

LOWER MCCOOK RIDGE ENCLOSURE - TREND STUDY NO. 10-2-10

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: 6560 ft. (2000 m)

Aspect: Northwest

Slope: 4%

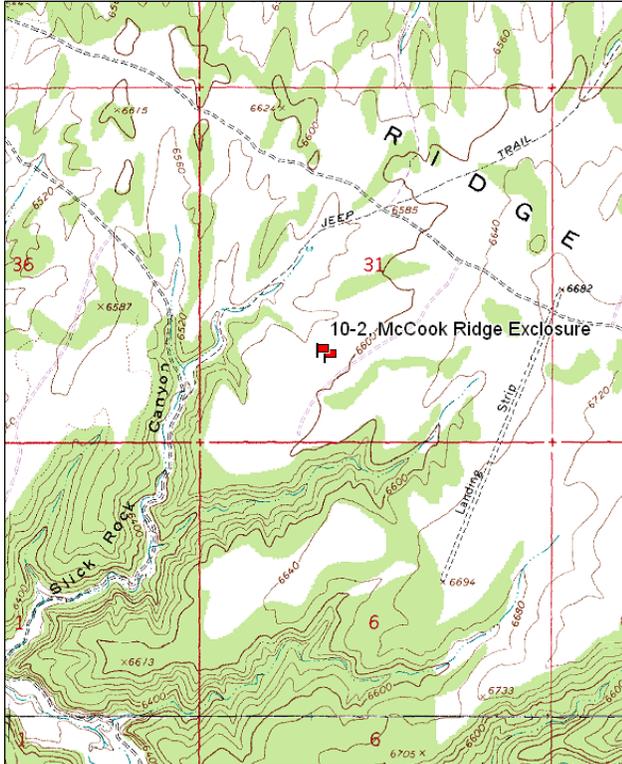
Transect bearing: 345° magnetic

Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

Directions:

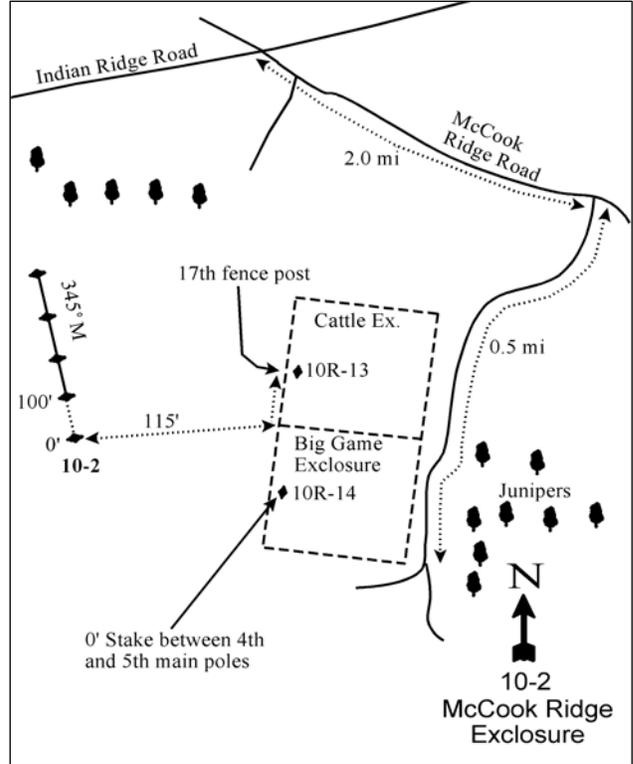
From Ouray, go 38 miles south to the McCook Ridge-Indian Ridge turnoff. Turn left (east) and travel on the Indian Ridge road 9.1 miles toward Sweetwater Canyon and McCook Ridge to the intersection of Cooper Canyon, Indian Ridge and McCook Ridge. From Indian Ridge road, turn southeast and proceed up McCook 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. From the northwest side of the deer fence on the lower McCook Ridge Enclosure, the 0-foot baseline stake is approximately 40 paces away bearing 263°M.

