

PR SPRING LIVESTOCK ENCLOSURE - TREND STUDY NO. 10R-33-10

Vegetation Type: Mountain Brush

Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer (Calving habitat)

NRCS Ecological Site Description: [Mountain Stony Loam \(Browse\), R048AY451UT](#)

Land Ownership: SITLA

Elevation: 8221 ft. (2506 m)

Aspect: South/Southeast

Slope: 3%

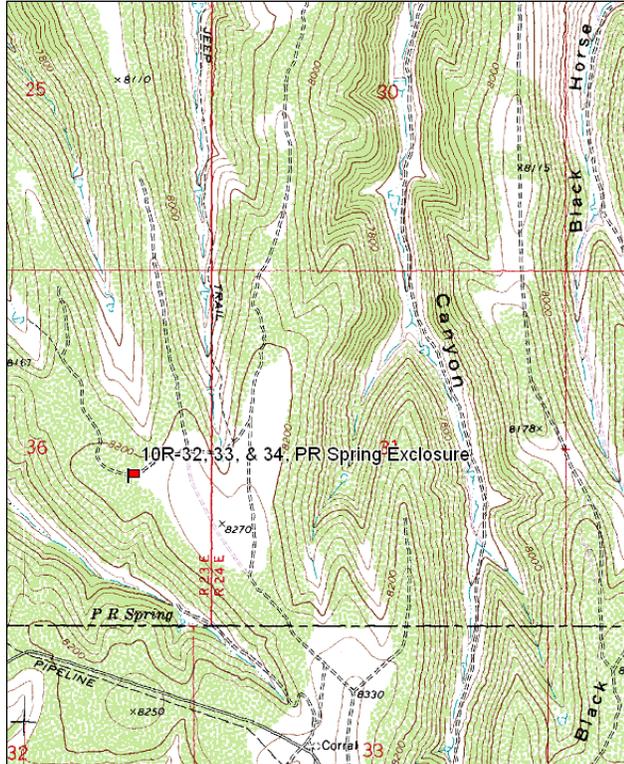
Transect bearing: 80° magnetic

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

Directions:

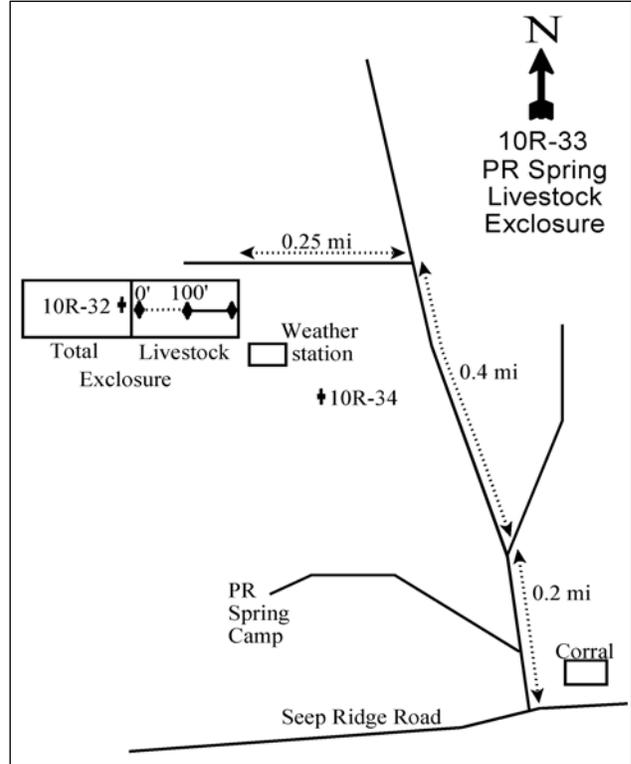
On the Seep Ridge Road go to the PR Spring turnoff. Travel 0.2 miles staying right (do not go down road to PR Spring and campground). Continue left 0.4 miles. Turn left once again and travel approximately 0.25 miles to a weather station then the enclosure. The 0-foot stake in the livestock enclosure is located near the fence separating the total and livestock enclosures. The 0-foot stake is marked by browse tag #423.

