata*) and fourwing saltbush (*Atriplex canescens*). The site is located on a broad swale that slopes gently to the northwest. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Lower McCook allotment. Wildlife use has fluctuated markedly throughout the sample years. Pellet group data indicates that deer use is typically higher within the livestock enclosure (10R-13) than outside the enclosure (10-2). Deer use was extremely heavy both outside the enclosure and in the livestock enclosure in 2005, but decreased to light levels on both studies in 2010. Estimated elk use was heavy at the outset of the study in 1997, but has been light to moderate both outside the enclosure and within the livestock enclosure since 2000. Cattle use appears to be light in the area (Table 1).

Browse: Big sagebrush was classified as basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), but is most likely a hybrid between basin big sagebrush and Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*). Sagebrush outside the enclosure and within the livestock enclosure typically display moderate to heavy use. Density and cover of sagebrush varies between the enclosures with the total enclosure (10R-14) having the lowest density of sagebrush plants, the livestock enclosure having the highest and outside the enclosure being intermediate. Recruitment of young sagebrush plants has generally been very good across all three studies, but was poor in 2005. Decadence is higher outside the enclosure and within the livestock enclosure than it is within the total enclosure (Table 2).

At the outset of the studies in 1997, winterfat had the highest density and cover inside the total enclosure with lower rates outside the enclosure and inside the livestock enclosure. There was a general decline in winterfat on all three studies in 2010, but particularly so within the total enclosure. Cover and density of winterfat were similar on all three studies in 2010. Winterfat cover was about six times greater in the total enclosure than in both the livestock enclosure and outside the enclosure in 2000, but cover within the total enclosure decreased substantially in 2005. Recruitment of young winterfat plants was somewhat low on all three studies from 1997 to 2005, but there was a large increase in recruitment outside the enclosure in 2010 with slight increases in recruitment within both the livestock enclosure and total enclosure. Average height and crown measurements also show winterfat inside the total enclosure to be larger than the winterfat in either of the other two studies. With the highest density, highest cover, and largest individuals occurring inside the total enclosure, it is likely that competition is greater here and may be responsible for the highest rate of decadence inside the total enclosure (Table 4).

Fourwing saltbush has similar densities in the total and livestock enclosures, with a lower density outside the enclosure. There was a large increase in cover on all three studies in 2000, but density of fourwing saltbush has declined on the studies throughout the study years. Percent decadence has been high for each transect in each reading. As with winterfat, the high decadence of fourwing saltbush is likely due more to drought and/or competition rather than utilization (Table 3).

Herbaceous Understory: Perennial grasses and forbs are neither abundant nor diverse on the studies (Table 5). Cheatgrass (*Bromus tectorum*) is the dominant herbaceous species on all three of the transects with the highest levels within the total enclosure and the lowest outside of the enclosure. The herbaceous understories have been similar for each transect.

Soil: Soils within the livestock enclosure and total enclosure have a clay loam texture and neutral pH. Soils on the transect outside the enclosure have a loam texture and a slightly alkaline pH. Basic ground cover is similar between the studies with high amounts of vegetation and litter cover, though bare ground cover is lower within the total enclosure than on the other two transects.

## Exclosure Complex Summary

Study Name	Year	Deer	Elk	Cattle
		days use/acre (ha)	days use/acre (ha)	days use/acre (ha)
Outside Exclosure (10-2)	1997	38 (94)	51 (126)	12 (29)
	2000	27 (67)	28 (68)	--
	2005	86 (212)	8 (20)	7 (18)
	2010	19 (48)	19 (46)	--
Livestock Exclosure (10R-13)	1997	59 (146)	96 (237)	--
	2000	64 (158)	12 (30)	--
	2005	166 (410)	26 (65)	--
	2010	23 (58)	15 (36)	--