Map Name: Cooper Canyon



Township: 13S Range: 24E Section: 31

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 647937 E 4389176 N

## LOWER MCCOOK RIDGE EXCLOSURE - TREND STUDY NO. 10-2

### Site Information

Site Description: This study was established in 1982 and is located outside of the enclosure complex constructed in 1964 on Lower McCook Ridge. Studies in the livestock enclosure (10R-13) and total enclosure (10R-14) were established in 1997. This study was read in conjunction with the enclosure studies in 1997 with data included in the tables, but a trend was not determined for this study for the 1997 sample year. For further discussion of 1997 data, refer to the Lower McCook Ridge Exclosure Comparison section. The site is located on a broad swale that slopes gently to the northwest with the vegetation composition dominated by a mixed stand of basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), fringed sagebrush (*A. frigida*), fourwing saltbush (*Atriplex canescens*) and winterfat (*Ceratoides lanata*). The area is an important wintering area for elk and mule deer. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Lower McCook allotment. Pellet group data indicated moderate use by deer in 1997, 2000 and 2010, with heavy use in 2005. Estimated elk use was moderately heavy in 1997, moderate in 2000 and 2010, but was light in 2005. Light use by cattle was sampled in 1997 and 2005, with no cattle pats sampled in 2000 or 2010. Quadrat frequency of rabbits was high in 2005, but much lower in all other sample years (Table - Pellet Group Data).

Browse: Several key browse species exist on the site including: basin big sagebrush, winterfat, fringed sagebrush, and fourwing saltbush. Basin big sagebrush is the most abundant species, but is likely a hybrid between basin big sagebrush and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). All big sagebrush was classified as basin big sagebrush. The population of big sagebrush has had a relatively stable density, with moderate decadence and good recruitment of young plants. The proportion of big sagebrush plants displaying poor vigor increased substantially from 2000 to 2005, but was still moderately low. Utilization of big sagebrush has been mostly moderate with a few years of fairly heavy use (Table - Browse Characteristics).

Fourwing saltbush provides good quality forage, but is less abundant. Density of saltbush has been slowly, but steadily, decreasing since 1995. Decadence increased markedly from 1995 to 2000 and has been high since 2000. Poor vigor of fourwing saltbush has also increased steadily since 2000 and was high in 2010. Recruitment of young plants has been mostly poor over the course of the study, but was good in 1988, 1995 and 2010. Utilization of fourwing saltbush has been light to moderate except for 2005, which had heavier use (Table - Browse Characteristics).

Winterfat density estimates were similar from 1995 to 2005, but decreased substantially in 2010. Decadence has been mostly low with good vigor in the population. Recruitment of young plants decreased from good in 1995 to poor 2000, remained low in 2005, then increased markedly in 2010. Utilization is difficult to determine due to the abundant annual growth, but was classified as light to moderate in most sample years and heavy in 2005. The weedy species broom snakeweed (*Gutierrezia sarothrae*) is also on the site, but in fluctuating cover (Table - Browse Trends) and density (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses are deficient and consist mostly of Sandberg bluegrass (*Poa secunda*) and bottlebrush squirreltail (*Sitanion hystrix*). Two other perennial species, Indian ricegrass (*Oryzopsis hymenoides*) and thickspike wheatgrass (*Agropyron dasystachyum*), were also sampled on the site at low frequency and cover. Most perennial grasses were found under the crown of shrubs. Cheatgrass (*Bromus tectorum*) is the dominant herbaceous species on the site, but has fluctuated in cover and frequency with precipitation. Forbs are not very diverse or abundant on the site. Scarlet globemallow (*Sphaeralcea coccinea*) is the most common perennial forb and nested frequency has been stable through all readings (Table - Herbaceous Trends).