Map Name: PR Spring



Township: 15S Range: 23E Section: 36

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 647372 E 4370118 N

Site Information

Site Description: The study samples the livestock enclosure at PR Spring which is accessible to wildlife, but excludes livestock. Grazing in the area is managed by the Bureau of Land Management as part of the Sweetwater allotment. The sampling baseline lies just east of the total enclosure baseline. The sampling baseline within the livestock enclosure is also only 200 feet in length. The browse component within the livestock enclosure is not as thick compared to the total enclosure. Use inside the livestock enclosure prior to enclosure construction was light to moderate by wildlife and light by livestock. Pellet group transect data estimated light use by elk since 2002. Estimated deer use has ranged from moderately light to moderately heavy since 2002. There was cattle sign in 2002 and 2005 that could have occurred from trespass cattle in the enclosure, but it is more likely that pats were from prior to construction of the enclosure (Table - Pellet Group Data).

Browse: Although diverse and abundant, the browse component in the livestock enclosure is not as dense as that in the nearby total enclosure. Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and true mountain mahogany (*Cercocarpus montanus*) are the key browse species. Combined they provide the majority of browse cover (Table - Browse Trends). The serviceberry population is a mixture of mature and young plants with low decadence and heavy utilization. True mountain mahogany has a mostly mature population, but recruitment of young plants is good, decadence has been mostly low and utilization very heavy. The mountain big sagebrush population is mostly mature with moderate decadence, marginal recruitment of young plants and light to moderate utilization. As with the total enclosure, snowberry (*Symphoricarpos oreophilus*) has the highest density of all the browse species within the livestock enclosure. Bitterbrush (*Purshia tridentata*), while highly preferred and displaying heavy use, occurs in low density. Other browse sampled within the livestock enclosure includes dwarf rabbitbrush (*Chrysothamnus depressus*), stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), broom snakeweed (*Gutierrezia sarothrae*), Gambel oak (*Quercus gambelii*) and grey horsebrush (*Tetradymia canescens*) (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses are diverse and abundant on the site. Common perennial species include: sedge (*Carex* sp.), Kentucky bluegrass (*Poa pratensis*), mutton bluegrass (*P. fendleriana*) and thickspike wheatgrass (*Agropyron dasystachyum*). Perennial forbs are also diverse and fairly abundant due to the abundance of two species, weedy milkvetch (*Astragalus miser*) and mat penstemon (*Penstemon caespitosus*). Desirable forb species include: pale agoseris (*Agoseris glauca*), Utah milkvetch (*Astragalus utahensis*), yellow Indian paintbrush (*Castilleja flava*), tapertip hawksbeard (*Crepis acuminata*), redroot eriogonum (*Eriogonum racemosum*), sulfur eriogonum (*Eriogonum umbellatum*), Lewis flax (*Linum lewisii*), lobeleaf groundsel (*Senecio multilobatus*) and scarlet globemallow (*Sphaeralcea coccinea*) (Table - Herbaceous Trends).

Soil: Soils are clay loam in texture and neutral in reactivity (pH 6.7) (Table - Soil Analysis Data). Bare ground cover is low with abundant vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2002, 2005 and 2010.

Trend Assessments

Browse:

- **2002 to 2005 - stable (0):** The density of serviceberry and true mountain mahogany increased slightly, but there was little change in either species cover. The density of sagebrush decreased slightly with a slight decrease in cover. Decadence of true mountain mahogany increased from 3% to 21% and poor vigor increased from 0% to 19%. Decadence of bitterbrush increased from 13% to 40%.

- **2005 to 2010 - stable (0):** There was a slight decrease in the density and cover of serviceberry, but the other preferred species remained similar. Decadence decreased in the true mountain mahogany and bitterbrush populations.

Grass:

- **2002 to 2005 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 18% and cover increased from 14% to 17%.
- **2005 to 2010 - stable (0):** There was little change in the sum of nested frequency or cover of perennial grasses.