**Table 1.** Pellet group transect data estimated use for the Lower McCook Ridge exclosure complex.

Study Name	Year	Percent Cover	Density Plants/acre	Percent Young	Percent Mature	Percent Decadent	Ave. height/crown
				(Plants/acre)	(Plants/acre)	(Plants/acre)	(in)
Outside Exclosure (10-2)	1997	9.15	3040	14	66	20	21/28
	2000	12.00	3980	32	43	26	19/29
	2005	10.66	3500	5	59	35	24/31
	2010	9.66	3940	32	46	22	23/32
Livestock Exclosure (10R-13)	1997	13.35	5780	31	58	10	24/29
	2000	21.68	6900	14	54	31	20/26
	2005	15.86	6600	4	56	40	21/27
	2010	8.65	4860	43	50	7	23/30
Total Exclosure (10R-14)	1997	1.33	640	81	19	0	33/37
	2000	2.62	1200	68	32	0	30/31
	2005	2.53	700	6	86	9	37/45
	2010	3.12	1260	63	29	8	40/52

**Table 2.** Browse characteristics of basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) for the Lower McCook Ridge exclosure study sites.

Study Name	Year	Percent Cover	Density Plants/acre	Percent Young	Percent Mature	Percent Decadent	Ave. height/crown
				(Plants/acre)	(Plants/acre)	(Plants/acre)	(in)
Outside Exclosure (10-2)	1997	0.73	240	8	50	42	29/28
	2000	2.55	700	0	60	40	31/35
	2005	1.04	640	6	28	66	23/36
	2010	0.26	480	33	21	46	17/20
Livestock Exclosure (10R-13)	1997	3.79	880	7	32	61	30/35
	2000	5.64	1100	0	33	67	31/38
	2005	1.32	900	4	13	82	22/20
	2010	2.87	680	12	50	38	31/36
Total Exclosure (10R-14)	1997	7.39	1280	2	58	41	34/40
	2000	12.48	1160	0	60	40	38/52
	2005	2.00	920	2	7	91	37/40
	2010	7.08	680	6	76	18	35/52

**Table 3.** Browse characteristics of fourwing saltbush (*Atriplex canescens*) for the Lower McCook Ridge exclosure study sites.

Study Name	Year	Percent Cover	Density <i>Plants/acre</i>	Percent Young <i>(Plants/acre)</i>	Percent Mature <i>(Plants/acre)</i>	Percent Decadent <i>(Plants/acre)</i>	Ave. height/crown <i>(in)</i>
Outside Exclosure (10-2)	1997	2.08	7620	10	90	0	8/9
	2000	2.20	7020	3	87	10	8/9
	2005	2.25	8020	3	95	1	6/7
	2010	2.05	4400	35	65	1	8/9
Livestock Exclosure (10R-13)	1997	3.03	4960	8	88	3	10/11
	2000	2.51	5920	2	84	14	8/8
	2005	1.57	6200	7	84	9	5/6
	2010	1.14	3460	13	86	1	9/9
Total Exclosure (10R-14)	1997	13.34	8020	12	80	8	23/18
	2000	13.75	9060	3	60	37	17/19
	2005	3.83	8860	6	90	4	10/11
	2010	2.94	4560	12	86	1	11/12

**Table 4.** Browse characteristics of winterfat (*Ceratoides lanata*) for the Lower McCook Ridge exclosure study sites.

Study Name	Year	Perennial Grass Species			Perennial Forb Species		
		<i>n</i>	<i>Sum of Nested Frequency</i>	<i>Percent Cover</i>	<i>n</i>	<i>Sum of Nested Frequency</i>	<i>Percent Cover</i>
Outside Exclosure (10-2)	1997	3	177	2.29	5	153	1.39
	2000	5	247	7.93	4	175	2.71
	2005	4	225	3.47	3	99	1.04
	2010	4	173	4.00	4	122	2.09
Livestock Exclosure (10R-13)	1997	4	193	2.40	4	103	0.63
	2000	4	252	7.75	5	129	0.85
	2005	4	277	4.81	1	45	0.45
	2010	4	85	1.23	3	54	1.01
Total Exclosure (10R-14)	1997	3	15	0.54	2	34	0.38
	2000	3	40	1.14	3	137	1.85
	2005	3	45	0.49	2	20	0.07
	2010	4	84	4.73	4	49	1.00

**Table 5.** Number of species sampled (*n*), sum of nested frequency and cover of perennial grasses and perennial forbs in the three studies at the Lower McCook Ridge exclosure complex.