Soil: The soil is light brown loam that was alluvial deposited and has slightly alkaline soil reaction (pH 7.6). Phosphorus has a low availability for plant growth and development at 5.5 ppm (Tiedemann and Lopez 2004)

(Table - Soil Analysis Data). Bare ground cover is fairly high on the site with most of the vegetation and litter cover provided from the seasonally variable species, cheatgrass (Table - Basic Cover). There is a small wash that runs through the end of the baseline and plant pedestaling is associated with the area. The soil erosion condition was classified as slight in 2005, but stable in 2010.

## Trend Assessments

### Browse:

- **1982 to 1988 - up (+2):** The density of the primary browse species, basin big sagebrush, increased 48%, though decadence also increased from 6% to 30%. Recruitment of young sagebrush plants increased from 15% to 44% of the population. The other key species fourwing saltbush, winterfat and fringed sagebrush also increased in density.
- **1988 to 1995 - stable (0):** Differences in density may be related to the larger sample area used in 1995; therefore, trend was determined using other parameters. There was little change in decadence, vigor or recruitment of any of the key browse species on the site.
- **1995 to 2000 - slightly down (-1):** There was little change in the variables of the primary shrub, basin big sagebrush. However, the density of fourwing saltbush decreased by 29% from 980 plants/acre to 700 plants/acre, though cover increased from less than 2% to 3%. Decadence of saltbush also increased from 10% to 40% with no new recruitment of young plants sampled. The density of winterfat also decreased by 31% from a high of 10,220 plants/acre to 7,020 plants/acre, though there was little change in cover.
- **2000 to 2005 - slightly down (-1):** The density of big sagebrush decreased by 12% from 3,980 plants/acre to 3,500 plants/acre. Decadence of sagebrush increased from 26% to 35%, poor vigor increased from 9% to 24%, and recruitment of young plants decreased from 32% to 5%. Fourwing saltbush density decreased by 9% to 640 plants/acre and cover decreased from 3% to 1%. Decadence increased to 66%, poor vigor increased to 25%, and recruitment of young plants increased, but remained poor. There was a 14% increase in the density of winterfat to 8,020 plants/acre, but cover remained similar.
- **2005 to 2010 - slightly down (-1):** The density of big sagebrush increased by 13% to 3,940 plants/acre primarily due to a large recruitment of young plants. Fourwing saltbush decreased by 25% to 480 plants/acre and cover decreased to less than 1%. Winterfat density decreased by 45% to 4,400 plants/acre, though cover remained similar.

### 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 - slightly up (+1):** There was a large increase in the sum of nested frequency of perennial grasses, but most of the increase was due to a significant increase in Sandberg bluegrass which has little forage value.
- **1995 to 2000 - up (+2):** The sum of nested frequency of perennial grasses increased by 52% and cover increased from 3% to 8%. There was a significant increase in the nested frequency of bottlebrush squirreltail and a significant decrease in the nested frequency of cheatgrass.
- **2000 to 2005 - slightly down (-1):** The perennial grass sum of nested frequency decreased slightly by 9%, but cover decreased to 4% with a significant decrease in the nested frequency of bottlebrush squirreltail. Cheatgrass increased significantly in nested frequency and cover increased from 4% to 14%.
- **2005 to 2010 - down (-2):** The sum of nested frequency of perennial grasses decreased by 23%, though cover remained similar. Cheatgrass decreased significantly in nested frequency and cover decreased to 5%.

### Forb:

- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for forbs are available from 1982, so no trend was given.