Forb:

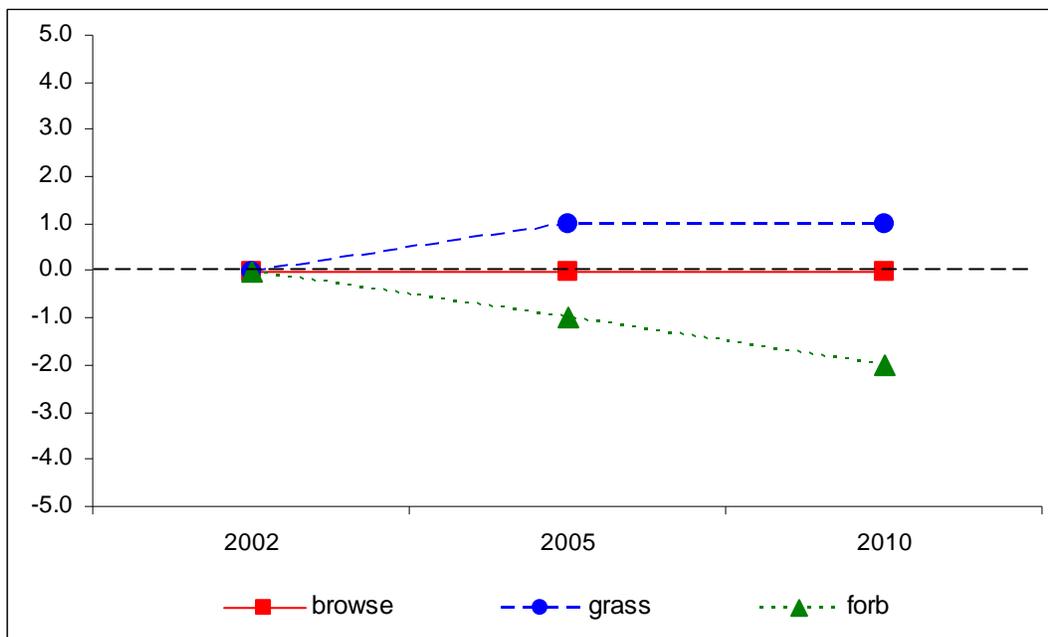
- **2002 to 2005 - slightly down (-1):** The perennial forb sum of nested frequency decreased by 12%, though cover increased from 9% to 12%.
- **2005 to 2010 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 11% and cover decreased to 8%.

DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --
Management unit 10R, study no: 33

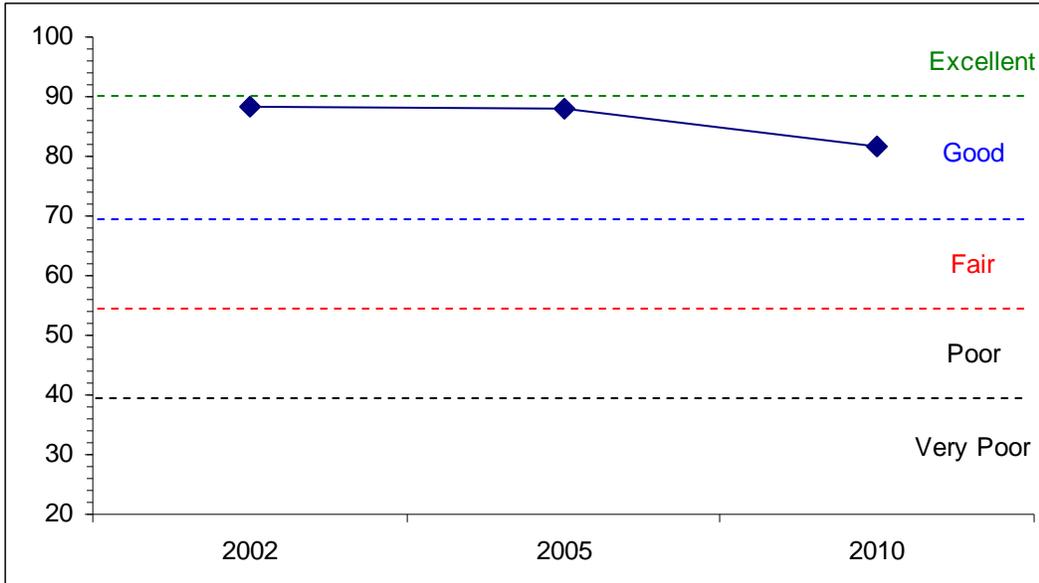
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
02	30.0	7.7	12.6	28.2	0.0	10.0	0.0	88.4	Good-Excellent
05	30.0	7.8	10.1	30.0	0.0	10.0	0.0	87.9	Good
10	24.0	10.7	6.9	30.0	0.0	10.0	0.0	81.6	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 10R, Study no: 33