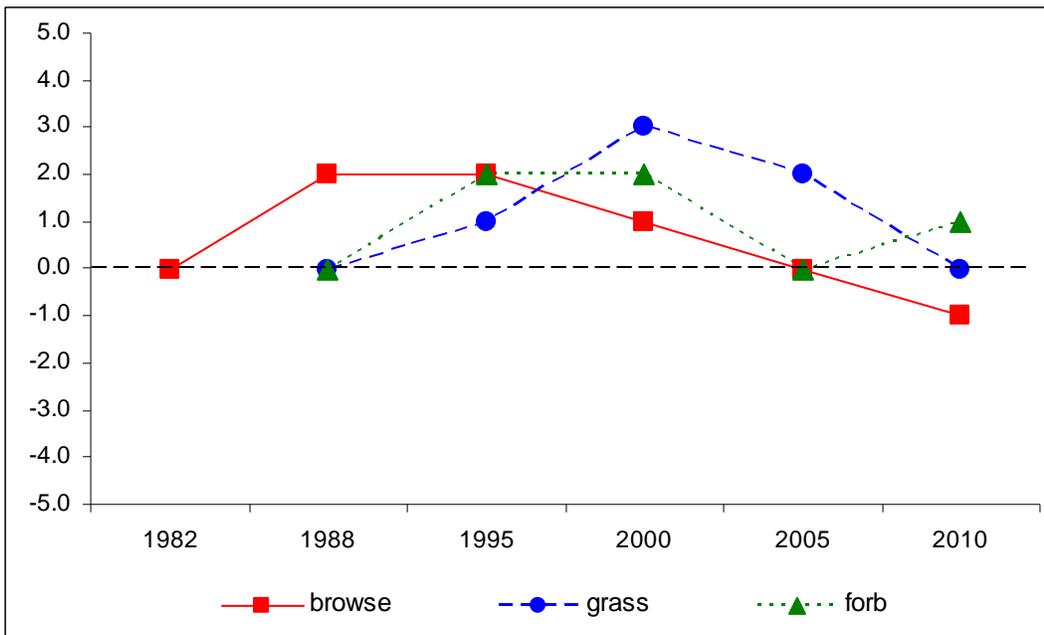
- **1988 to 1995 - up (+2):** Perennial forb sum of nested frequency increased by 34%.
- **1995 to 2000 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, but cover increased from 1% to 3% due to a large increase in cover of scarlet globemallow.
- **2000 to 2005 - down (-2):** The sum of nested frequency of perennial forbs decreased by 43% and cover decreased to 1%.
- **2005 to 2010 - slightly up (+1):** The perennial forb sum of nested frequency increased by 23% and cover increased to 2%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --  
Management unit 10, study no: 2

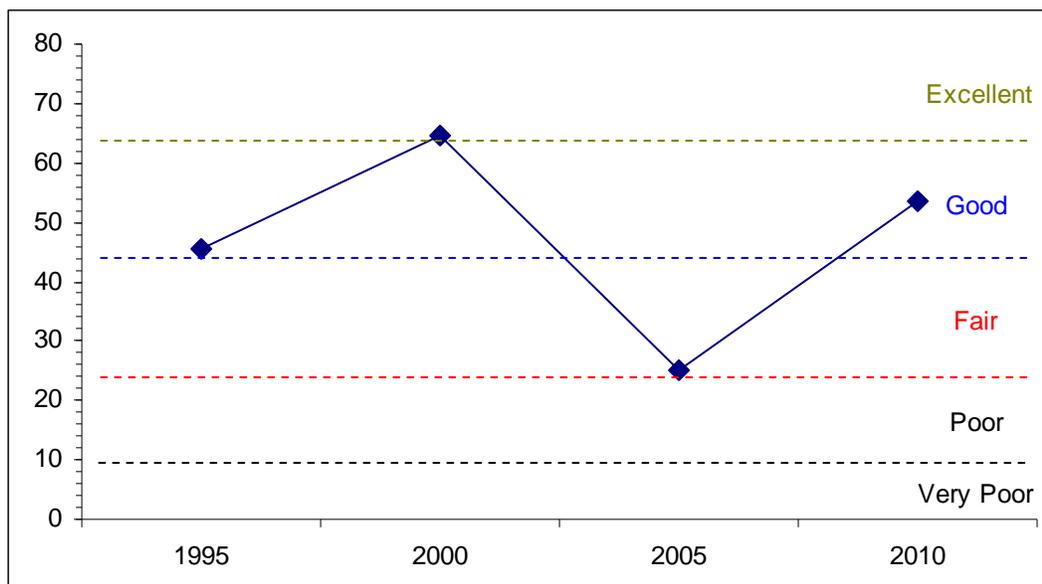
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
95	23.9	13.0	12.7	5.6	-11.9	2.2	0.0	<b>45.4</b>	Fair-Good
00	27.4	9.2	9.8	15.9	-3.1	5.4	0.0	<b>64.5</b>	Good-Excellent
05	17.9	5.8	2.8	6.9	-10.3	2.1	0.0	<b>25.2</b>	Poor-Fair
10	19.3	10.7	15.0	8.0	-3.7	4.2	0.0	<b>53.4</b>	Good

**Trend Summary**

CUMULATIVE RANGE TREND ASSESSMENT--  
Management unit 10, Study no: 2



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--  
 Management unit 10, Study no: 2



HERBACEOUS TRENDS--  
 Management unit 10, Study no: 2

Type	Species	Nested Frequency						Average Cover %				
		'88	'95	'97	'00	'05	'10	'95	'97	'00	'05	'10
G	<i>Agropyron dasystachyum</i>	a-	a-	a-	ab4	b15	b26	-	-	.38	.22	.93
G	<i>Bromus tectorum</i> (a)	-	d288	d263	b171	c191	b148	15.91	5.44	4.17	13.75	4.95
G	<i>Festuca ovina</i>	4	-	-	1	-	-	-	-	.00	-	-
G	<i>Oryzopsis hymenoides</i>	1	7	15	10	10	15	.24	.22	.62	.06	.43
G	<i>Poa secunda</i>	a30	b103	b120	b118	c128	b98	2.04	1.35	4.42	1.79	2.00
G	<i>Sitanion hystrix</i>	a17	b52	ab42	d114	c72	ab34	.50	.70	2.50	1.39	.63
Total for Annual Grasses		0	288	263	171	191	148	15.91	5.44	4.17	13.75	4.95
Total for Perennial Grasses		52	162	177	247	225	173	2.79	2.29	7.93	3.47	4.00
Total for Grasses		52	450	440	418	416	321	18.71	7.73	12.11	17.22	8.96
F	<i>Allium</i> sp.	-	2	-	2	-	-	.00	-	.00	-	-
F	<i>Calochortus nuttallii</i>	-	2	-	-	-	-	.00	-	-	-	-
F	<i>Chaenactis douglasii</i>	-	-	-	-	1	-	-	-	-	.00	-
F	<i>Chenopodium leptophyllum</i> (a)	-	-	-	-	1	5	-	-	-	.00	.01
F	<i>Cymopterus</i> sp.	-	-	-	-	2	-	-	-	-	.00	-
F	<i>Delphinium nuttallianum</i>	-	2	2	-	-	-	.00	.00	-	-	-
F	<i>Descurainia pinnata</i> (a)	-	b32	ab13	a-	b30	a6	.29	.08	.00	.29	.01
F	<i>Draba</i> sp. (a)	-	b11	a-	a-	ab7	ab1	.02	-	-	.02	.00
F	<i>Erigeron flagellaris</i>	-	1	-	-	-	-	.01	-	-	-	-
F	<i>Erigeron pumilus</i>	bc32	c40	c42	bc33	a-	b11	.25	.40	.29	-	.36
F	<i>Lappula occidentalis</i> (a)	-	c55	bc38	b21	d108	d124	.27	.29	.20	1.46	.54
F	<i>Medicago sativa</i>	-	-	-	-	-	9	-	-	-	-	.01
F	<i>Penstemon</i> sp.	-	-	2	-	-	-	-	.03	-	-	-
F	<i>Schoenrambe linifolia</i>	a-	b25	a2	a-	a-	ab12	.05	.00	-	-	.03
F	<i>Sisymbrium altissimum</i> (a)	-	6	-	-	-	-	.07	-	-	-	-