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL--
 Management unit 10R, Study no: 33



HERBACEOUS TRENDS--
 Management unit 10R, Study no: 33

Type	Species	Nested Frequency			Average Cover %		
		'02	'05	'10	'02	'05	'10
G	Agropyron dasystachyum	102	124	145	1.14	2.24	1.24
G	Agropyron spicatum	a1	b41	a20	.00	.69	.49
G	Carex sp.	b187	a139	a100	8.90	6.26	4.77
G	Koeleria cristata	a-	b8	b23	-	.12	.78
G	Poa fendleriana	24	31	41	.57	.62	1.05
G	Poa pratensis	136	185	150	3.43	7.22	7.94
G	Poa secunda	a-	ab9	b19	-	.18	.77
G	Sitanion hystrix	5	1	-	.03	.03	-
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		455	538	498	14.08	17.38	17.06
Total for Grasses		455	538	498	14.08	17.38	17.06
F	Agoseris glauca	7	-	-	.02	-	.00
F	Androsace septentrionalis (a)	a-	b19	a-	-	.07	-
F	Antennaria rosea	12	28	16	.11	.37	.06
F	Arenaria sp.	a-	a-	b15	-	-	.05
F	Astragalus miser	146	135	147	5.00	5.12	4.34
F	Astragalus utahensis	5	6	4	.04	.09	.01
F	Castilleja flava	b25	ab12	a3	.35	.14	.18
F	Cirsium sp.	8	4	2	.02	.07	.00
F	Collinsia parviflora (a)	a-	b9	ab1	-	.02	.00
F	Crepis acuminata	5	12	2	.01	.07	.00
F	Erigeron eatonii	130	104	100	.83	1.08	.60
F	Eriogonum racemosum	b22	b15	a-	.20	.11	-
F	Eriogonum umbellatum	14	12	12	.14	.10	.08

T y p e	Species	Nested Frequency			Average Cover %		
		'02	'05	'10	'02	'05	'10
F	<i>Gilia</i> sp. (a)	-	-	4	-	-	.03
F	<i>Lepidium</i> sp. (a)	5	8	6	.02	.04	.01
F	<i>Linum lewisii</i>	9	16	11	.02	.14	.07
F	<i>Lupinus argenteus</i>	2	2	4	.15	.00	.01
F	<i>Machaeranthera canescens</i>	13	6	9	.11	.05	.07
F	<i>Penstemon caespitosus</i>	_b 217	_a 166	_a 136	1.85	3.08	1.68
F	<i>Phlox longifolia</i>	90	87	84	.32	.55	.44
F	<i>Polygonum douglasii</i> (a)	_a 5	_b 60	_a 5	.01	.17	.01
F	<i>Potentilla gracilis</i>	1	-	1	.00	.00	.03
F	<i>Senecio integerrimus</i>	_a -	_{ab} 1	_b 10	-	.18	.15
F	<i>Senecio multilobatus</i>	3	-	-	.00	.00	-
F	<i>Sphaeralcea coccinea</i>	11	7	1	.06	.18	.00
F	<i>Streptanthus cordatus</i>	-	-	2	-	-	.00
F	<i>Taraxacum officinale</i>	_a 4	_b 25	_a 10	.02	.31	.08
F	<i>Tragopogon dubius</i>	-	2	-	-	.00	-
Total for Annual Forbs		10	96	16	0.02	0.31	0.06
Total for Perennial Forbs		724	640	569	9.31	11.69	7.91
Total for Forbs		734	736	585	9.34	12.00	7.97