Type	Species	Nested Frequency						Average Cover %				
		'88	'95	'97	'00	'05	'10	'95	'97	'00	'05	'10
F	<i>Sphaeralcea coccinea</i>	98	100	105	119	96	90	.75	.95	2.24	1.03	1.67
F	<i>Tragopogon dubius</i>	a <sup>-</sup>	a <sup>2</sup>	a <sup>-</sup>	b <sup>21</sup>	a <sup>-</sup>	a <sup>-</sup>	.01	-	.18	-	-
Total for Annual Forbs		0	104	51	21	146	136	0.66	0.38	0.20	1.78	0.57
Total for Perennial Forbs		130	174	153	175	99	122	1.09	1.39	2.71	1.04	2.09
Total for Forbs		130	278	204	196	245	258	1.75	1.77	2.92	2.82	2.66

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

#### BROWSE TRENDS--

Management unit 10, Study no: 2

Type	Species	Strip Frequency					Average Cover %				
		'95	'97	'00	'05	'10	'95	'97	'00	'05	'10
B	<i>Artemisia frigida</i>	69	53	70	46	69	3.04	2.94	6.44	.48	4.30
B	<i>Artemisia tridentata tridentata</i>	56	57	58	54	58	10.39	9.15	12.00	10.66	9.66
B	<i>Atriplex canescens</i>	27	10	24	25	20	1.99	.73	2.55	1.04	.26
B	<i>Atriplex confertifolia</i>	0	0	0	0	1	-	-	-	-	-
B	<i>Ceratoides lanata</i>	71	62	61	66	49	4.31	2.08	2.20	2.25	2.05
B	<i>Gutierrezia sarothrae</i>	39	31	40	20	49	1.41	.38	.95	.25	3.02
B	<i>Opuntia sp.</i>	3	0	4	2	1	.18	-	.03	.03	-
Total for Browse		265	213	257	213	247	21.34	15.30	24.19	14.73	19.30

#### CANOPY COVER, LINE INTERCEPT--

Management unit 10, Study no: 2

Species	Percent Cover	
	'05	'10
<i>Artemisia frigida</i>	.28	3.13
<i>Artemisia tridentata tridentata</i>	10.51	9.73
<i>Atriplex canescens</i>	.95	.90
<i>Ceratoides lanata</i>	2.40	2.06
<i>Gutierrezia sarothrae</i>	-	1.76
<i>Opuntia sp.</i>	.06	-

#### KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 10, Study no: 2

Species	Average leader growth (in)	
	'05	'10
<i>Artemisia tridentata tridentata</i>	3.3	1.2
<i>Ceratoides lanata</i>	4.1	1.8

**BASIC COVER--**

Management unit 10, Study no: 2

Cover Type	Average Cover %						
	'82	'88	'95	'97	'00	'05	'10
Vegetation	2.25	2.50	41.63	23.80	39.90	34.58	32.74
Rock	0	0	1.49	.56	.21	.24	.09
Pavement	0	0	3.29	18.23	3.52	3.09	3.33
Litter	48.50	60.75	40.01	25.04	38.48	20.53	38.40
Cryptogams	0	.50	3.93	4.90	3.13	4.77	1.26
Bare Ground	49.25	36.25	26.30	25.04	35.13	50.37	39.55

**SOIL ANALYSIS DATA --**

Management unit 10, Study no: 2, Study Name: McCook Ridge Exclosure

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.4	7.6	35.0	38.8	26.2	1.9	5.5	185.6	0.5

**PELLET GROUP DATA--**

Management unit 10, Study no: 2

Type	Quadrat Frequency					Days use per acre (ha)			
	'95	'97	'00	'05	'10	'97	'00	'05	'10
Rabbit	11	3	15	68	19	-	-	-	-
Elk	18	26	24	26	6	51 (126)	28 (68)	8 (20)	19 (46)
Deer	17	21	18	37	34	38 (94)	27 (67)	86 (212)	19 (48)
Cattle	-	1	-	4	1	12 (29)	-	7 (18)	-