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

BROWSE TRENDS--

Management unit 10R, Study no: 33

T y p e	Species	Strip Frequency			Average Cover %		
		'02	'05	'10	'02	'05	'10
B	<i>Amelanchier utahensis</i>	53	51	47	5.44	4.23	2.59
B	<i>Artemisia tridentata vaseyana</i>	79	72	74	15.19	13.78	13.07
B	<i>Cercocarpus montanus</i>	31	36	36	3.41	3.48	2.26
B	<i>Chrysothamnus depressus</i>	4	3	1	.04	.03	-
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	48	39	44	1.00	1.26	1.26
B	<i>Gutierrezia sarothrae</i>	4	7	3	.03	.33	.09
B	<i>Mahonia repens</i>	1	2	0	-	.03	-
B	<i>Purshia tridentata</i>	14	11	12	.48	.86	.24
B	<i>Quercus gambelii</i>	4	3	3	.01	.03	-
B	<i>Symphoricarpos oreophilus</i>	80	82	82	9.72	11.39	9.35
B	<i>Tetradymia canescens</i>	17	14	7	.62	.36	.06
Total for Browse		335	320	309	35.95	35.81	28.97

CANOPY COVER, LINE INTERCEPT--

Management unit 10R, Study no: 33

Species	Percent Cover		
	'02	'05	'10
<i>Amelanchier utahensis</i>	9.10	8.08	6.36
<i>Artemisia tridentata vaseyana</i>	17.66	17.48	20.83
<i>Cercocarpus montanus</i>	5.05	5.56	4.61
<i>Chrysothamnus depressus</i>	-	.06	.06
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	1.14	1.88	1.35
<i>Gutierrezia sarothrae</i>	.03	.10	-
<i>Mahonia repens</i>	-	.18	-
<i>Purshia tridentata</i>	1.28	.53	.36
<i>Quercus gambelii</i>	.15	.15	.11
<i>Symphoricarpos oreophilus</i>	10.63	13.96	12.50
<i>Tetradymia canescens</i>	.16	.01	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 10R, Study no: 33

Species	Average leader growth (in)		
	'02	'05	'10
<i>Amelanchier utahensis</i>	2.0	2.6	2.6
<i>Artemisia tridentata vaseyana</i>	2.2	2.1	1.6
<i>Cercocarpus montanus</i>	1.9	1.8	2.9

BASIC COVER--

Management unit 10R, Study no: 33

Cover Type	Average Cover %		
	'02	'05	'10
Vegetation	52.09	55.32	56.34
Rock	1.24	1.43	.43
Pavement	6.34	6.40	4.09
Litter	46.46	38.85	53.52
Cryptogams	.03	.18	.45
Bare Ground	20.18	20.83	14.03

SOIL ANALYSIS DATA --

Management unit 10R, Study no: 33, Study Name: PR Spring Livestock Enclosure

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.7	6.8	35.3	32.7	32.0	3.6	14.9	291.2	0.8

PELLET GROUP DATA--

Management unit 10R, Study no: 33

Type	Quadrat Frequency			Days use per acre (ha)		
	'02	'05	'10	'02	'05	'10
Rabbit	11	37	5	-	-	-
Elk	7	14	3	19 (46)	21 (53)	11 (26)
Deer	14	22	14	48 (117)	63 (155)	25 (61)
Cattle	3	1	-	14 (34)	14 (34)	-