**BROWSE CHARACTERISTICS--**

Management unit 10, Study no: 2

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<b>Artemisia frigida</b>										
82	<b>299</b>	0	100	0	33	0	0	0	7/3	
88	<b>1199</b>	19	81	0	233	0	0	0	7/5	
95	<b>9680</b>	31	69	0	2520	.82	.82	0	12/10	
97	<b>7900</b>	14	86	0	80	0	0	0	10/8	
00	<b>9800</b>	10	87	2	8040	17	7	.40	4/7	
05	<b>2680</b>	31	68	1	560	4	0	.74	5/6	
10	<b>7960</b>	25	74	2	8360	0	0	2	5/8	
<b>Artemisia tridentata tridentata</b>										
82	<b>3965</b>	15	79	6	166	5	0	6	24/33	
88	<b>5865</b>	44	26	30	1766	47	14	2	24/30	
95	<b>3860</b>	31	58	11	1720	53	3	3	22/30	
97	<b>3040</b>	14	66	20	160	55	9	4	21/28	
00	<b>3980</b>	32	43	26	20	26	13	9	19/29	
05	<b>3500</b>	5	59	35	-	41	37	24	24/31	
10	<b>3940</b>	32	46	22	480	10	26	23	23/32	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Atriplex canescens</i>									
82	<b>399</b>	0	100	0	-	0	0	0	27/21
88	<b>698</b>	29	71	0	-	0	0	0	26/29
95	<b>980</b>	12	78	10	20	27	12	0	26/33
97	<b>240</b>	8	50	42	-	8	8	17	29/28
00	<b>700</b>	0	60	40	-	29	3	0	31/35
05	<b>640</b>	6	28	66	20	28	56	25	23/36
10	<b>480</b>	33	21	46	-	8	17	50	17/20
<i>Atriplex confertifolia</i>									
82	<b>0</b>	0	0	-	-	0	0	0	-/-
88	<b>0</b>	0	0	-	-	0	0	0	-/-
95	<b>0</b>	0	0	-	-	0	0	0	-/-
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>40</b>	100	0	-	-	0	0	0	-/-
<i>Ceratoides lanata</i>									
82	<b>3466</b>	21	79	0	-	0	0	0	5/5
88	<b>3698</b>	29	48	23	-	2	0	3	7/4
95	<b>10220</b>	14	86	0	-	7	.58	0	10/10
97	<b>7620</b>	10	90	0	-	42	0	0	8/9
00	<b>7020</b>	3	87	10	20	43	21	.56	8/9
05	<b>8020</b>	3	95	1	20	16	80	.24	6/7
10	<b>4400</b>	35	65	1	-	13	2	.90	8/9
<i>Gutierrezia sarothrae</i>									
82	<b>2999</b>	44	56	0	699	0	0	0	10/7
88	<b>6765</b>	24	74	1	5066	.49	.49	0	5/5
95	<b>3200</b>	36	63	2	200	0	0	0	9/9
97	<b>1740</b>	5	94	1	-	0	0	1	7/7
00	<b>3020</b>	20	75	5	100	0	0	1	5/7
05	<b>740</b>	11	89	0	-	3	0	0	6/7
10	<b>5060</b>	52	47	1	-	0	0	1	6/8
<i>Opuntia sp.</i>									
82	<b>233</b>	0	100	0	-	0	0	0	3/4
88	<b>265</b>	63	37	0	-	0	0	0	4/9
95	<b>80</b>	0	100	0	-	0	0	0	4/12
97	<b>0</b>	0	0	0	-	0	0	0	-/-
00	<b>100</b>	20	60	20	-	20	0	0	4/11
05	<b>60</b>	0	33	67	-	0	0	0	3/10
10	<b>20</b>	0	100	0	-	0	0	0	-/-

		Age class distribution			Utilization				
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Pinus edulis									
82	<b>0</b>	0	0	-	-	0	0	0	-/-
88	<b>33</b>	100	0	-	33	0	0	0	-/-
95	<b>0</b>	0	0	-	-	0	0	0	-/-
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>0</b>	0	0	-	-	0	0	0	-/-

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 <i>days use/acre (ha)</i>	Elk <i>days use/acre (ha)</i>	Cattle <i>days use/acre (ha)</i>
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 <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	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 <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	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.