BROWSE CHARACTERISTICS--
Management unit 10R, Study no: 33

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>Amelanchier utahensis</i>									
02	1760	52	42	6	100	22	25	2	45/43
05	1920	60	32	7	400	15	23	6	45/39
10	1700	46	49	5	160	24	27	6	39/34
<i>Artemisia tridentata vaseyana</i>									
02	3240	14	50	36	120	6	10	11	29/37
05	2940	10	61	29	100	18	1	16	29/37
10	2980	6	76	18	220	50	7	8	28/40
<i>Cercocarpus montanus</i>									
02	1240	34	63	3	80	15	50	0	50/36
05	1540	17	62	21	60	19	70	19	46/31
10	1500	23	73	4	-	41	35	3	39/31
<i>Chrysothamnus depressus</i>									
02	120	0	100	-	-	33	0	0	3/8
05	80	0	100	-	-	75	0	0	3/6
10	40	0	100	-	-	0	0	0	4/9
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
02	2160	12	81	6	-	.92	0	2	11/11
05	1900	23	77	0	-	3	0	0	11/13
10	1600	6	91	3	-	1	0	1	11/12
<i>Gutierrezia sarothrae</i>									
02	240	17	67	17	-	0	0	0	4/6
05	340	41	59	0	-	0	6	0	5/8
10	80	0	100	0	-	0	0	0	-/-
<i>Mahonia repens</i>									
02	120	0	100	-	-	0	0	0	-/-
05	60	33	67	-	-	0	33	0	3/7
10	0	0	0	-	-	0	0	0	-/-
<i>Purshia tridentata</i>									
02	320	13	75	13	-	6	81	0	12/25
05	300	0	60	40	-	0	73	7	15/22
10	280	0	93	7	20	14	71	29	12/22
<i>Quercus gambelii</i>									
02	100	80	20	-	-	0	0	0	17/7
05	100	100	0	-	-	0	0	0	5/4
10	60	100	0	-	-	0	0	0	21/15
<i>Symphoricarpos oreophilus</i>									
02	4640	25	73	2	-	3	0	1	15/25
05	6060	17	82	1	100	9	.33	0	14/19
10	6500	33	67	0	160	5	0	0	12/19

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Tetradymia canescens										
02	720	17	75	8	-	6	11	0	4/5	
05	740	22	78	0	-	43	35	0	5/6	
10	240	17	75	8	20	17	50	0	5/7	

PR SPRING EXCLOSURE COMPARISON
TREND STUDY NO. 10R-32, 10R-33 & 10R-34

Site Information

Site Description: The studies were established in 2002 to gather baseline data for a three-way enclosure that was built in 2001 by the Bureau of Land Management (BLM) near PR Spring on the North Book Cliffs. Grazing in the area is managed by the BLM as part of the Sweetwater allotment. The enclosure complex was not built in a totally homogeneous area. The total and livestock enclosures were placed in an area where several browse species are moderately abundant. This includes large, tree-like serviceberry (*Amelanchier utahensis*) plants that provide an abundance of overhead canopy cover. The transect that monitors the community outside of the enclosures is much more open where mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is the dominant species. Due to the dimensions of the enclosure, the transects established inside the total (10R-32) and livestock (10R-33) enclosures are only 200 feet in length, while the transect outside (10R-34) is 500 feet long. Some of the difference in vegetation characteristics between these studies may arise from differing transect lengths, as well as the heterogeneity of the vegetation community. Pellet group data was collected inside the total enclosure for 2002 to capture the construction year utilization. Pellet group data has indicated moderate to heavy use by deer and light to moderate use by elk throughout the study years. There has been variability in wildlife use between the livestock enclosure and outside the enclosure, with higher use by deer and elk in 2002 and 2010 outside the enclosure, but higher use inside the livestock enclosure in 2005. Cattle use appears to be light in the area (Table 1).

Browse: The browse component dominates the vegetation community on all three of the study transects. Browse cover is highest inside the total enclosure with serviceberry, mountain big sagebrush, snowberry (*Symphoricarpos oreophilus*) and true mountain mahogany (*Cercocarpus montanus*) providing nearly all of the browse cover. These four species also dominate the livestock enclosure, but mountain big sagebrush is the predominant species. Outside of the enclosure, mountain big sagebrush dominates the sample area with a large component of snowberry and bitterbrush (*Purshia tridentata*). Serviceberry and mahogany are less common outside the enclosure. Utilization of sagebrush has been mostly light to moderate outside the enclosure and in the livestock enclosure. Use of sagebrush was moderate in the livestock enclosure in 2010. The total and livestock enclosures have displayed decreasing recruitment of young mountain big sagebrush plants over the course of the study, while recruitment has remained similar outside the enclosure. All three studies have shown a decrease in decadence of mountain big sagebrush from 2005 to 2010 (Table 2).

Herbaceous Understory: Perennial grasses are abundant on the studies, but are not particularly diverse. Bluegrass species (*Poa spp.*), including Kentucky bluegrass (*P. pratensis*), dominate the grass component on all three studies, and have generally increased in cover since 2002. Perennial grasses tend to have higher cover and sum of nested frequency outside the enclosure primarily due higher values provided by the bluegrass species. Perennial forbs are diverse and fairly abundant on the three studies. Perennial forb sum of nested frequency and cover are higher outside the enclosure and in the livestock enclosure than in the total enclosure. There was a general increase in the cover of perennial forbs on all three studies in 2005, but cover decreased again in 2010. The sum of nested frequency of perennial forbs has steadily decreased in the total and livestock enclosures since 2002, but has remained similar outside of the enclosure (Table 3).

Soil: Due to the close proximity of the studies, soil attributes are similar on the studies. Soils have a clay loam texture with a neutral pH. Basic ground cover characteristics are similar between all of the transects. Vegetation and litter cover are abundant, especially the browse component. Bare ground cover is low on all three studies, but is lowest within the total enclosure.

Exclosure Complex Summary

Study Name	Year	Deer	Elk	Cattle
		days use/acre (ha)	days use/acre (ha)	days use/acre (ha)
Total Exclosure (10R-32)	2002	39 (96)	23 (56)	7 (18)
	2005	--	--	--
	2010	--	--	--
Livestock Exclosure (10R-33)	2002	48 (117)	19 (46)	14 (34)
	2005	63 (155)	21 (53)	14 (34)
	2010	25 (61)	11 (26)	--
Outside Exclosure (10R-34)	2002	73 (180)	31 (78)	14 (34)
	2005	23 (5)	7 (17)	10 (25)
	2010	42 (104)	23 (58)	13 (33)

Table 1. Pellet group transect data estimated use for the PR Spring exclosure complex.

Study Name	Year	Percent Canopy Cover	Density Plants/acre	Percent Young (Plants/acre)	Percent Mature (Plants/acre)	Percent Decadent (Plants/acre)	Ave. height/crown (in)
		Total Exclosure (10R-32)	2002	20.08	3560	21	64
	2005	15.36	3180	13	60	27	23/31
	2010	18.64	3000	9	83	9	27/36
Livestock Exclosure (10R-33)	2002	17.66	3240	14	50	36	29/37
	2005	17.48	2940	10	61	29	29/37
	2010	20.83	2980	6	76	18	28/40
Outside Exclosure (10R-34)	2002	26.10	4180	7	61	32	31/38
	2005	24.14	3940	7	56	38	30/38
	2010	30.36	3900	6	78	16	32/43

Table 2. Browse characteristics of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) for the PR Spring exclosure study sites.

Study Name	Year	Perennial Grass Species			Perennial Forb Species		
		<i>n</i>	Sum of Nested Frequency	Percent Cover	<i>n</i>	Sum of Nested Frequency	Percent Cover
Total Exclosure (10R-32)	2002	6	442	12.55	19	452	6.51
	2005	5	466	13.14	19	388	8.17
	2010	6	417	18.21	17	267	6.83
Livestock Exclosure (10R-33)	2002	6	455	14.08	19	724	9.31
	2005	8	538	17.38	18	640	11.69
	2010	7	498	17.06	19	569	7.91
Outside Exclosure (10R-34)	2002	8	679	16.36	21	628	6.05
	2005	7	636	17.50	22	710	12.53
	2010	7	619	25.00	19	614	8.81

Table 3. Number of species sampled (*n*), sum of nested frequency and cover of perennial grasses and perennial forbs in the three studies at the PR Spring exclosure complex.